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External Debt and Agricultural Production in Nigeria

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Abstract: Over time, Nigeria has experienced upsurge in external debt stock and several studies have estimated negative impact of growing external debt on economic growth. On sectoral basis therefore, our study proceeds to evaluate such impact of external debt on growth of agricultural production in Nigeria using time series data from 1980 to 2017. For this purpose, we utilized co-integration being test instrument and ECM to investigate link among variables used. The empirical results reveal that external debt failed to yield increase in output returns in agricultural productivity by its inverse association with agricultural output. This indicates that acquired external loans for agriculture within period of study were not optimally utilized for same resolve. Hence, we advise that Nigerian government should demonstrate sound commitment to effective debt management in order to ensure foreign loans are suitably channeled and healthily utilized for purpose acquired for as this would equally guarantee that the output returns would be sufficient for debt service obligation and balance to promote growth in other sectors of Nigerian economy.

Keywords: External debt; agricultural sector; stability test; error correction mechanism.

Introduction

Nigeria debt crisis which has had profound influence on its economy in recent past can be traced to the early 1980s which was aftermath of occurrence of oil increase of 1970s. The problem arising from the crisis has been increasing debt burden which now constitutes major constraint on Nigeria's growth course. The loans were acquired to finance gap between resources available and what is required for growth and development, but contracted loans were not optimally deployed with result that returns on investment have not been adequate to meet maturing obligations and leave balance to support GDP growth (Adesola, 2009).

External debt, capital flight and low output have remained Nigeria's growth problem. In Nigeria, these have grown higher with aggregate stock of capital flight markedly exceeding

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external debt level (Ndikumano & Boyce, 2008). Key objective of nations is to clinch rising national income, rising output and total improvement in living standard (Itesede, 2005).

The Nigeria external debt and its impact on growth of the economy in the recent past can be traced to the early 1980s which was the aftermath of the occurrence of the oil price increase of the 1970s. Therefore, this study reviews some relevant literature on external debt in developed and developing countries (Kibritcioglu & Dibooglu, 2001).

Low pace in development is pigeonholed by inadequate internal capital formation resulting from vicious circle of low productivity, low savings and low income (Adepoju et al. 2007). The growth model demonstrated by Solow (1956) explained long run growth path of developed capitalist economies in terms of accumulation of capital and technological progress. The sole concern of this model is growth in income. Objective of external loan is to enhance capital formation. Hence, this calls for technical change, managerial and financial support from western countries. External debt accumulates since servicing requirement is not friendly enough. In this regard, external debt becomes a self-perpetuating mechanism of exploitation and so constraint to growth in developing economies (Nakatami & Herera, 2007).

Lack of sufficient domestic resources which result to scenario where resources from external transactions are not enough to promote domestic economic growth and development, and concurrently meet foreign debt obligations, thus the problem of debt servicing will ensue and invariably lead to debt overhang. This is major barrier to economic development in Nigeria.

On sectoral basis therefore, we resolve is to evaluate econometrically impact of external debt on growth of agricultural production in Nigeria. The study also aims to evaluate the impact of government expenditure on agriculture, in addition to other predictors. Our organization of study is such that theoretical and empirical literatures are reviewed next. Thereafter, we have methods and materials, followed by results and afterwards, conclusion of study.

Literature Review

Theoretical Issues

Several theories have explained relocation of capital from nations with excess to nations with scarcity. In this study, we intend to employ neo-classical theory (NCT) of economic growth and two-gap (TG) theory. In line with NCT of growth there is tendency for rate of profit to fall in capital surplus countries owing to increasing competition. As such, transnational capital movement becomes aspect of global trade where comparative advantage determines direction of export.

This further incorporated capital and labour whereby surplus/deficit is based on BOPs. A surplus balance would encourage export of capital to meet deficits balances of countries that wallowing in shortfall in exportation of goods and services in order to meet their domestic requirements. Thus, foreign borrowing could be used to substitute for capital and labour as factor costs in production of output in agricultural sector. It is believed therefore, that foreign loan would be adequately financed by output from the agricultural sector. There exists linkage between external borrowing and domestic economic management. Going forward, we employ TG theory below to account for such theoretical justification for borrowing.

Two-Gap Theory

The requirement for government to borrow in order to bridge investment-saving gap (I-S), foreign trade gap (M-E) and ensuring self-sustained economic growth instead of employing simply own funds is accounted for by twofold gap theory. Economic agents borrow either on behalf of government or otherwise to bridge I-S gap, savings-foreign exchange gap and savings-technology gap which exist if domestic saving is less than level required for achieving target rate of output growth.

