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# **EXCHANGE RATE MOVEMENTS AND THE AGRICULTURAL SECTOR IN NIGERIA: AN EMPIRICAL INVESTIGATION**

**ANTHONY ORJI**

Department of Economics, University of Nigeria, Nsukka  
E-mail: anthony.orji@unn.edu.ng

**JONATHAN E. OGBUABOR**

Department of Economics, University of Nigeria, Nsukka  
E-mail: jonathan.ogbuabor@unn.edu.ng

**CHIAMAKA OKEKE**

Department of Economics, University of Nigeria, Nsukka  
Email: www.chiamaka13@yahoo.com

**ONYINYE I. ANTHONY-ORJI**

Department of Economics, University of Nigeria, Nsukka  
E-mail: onyinye.anthony-orji@unn.edu.ng

## **Abstract**

This study examined the impact of exchange rate movements on the agricultural sector in Nigeria. Time series data and Ordinary Least Square (OLS) estimation technique were employed in this study to address the specified objective. The variables employed in this study were exchange rate, Agric GDP, Government Capital Expenditure, foreign direct investment, credit to private sector, and Lending interest rate. The result showed that exchange rate movements play a significant role in the agric sector performance in Nigeria. Specifically, the findings showed that exchange rate, government capital expenditure, foreign direct investment and lending interest rate were positively related to agric GDP while credit to private sector was negatively related. Co-integration approach was also applied to determine the long-run relationship between the variables. The results revealed that the variables have a statistically significant impact on the agricultural sector in the long run. The study recommended that the apex bank should keep a close watch on exchange rate developments in order to enhance exchange rate stability which will contribute to the development of the agric sector.

**Keywords:** Exchange Rate; Movements; Agric Sector; Empirical, Analysis

**JEL classification codes:** F31, O13, F14, Q11.

## 1. INTRODUCTION

Agriculture has proved to be an indispensable tool for the achievement of economic growth. The importance of agriculture was summed up by Nobel laureate, Simon Kuznets who noted that agriculture facilitated development in an economy not only through its contribution of raw materials and inputs for manufacturing but also through the use of agricultural products as exports for enhanced foreign exchange earnings and revenue generation (Todaro&smith, 2011 and Ochalibe, Okoye&Enete, 2019). As a result of the increasing demand for food and other essential agric products, agriculture is regarded as the largest and most significant industry in the world.

Agricultural productivity is important not only for a country's balance of trade, but the security and health of its population as well (Orji, Ogbuabor, and Umesiobi 2014). Growth in the agricultural sector has also played a crucial role in the reduction of poverty and evidence of this can be seen in countries like China and India. However, the Nigerian economy has not yet been able to benefit from the potentials of agriculture. Economists posit that some of the reasons for this include neglect of the sector by the Nigerian government, inadequate allocation of funds to the sector as well as lack of an enabling environment. However, recent arguments in the literature suggest that exchange rate movements may be a contributing factor (Adekunle&Ndukwe, 2018 and Emmanuel, 2019).

Excessive volatility in exchange rate creates uncertainty and risks for economic agents with destabilizing effects on the macro economy. Hence, failure to properly manage the exchange rate induces distortions in consumption and production patterns. Exchange rate movements have been empirically observed to cause instability in other core macroeconomic variables such as inflation, unemployment rate, consumer and producer prices, volume of goods and services produced, balance of payment, volume of trade as well as a nation's growth rate. Thus, as stated by Mordi (2006), maintaining relative stability in exchange rate is imperative for both internal and external balance as well as growth in an economy.

Prior to the oil boom of the 1970's, Nigeria operated a fixed exchange rate system. The naira was pegged to the British pound sterling up until 1967 when the pound was devalued and thereafter to the dollar (Obadan, 2006). This system helped to maintain a stable exchange rate and also helped the country to preserve the value of her external reserves. During this period, the agriculture sector was a major contributor to Nigeria's total GDP. Agriculture was the mainstay of the economy and it provided food and employment for the populace as well as raw materials for the nascent industrial sector. The sector was also responsible for generating the bulk of government revenue and foreign exchange earnings and its average share to GDP was about 55.8%.