The consequences of these gaps on Nigerian economy necessitated need to bridge the gap was quite evident in the past and now. For this reason, various foreign donors directed governments to prepare development plans needed to achieve output stabilization and diversified economic growth in long-run particularly in agricultural sector.

Since rise in investment and saving in any economy could lead to increase in agricultural output via economic growth (Hunt, 2007) and growth may not have occurred unless there exist a rise in capital stock to a given level (Sachs, 2002), growth is determined by the saving decision because all savings are invested and become part of capital stock. As capital rises, investment and output rise therefore, saving level continue to increase. Thus, enlargement of capital and saving is sufficient to bring about long-run self-sustained economic growth which is referred to as golden age growth path where output grows at same balanced rate with labor and capital stock.

Previous Empirical Findings

External borrowing plays an important role in augmenting local resources to meet goals of nations (Todaro, 2006) as well as well as providing nations with overseas exchange desired for BOP support and project financing (Nowzad, 2003). Nigeria's external debt stock has a significant effect on her economic growth (Ijeoma, 2013). In a study of effect of external debt on economic growth in Nigeria using time series data from1970-2007, causality does not exist between external debt and economic growth as causation between debt and growth was also found to be weak and insignificant in Nigeria (Ogunmuyiwa, 2011).

Examining external debt crisis, debt relief and economic growth in Nigeria using descriptive survey, it was argued that huge external debt owed by Nigeria was responsible for slow economic growth and so lack of fiscal discipline due to over dependence on oil revenue amongst others were factors responsible for the Nigerian debt crisis (Okolie, 2015).

Measuring size of debt crisis effect on agricultural output using OLS for 13 less developed countries over 1982-2010, inverse relationship between debt and agricultural output was obtained (Warner, 2012). In study of 13 countries over period of 1965-2011, it was affirmed that debt crisis of 1982 had significant effects in terms of intense slowdown of domestic investment mostly on agriculture (Rockerbie, 2013).

Conducting empirical examination on relationship between economic growth, exports and external debt of Lebanon for 1970-2013, it was reported that both short run and long run relationships exist among the variables (Wadad, 2015).

Others revealed insignificant effect of external debt on growth and so recommends that domestic loans should be sourced for so that returns on investment will not be tax away by external creditors (Abubakar and John, 2015). Also, observing link between Nigeria external debt and economic growth from 1975-2006, it was revealed that external debt has negative relationship with economic growth in Nigeria. Based on findings, the study

endorses synchronizing debt accumulation for assignments with scheduling of repayment whereas portfolio of debt must be diversified in terms of sources and types to circumvent injurious attentiveness and re-emergence (Ezeabasili et al. 2011).

Examining effect of external debt on service sector and agricultural growth of Ethiopia economy from 1981-2012, it was found that service sector growth and agricultural sector growth have contributed positively to the economic growth of Ethiopia (Ramakrishna, 2012). Some authors reported that external debt at aggregate level, adversely affects growth of agricultural economy and causality is unidirectional one such that growth of agricultural output is unfavorably affected by debt burden (Brownson, Vincent, Emmanuel and Etim, 2014).

Country's foreign borrowing requirements depend on its total expenditure in relation to her total domestic production. For foreign borrowing to impact positively on economic growth, it must add to domestic savings and investment. Thus, for countries to reduce her foreign loan requirements, it has to increase her domestic savings sufficiently enough to sustain her desired target rate of growth (Obadan, 2004).

Carefully exploring effect of external debt service payment practices on agricultural productivity in Nigeria, it was indicated a significant impact of debt services on agricultural productivity. The study thus recommends for more foreign loans for agricultural expansion (Adetula, 2009). On effect of external debt on growth in Iran (1974-2007) using co-integration test and ECM, authors showed that external debt and imports inverse impacted GDP though insignificantly (Safdari and Mehrizi, 2011).

On dynamic impact of external debt accumulation on private investment and growth in Africa with focus on 81 DCs for 965-1999, no significant correlation was found between debt/export ratio and investment variables. Crowding out effect had point estimate of 0.03% (Cohen, 1993). Using2SLS technique to examine relevance of debt overhang hypothesis in Nigeria, it was reported debt servicing adversely affected private investment while policy simulation results revealed that hypothesized debt reduction of (40%, 50%, and 75%) anticipated active in 1986 would increase investment and GDP (Egwaikhide, 1998).

Gaps in the Literature

Most of literature reviewed focused on external debt and economic growth while some studies namely Brownson, Vincent and Etin (2014) that focused on external debt on the growth of agricultural sector of the Nigeria economy adopted OLS technique. Our study proceeds to bridge the gap in literature by studying impact of external debt on agriculture on level of agricultural production in Nigeria using ECM. The outcome of this study constitutes vital contribution to literature on subject.

Methods

Model Specification

Our econometric equation of EC form becomes:

$$A(L)\Delta Q_t = \Phi + D(L)\Delta Z_t + \phi(Q_{t-1} - \eta_0 - \eta_1 Z_{t-1}) + e_t \quad (1)$$

$$Z = [XDB, ARQ, XRT, GEA, DSC]$$

Where Q = output, XDB = external debt, ARQ = agricultural production, XRT = nominal exchange rate, GEA = government expenditure on agriculture, DSC = external debt servicing.

Data Sources

The study relies on historical data, which are available in secondary form. The study employs annual time series data spanning period, 1980 to 2017. The variables used where obtained from IMF sources and supplemented with CBN Statistical Bulletins.

Findings

One of preliminary investigations of this study is analysis of the descriptive statistics (mean, median, standard deviation, skewness kurtosis and Jarque-Bera) of the variables, for the sample period of forty-six (46) years. The observed statistics reveals that the time series values of the variables, the standard deviation are found greater than their means (Table 1). The mean values of all variables are larger than medians, indicating positive skewness of all variables.

The Jarque-Bera (JB) test of normality statistics recorded high positive values of 29.32589, 25.99845, 6.667008, 13.41741, 43.75312, for ARQ, XDB, XRT, GEA and DSC respectively and very low probability values indicating that the variables did not have normal distributions. Thus, the null hypothesis (H_o) that the variables are normally distributed or the joint hypothesis that the skewness, S = 0 and kurtosis K = 3 is rejected. Note that JB is equal to zero (0) if the distribution is normal and that low probability values imply that the JB statistics is significantly different from zero, (Jarque-Bera, 1987).

Figure 1. **Descriptive Graph for Agricultural Sector Model**
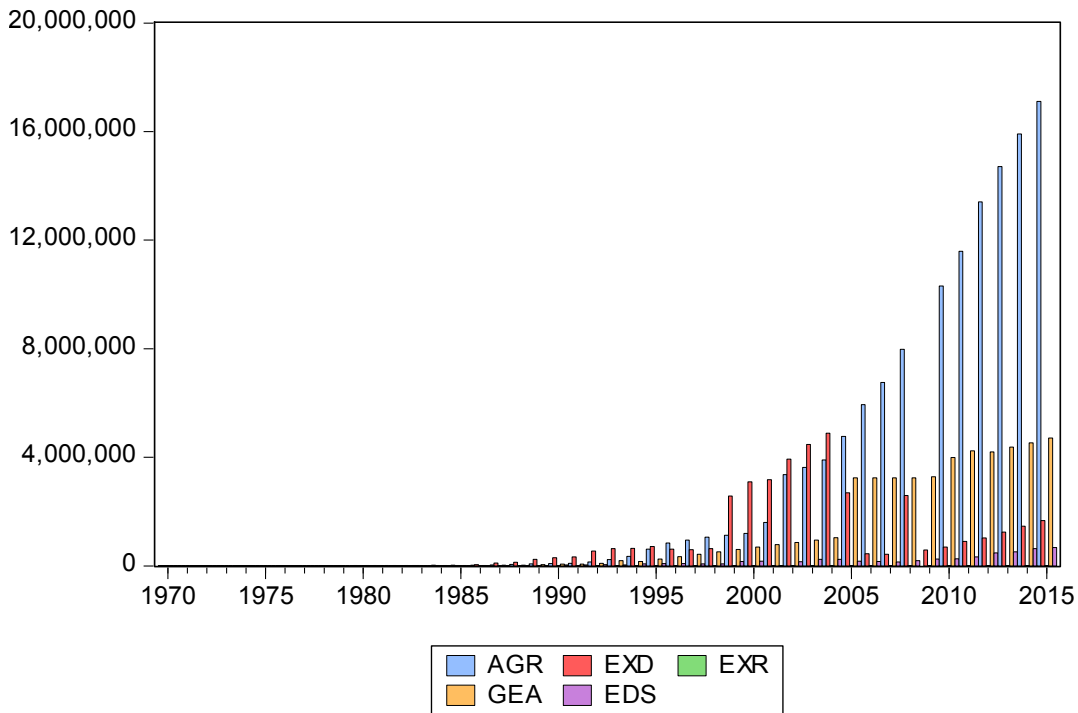
Table 1. **Descriptive Statistics for agricultural sector model**