However, between 1971 and 1980 increased oil exploration activities as well as the oil boom led to an overvaluation of the nation's currency because of sharp increases in oil prices, as well as massive foreign exchange inflow. During this

period, the exchange rate generally reflected movements in oil prices. This appreciation of the currency encouraged excess importation, capital flight and discouraged non-oil exports (Obadan, 2006). However, oil activities eventually made the once thriving agricultural sector collapse as a result of sheer neglect and a shift in national priorities to the oil sector. Osaka et al (2003) as cited in Obadan (2006) stated that annual production of major cash crops such as cocoa, rubber, groundnut and cotton, fell by 42%, 29%, 64% and 65% respectively between 1970 and 1985. Thus, as a result of over dependence on oil sales and neglect, both the agriculture and manufacturing sectors witnessed general declines in productivity in the periods between 1971 and 1980. Agriculture share plummeted to as low as 28.4%. In addition to a fall in its GDP contribution, export earnings from the sector declined in real terms to about 1.6% in 1981. According to Olayemi (1976) as cited in Monye-Emina (2009), importation of agricultural products rose to as high as 17.2% of total imports by 1980. The food import bill rose from 113.88 million in 1970 to N1,964.8 million in 1981. The sector witnessed a drastic decline in production as labour began to migrate to urban areas in search of employment which consequently led to a rise in food prices.

The need to correct the low productivity in the agric sector triggered the implementation of the SAP policy in July 1986 which was fundamentally aimed at promoting exports through the complete restructuring of the productive base of the economy. The SAP judiciously combined trade policies and exchange rate reforms with the sole aim of increasing the competitiveness of the non-oil sector. However, the SAP policy was unable to achieve all its long term objectives and as a result, various exchange rate systems were adopted over the years in a bid to maintain a healthy balance of payment as well as foster the necessary economic growth thus instigating up and down movements in the Nigerian exchange rate.

The table below shows the average contribution of the agric sector to GDP from 1981 to 2013.

**Table 1.** Average Sectoral Contribution to GDP (1981 – 2013)

<b>PERIOD</b>	<b>AGRICULTURE</b>
1981-1984	35.33%
1985-1988	40.25%
1989-1992	39.8%
1993-1996	40.28%
1997-2000	42.29%
2001-2004	41.61%
2005-2009	41.76%
2010-2013	40.08%

Source: CBN (2013)

Available statistics suggests that the agriculture sector performance has not been encouraging either. The pre SAP period was characterized by stagnation in agricultural production, low producer prices, restrictions on marketing as well as natural hindrances like the drought of the early 1980's. Furthermore, due to the neglect arising from the increased oil prices, agriculture contributed a mere 35.33% to GDP in the periods between 1981 and 1984 as shown in table 1 above. However, it can be observed that the SAP policy seemed to have abated the dismal situation in the agriculture sector. The real depreciation of the naira improved producer prices, while the liberalization of trading and the elimination of marketing boards positively impacted on the agricultural sector. Thus agricultural production expanded during the SAP period with an annual average growth rate of 3.8%. Under SAP, Nigeria improved in its self sufficiency and by 1992, Nigeria was importing only a fifth as much food as they had in 1986 (World Bank, 1994). Within 1986 and 1990 the sector recorded its highest growth rate of about 5%. It can be observed from the table above that the sectors productive expansion caused the average contribution of agriculture to GDP to rise from 35.33% to 40.25% in the period 1985 to 1988. This rise in agriculture share peaked in the period 1997 to 2000 during which it contributed an average of about 42.29%. The sectors average contribution however witnessed a decline to 40.08% between 2009 and 2013. CBN (2013) reports that the average contribution of the agriculture sector from 1986 to 2002 was 40.98% while its recorded share to GDP from 2003 to 2013 was 40.86% showing that there was an average decline of about 0.12% between the two periods.

Some economists have argued that this slight improvement in the overall agriculture sector performance in the post SAP era is a far cry from its performance before the oil boom era. However, the fact remains that despite upward movements of the Nigerian exchange rate, the agriculture sector performance recorded slight improvements and the above findings seems to refute claims made by traditionalists who propose that exchange rate movements is to blame for the dismal performance of the agriculture sector. Hence, in view of the above problems, this study intends to examine the impact of exchange rate movements on the Nigerian agricultural sector performance. The rest of the study is as follows: section two briefly reviews various related literature, section three focuses on the methodology, section four presents the analysis and interpretation of findings and section five provides the conclusion and recommendations.

## **2. LITERATURE REVIEW**

The issue of exchange exchange rate movements and its relationship with different sectors of the economy has been a theoretical and empirical issue for sometime now. Currently the debate is still on but the findings of the different researchers are yet to resolve the empirical dilemma (See for example, Adekunle&Ndukwe, 2018, Ochalibe, Okoye & Enete 2019, and Emmanuel, 2019). In an earlier study, Obayelu and Salau (2010) gave a systematic analysis of the response of aggregate agricultural production in Nigeria to exchange rate. Upon application of the Vector Error Correction Model (VECM), the results revealed that

agricultural production responded positively to increases in exchange rate both in the short run and long run.