Statistics	ARQ	XDB	XRT	GEA	DSC
Mean	2845256.3	908832.2	53.49086	1028076.	113295.8
Median	145225.3	428058.7	19.66090	92797.40	35024.10
Maximum	17109552	4890270.6	158.3600	1083.09	670291.3
Minimum	2576.400	175.0000	0.544500	903.90	73.60000
Std. Dev.	4848212.5	1303853.1	63.25763	1600799.	171040.0
Skewness	1.757075	1.653886	0.621992	1.337111	1.904708
Kurtosis	4.814172	4.710113	1.582876	3.066979	5.970413
Jarque-Bera	29.32589	25.99845	6.667008	13.41741	43.75312
Probability	0.000000	0.000002	0.035668	0.001220	0.000000
Sum	1.28E+08	40897448	2407.089	46263398	505312.6
S. Sq. Dev.	1.03E+15	7.48E+13	176067.2	1.13E+14	1.29E+12

Source: Researchers' compilation

Unit Root Test

Recent development in econometrics has shown that there are problems associated with time series macroeconomics data analysis due to non-stationarity (Alemayehu, Njuguna &Daniel 2012). To avoid pitfall of wrong inference from non-stationary regression, unit root test based on ADF test statistic was conducted to determine the existence of unit root. In this study, 5% critical value is used. Therefore, the results of the test obtained are presented in table 2 and 3 below.

Table 2. **Level Unit root test results**

Variables	ADF	ADF at 5% Critical Value	Order of integration
ARQ	1.0197	-2.9297	-
XDB	-1.9583	-2.9297	-
XRT	-0.2455	-2.9297	-
GEA	-1.2773	-2.9434	-
DSC	-1.4854	-2.9332	-

Source: Researchers' compilation

Table 3. **Difference Unit Root Test Results**

Variables	ADF test statistic at 1st difference	ADF at 5% Critical Value	Order of integration
ARQ	-6.5870	-2.9332	I(1)
XDB	-5.5870	-2.9332	I(1)
XRT	-7.1308	-2.9314	I(1)
GEA	-6.4609	-2.9297	I(1)
DSC	-5.8738	-2.9314	I(1)

Source: Researchers' results

Results in table 3 above show that all series are only stationary at first difference. In table 3, the critical values at 5 per cent are found less than ADF test statistic (in absolute terms) at the 5 per cent level of significance In effect, disequilibrium errors arising from the regression analysis of our static model are stationary.

Co-integration Test

The provision of Johasen co-integration test results for equation 9 confirmed the co-integration of the series at 5 per cent level as Trace and Max-Eigen Statistic indicate 3 and 2 co-integrating equation(s) respectively at the 0.05 level as showed in table 4 below. This affirm existence of long-run equilibrium relationship among our variables.

Table 4. **Unrestricted Co-integration Results for equation 9.**

| Hypothesized No of CE(s)	Eigen value	Trace Statisitic	0.05 Critical Vvalue	Prob**	Max-Eigen Statistic	0.05 Critical Vvalue	Prob**
None*	0.8896	163.305	69.8189	0.0000	90.3729	33.8769	0.0000
At most1*	0.6437	72.932	47.8561	0.0001	42.3110	27.5843	0.0003
At most 2*	0.3541	30.6224	29.7970	0.0401	17.9239	21.1316	0.1327
At most 3	0.2232	12.6975	15.4947	0.1264	10.8309	14.2646	0.1629
At most 4	0.0445	1.8665	3.8415	0.1719	1.8665	3.8415	0.1719