On the contrary, Yaqub (2010) adopted the modified IS-LM framework to study the effects of exchange rate changes on real sector output performance in Nigeria from 1970 to 2007. Estimating the behavior equations as a system using regression estimation technique, results obtained indicated that exchange rate depreciation had adversely affected agricultural output. Basing his argument on the cobweb theory, he asserted that the lagged value of exchange rate was negatively related to the current agricultural output levels.

The above contradicting results led to more recent studies by researchers like Oriavwote and Oyovwi (2013) who investigated the role real effective exchange rate played in agricultural output in Nigeria. The co-integration technique with its implied ECM was employed to estimate data which covered the period between 1980 and 2011. The results of the empirical analysis indicated that real effective exchange rate had a significant positive impact on the level of agricultural output in the country during the period of study which confirmed the results of Obayelu and Salau (2010).

Onyinbo et al (2014) refuted the results obtained by Oriavwote and Oyovwi (2014) when he explored the nexus of exchange rate deregulation and agricultural share of GDP in Nigeria from 1986 to 2011. The study adopted the unrestricted Vector Auto Regression model, the pairwise Granger Causality and the VECM. The granger causality test indicated the existence of a unidirectional causality from exchange rate to agriculture share of GDP. Further analysis also revealed that exchange rate deregulation had a negative impact on agric share of GDP in Nigeria during the period of study.

In another study, Anigbogu et al (2014) empirically x-rayed the effects of the misalignments and volatility of real exchange movements on the Nigerian agric sector. Employing the method of Ordinary Least Squares (OLS), the study revealed that real exchange rate misalignment and volatility negatively impacted on agriculture production levels. Furthermore, Olarinde and Abdulahi (2014) examined the empirical link between macroeconomic policies and the agric sector in Nigeria. The study covered the period between 1986 and 2005 and adopted the VECM approach to examine both the long run and short run relationships. The results confirmed a positive response of agric productivity to changes in real exchange rate in both the long run and the short run periods.

### 3. METHODOLOGY

In a bid to capture the objective of this study, we present a multiple linear regression model on the impact of exchange rate movements on agricultural output in Nigeria.

$$LOGAGDP = f(EXCH, GCEXP, CPS, LOGFDI, LIR) \quad (1)$$

In this model, agriculture GDP (AGDP) which is the dependent variable will serve as a proxy for agricultural output while Exchange rate (EXCH), Government capital expenditure (GCEXP), credit to private sector (CPS), Foreign Direct Investment (FDI) and Lending Interest Rate (LIR) are the independent variables.

The author included all other independent variables because they have been observed in the literature to have a strong influence on the agric sector. The econometric model is thus:

$$LOGAGDP_t = \beta_0 + \beta_1 EXCH + \beta_2 GCEXP_t + \beta_3 CPS_t + \beta_4 LOGFDI + \beta_5 LIR + \mu_t \quad (2)$$

Where  $\beta_0$  is the Intercept term,  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  are the model parameters and  $\mu_t$  is the stochastic error term. For the hypothesis that exchange rate movements adversely affect agricultural output to be accepted, the coefficients are expected to be significantly different from zero. Time series data extending over the period of 1981 to 2015 were utilized in this study. The data were collected from various issues of Central Bank of Nigeria statistical bulletin and annual reports (CBN, 2013; 2014 and 2015).

The a priori expectations are that exchange rate movements will negatively influence the AGDP. Since commercial agriculture in Nigeria depends to a large extent on imported capital goods and machinery, a rise in exchange rate values should lead to a fall in agricultural output as the price of imported capital goods become more expensive. It can also be predicted that government capital expenditure, Credit to Private Sector and FDI will influence AGDP positively. While a negative relationship exists between agricultural output and lending interest rate because a high lending rate will have a reverse effect on borrowing which will reduce investments in the agric sector and cause a downturn in agricultural output.

For the purpose of analysis, we will first conduct unit root tests using Augmented Dickey Fuller (ADF) and then test for co integration using the Engle-Granger two step procedure and finally, we run the regression using Ordinary least Square (OLS).