Source: Researchers' Results

Stability Test

Figure 2. **CusumTest**
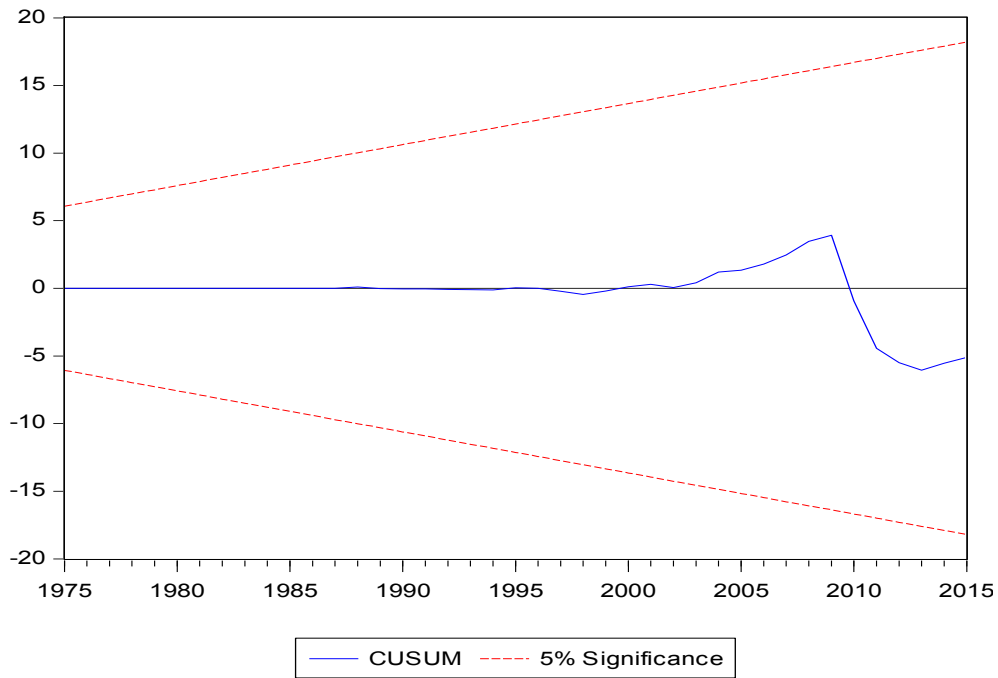
Source: Researchers' Results

Figure 3. **Cusum of Squares Test**
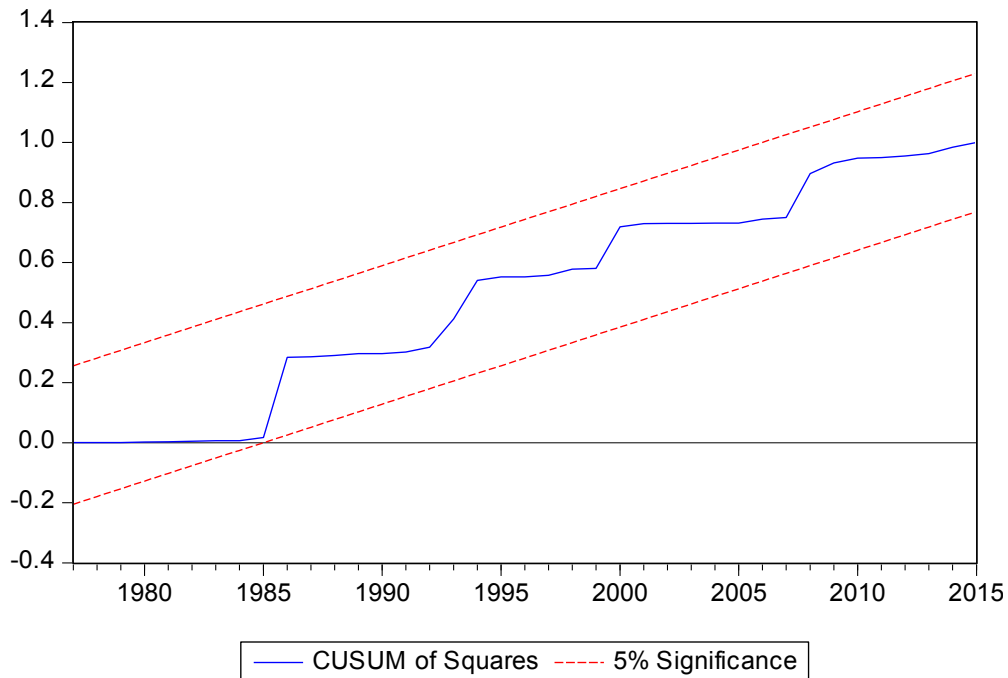
Source: Researchers' Results

Stability test was performed using Cusum and Cusum of Squares test as shown in figure 2 and 3 above. Existence of parameter stability was established since Cusum goes within area between critical bound (dotted bound) lines. It was estimated at 5 per cent critical level.

Table 5. **Parsimonious Error Correction Estimates**

Variables	Coefficient	t-Statistic	Prob.
C	-2.1579	-2.1065	0.0422
Δ [XDB]	-0.3142	-2.8149	0.0179
Δ [XRT(-3)]	-1.5041	-0.2781	0.0325
	1.6759	7.1154	0.0000
Δ [GEA(-1)]	1.0677	10.6392	0.0000
Δ [DSC]	-0.7098	-2.1546	0.0042
ECM(-1)			
	0.8953		
R-squared	0.8833		
Adj. R-squared	483.2232		
F-statistic	0.0000		
Prob(F-sta.)	1.6193		
DW Stat.			

Source: Author's regression output.

Discussion of Empirical Estimates

The results for parsimonious error correction estimates of ARQ for the entire sample period of 1980 to 2017 reported in table 5 above show good fit estimates; whereby R^2 indicates that 89 per cent of variations in ARQ is explained with explanatory variables used in this study. The F-statistic which measures the joint significant of the regressors is significant at 5% level.

The results also indicate that only XRT lagged three-year period and GEA lagged by one-year period respectively are at 5 per cent level. However, DSC shows direct relationship coefficient, contrary to our a priori expectations but significant at 5 percent level, while XDB inversely affected ARQ.

Alternatively, the findings indicate that external debt stock in relation to agricultural output contributes negatively to the economic growth in Nigeria. This could emanating from fact that some external loans may not have been properly channeled and utilized to increase agricultural productive capacity of Nigerian economy and this probably could have generated returns for the debt repayment and promote economic growth and development. More also, less emphasis may have been placed on optimal debt management strategies. This result is consistent with the findings particularly with Ogunmuyiwa (2011), Ezeabasili et al. (2011), Olanrewaju, Abubakar & John (2015) who examined the effect of external debt on the economic growth in Nigeria and also Warner (2012) for the case of 13 less developed countries and Safdari and Mehrizi (2011) for Iran.

The coefficient of XRT is 1818.504 and is in conformity with our a priori expectation between agricultural output and exchange rate and is also significant at 5% level. This means that appreciation in exchange rate increases agricultural productivity. This could be emanating from rise in foreign exchange earnings from agricultural exports. This finding is contrary to the result obtained by Ijeoma (2013) which indicates that increase in exchange rate reduces growth.

The coefficient of GEA implies direct relationship between ARQ and GEA in Nigeria and passes significance test at 5% level. The results further expressed that increase in government spending in agricultural sector would boost its output. These findings conform to the results obtained by Adetula (2009) who carefully explored the effect of external debt service payment practices on agricultural productivity in Nigeria.

In addition, coefficient of DSC indicates direct relationship with ARQ which is contrary to our a priori expectation because given the results obtained implies that an increase in external debt servicing will lead to a rise in agricultural output. This could reflecting that Nigeria is capable of always fulfilling her debt service obligation. This result is consistent with the findings of Cohen (1993), who examined dynamic impact of external debt accumulation on private investment and growth in Africa.

The value of DW statistic n is 1.6193. This implies absence of serial correlation because the closer the DW value is to 2.0 the better the evidence of the absence of serial correlation. With this, we reject presence of serial autocorrelation in our model. The coefficient and the t-statistic of ECM are negative and passes significance at 5% level. Significance of ECM is reconfirmation of existence of long run equilibrium between ARQ and its determinants used in this study.

Conclusion

The empirical analysis based on ECM estimation, revealed that external debt has negative impact on agricultural production. Nonetheless, Nigeria should not denounce external borrowing completely because, if the loans are properly utilized it can lead to accelerated economic growth in Nigeria. Be that as it may, the Nigerian policy makers need to appraise the present debt situation of the economy in order to appreciate enormity of this problem. Furthermore, if external loans are properly monitored and utilized for agriculture it can create good road map for Nigeria to have additional resources to fast track the nation's economic development.
Thus, we advise that expenditure of external loans for agricultural productivity needs monitoring to guarantee apposite channeling into productive agricultural use for benefit of Nigerian conomy. However, with continuous accumulation of external debt stock, Nigerian government should reduce its non-concessional borrowing. In fact, public sector debt strategy ought to be adequately supervised for purpose of enhancing growth in agricultural sector.

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