## 4. RESULTS AND DISCUSSIONS

### 4.1. STATIONARITY TEST

Table 2 shows the unit root test results for all the variables in the model. From the table above, it is clear that all variables are integrated at first difference. Comparing the ADF test statistics and the 5% critical values, we can see that the ADF statistics for all the variables are greater than the 5% critical values. Thus, we conclude that there is no unit root and all the variables are stationary at the 5% level of significance.

**Table 2.** *The unit root test results*

Variable	ADF Test Stat	5% Critical Value	Order of Integration
LOG AGDP	-4.031512	-3.552973	I(1)
EXCH	-5.294691	-3.552973	I(1)
GCEXP	-4.622732	-3.595026	I(1)
CPS	-5.179506	-3.552973	I(1)
LOG FDI	-10.49902	-3.552973	I(1)
LIR	-5.320454	-3.557759	I(1)

#### 4.2. COINTEGRATION TEST

As shown in the table above, the ADF test statistics reported a result of -4.734636 which is greater than the 5% critical value of -3.548490 in absolute terms. Hence, we conclude that the variables are co-integrated. This means that the series are stationary at level. Hence, there is a long-run relationship between the regressors and the regressand.

**Table 3.** *Result of the cointegration test for model 1*

Variable	ADF Statistics	Critical Value (5%)
Residual term	-4.734636	-3.548490

#### 4.3. PRESENTATION OF OLS REGRESSION RESULT

**Table 4.** *Dependent Variable: LOGAGDP*

Variable	Coefficient	Std. Error	T-Statistic	Prob.
EXCH	0.020687	0.003642	2.784775	0.0000
GCEXP	0.002812	0.000668	4.208677	0.0002
CPS	-0.057035	0.020481	-2.784775	0.0093
LOGFDI	0.706944	0.204958	3.449220	0.0017
LIR	0.021300	0.030660	0.694700	0.4928
C	4.160813	0.579256	7.183025	0.0000
R-SQUARED	0.950240	F-STATISTIC		110.7589
DURBIN-WATSON		PROB F-STATISTIC		0.000000
1.600787				

#### 4.4. EVALUATION OF RESULT

The coefficient of EXCH is 0.020687 which implies that holding all other variables constant, a percentage increase in exchange rate will on the average increase AGDP by 0.020687%. The regression result shows that exchange rate (EXCH) has a positive relationship with Agric GDP (AGDP) and this does not conform to a priori expectation. This may be as a result of the fact that even though higher exchange rates increase the cost of imported raw materials and machinery used by the commercial agric sector, the sector still takes advantage of lower export prices. Thus, the agric sector exports more than it imports and is still able to realize more revenue (Agric GDP) than the costs it incurs. Also a large portion of the Nigerian agricultural sector consists of small scale farmers who do not depend on imported raw materials for their production activities. Hence, are not affected adversely by the up and down movements in the exchange rate.

The value of the coefficient of GEXP which is 0.002812 implies that all other variables held constant, a one naira increase in GCEXP will on the average, increase the AGDP by 0.002812%. Also, the value of the coefficient of FDI which is 0.706944 implies that all other variables held constant, a percentage increase in FDI will on the average, increase the AGDP by 0.706944%. The regression result shows that both Government Capital Expenditure (GEXP) and FDI are positively related with Agric GDP (AGDP) and this conforms to a priori expectation.

From the regression result, the coefficient of the CPS variable assumes a value of -0.057035. This implies that on the average, a unit increase in CPS will decrease AGDP by 0.057035% holding all other variables constant. The variable CPS is negatively related to AGDP and this does not conform to a priori expectation. In the Nigerian context, this may be as a result of the fact the necessary infrastructure needed to boost the agric sectors activities such as good road networks, good irrigation systems, adequate storage facilities, resistant seeds, fertilizers, good pesticides and overall increase in Research and Development in the agric sector etc, are either lacking or are grossly inadequate. Thus as a result, even with an increased flow of loans, trade credits and other monetary flows to the private sector, there is still no appreciable rise in agric productivity. Also another cause of this inverse relationship in Nigeria stems from the attitude and backward mentality of some Nigerians. Many a time, private individuals who are granted loans do not use the loans for the purpose of boosting agric sector activities, but rather divert these loans to non- agricultural projects thereby suffocating the purpose for which the loan was given. This instigates a negative relationship between credit to private sector and agricultural GDP in Nigeria.

The lending interest rate has a coefficient value equal to 0.021300. This implies that all other variables held constant, a unit increase in LIR will on the average, increase AGDP by 0.021300%. The results of the regression show that the lending interest rate is positively related to the agric GDP and thus, does not conform to a priori expectation. In Nigeria, the Central Bank has had to on many occasions, tightened money supply which consequently led to increased interest rate. This

action of the apex bank is as a result of rising inflation experienced by the Nigerian economy. However, as backed by theory, this rise in interest rate discourages borrowers or investors from borrowing funds from commercial banks and this in turn decreases total output in the agric sector. In a bid to ameliorate the impact of its tight monetary policy and stimulate banks' lending to the critical sectors, agric inclusive, the CBN in collaboration with the government have created special funds which can be assessed at relatively low interest rate. This action was in line with its development mandate and these include, the Commercial Agric Credit Guarantee Scheme (CACGS). The scheme was designed to reduce interest rate in agric production so that farmers can exploit more untapped potentials of the nation's agric sector. The above implies that although interest rate has been on the rise in the Nigerian economy, the CBN still found a way to ensure it does not impact on agric output. This means that lending interest rate does not have a significant effect on agricultural output growth in Nigeria as proved by the regression result which shows the coefficient of lending interest rate was not statistically significant.

#### **4.5. COEFFICIENT OF DETERMINATION ( $R^2$ )**

The coefficient of determination ( $R^2$ ) measures the proportion of the variation in AGDP explained by EXCH, GCEXP, CPS, LOGFDI and LIR. It measures the goodness of fit of the estimated model. The  $R^2$  of this study is 0.950240. This implies that the explanatory variables (EXCH, GCEXP, CPS, LOGFDI and LIR) explained about 95.02% of the total variations in the dependent variable (LOGAGDP). This signifies that the model is a good fit.

### **5. POLICY RECOMMENDATIONS AND CONCLUSION**

#### **5.1 POLICY RECOMMENDATIONS**

Good policies are important in order for the Nigerian economy to reap the full benefits of the agricultural sector. Thus, based on the research results obtained in this work, we recommend the following:

- The government should take advantage of rising exchange rates in the country by encouraging export promotion strategies in the country. This is because the research results revealed that rising exchange rates contribute positively to agric output. Thus this will increase the growth prospects of the country. Thus in order to achieve this, the government should engage in importation of capital goods which are required for boosting productive activities in the agric sector.
- The results show that the Nigerian governments' capital expenditure positively impacts the agricultural sector. This thus implies that the higher the government capital expenditure in the agric sector, in terms of good road networks to aid transportation of agric produce, well functioning irrigation systems, adequate storage facilities etc, the higher the Agric GDP will be since farmers would be able to produce more agric output both for domestic

consumption as well as for exports. Hence, the government should create an enabling environment for businesses to thrive by increasing its spending on basic infrastructure.

- The results show that credit to private sector negatively impact on the agric and manufacturing sector activities. This is because at times, private individuals who collect loans misuse such funds. Hence, there is a need for the lending institutions to properly monitor credit flows to the private sector to ensure that borrowed funds are properly invested in real sector activities and used for the purpose for which they were initially granted. This is to reduce cases of embezzlement by the borrowers and to monitor the growth of businesses which the loans were invested in. Proper monitoring should be given to such projects to make sure they implemented in line with the economic growth objective of the Nigerian economy.
- There is need for government capital expenditure to focus on key sectors that will bring about rapid economic growth since Nigeria is still a growing economy. According to the endogenous growth model, investment in Human Capital, innovation and knowledge are significant determinants of economic growth. In Nigeria, necessary tools for boosting real sector activities such as educated labor force, technical experts as well as good managerial capacity are inadequate. Thus as a result, even with the necessary infrastructure in place, an increased flow of loans, trade credits and other monetary flows to the private sector, there will still be no appreciable rise in overall productivity. Thus, there is need for the government to also invest in human capital and not just physical infrastructure.
- The government should endeavour to create partnerships and sign mutually advantageous deals with foreign countries in order to boost real sector activities. This will not only increase total output, but will also create employment, increase managerial capacity and technical expertise as well as increase overall GDP.
- Finally, it is imperative for the apex bank to keep a close watch on exchange rate developments. The CBNs role in the foreign exchange market to enhance exchange rate stability should continue to remain a core objective under the monetary targeting framework and should be kept in line with the growth objectives and targets of the country.

## 5.2 CONCLUSION

This study used classical linear regression model (CLRM) to estimate the impact of exchange rate movements on the agric sector in Nigeria for the period 1981-2015. From our findings, exchange rate movements were found to have significant positive impacts on the agricultural sector. This shows that the Nigerian agric sector can survive the adverse impacts of currency depreciation by taking advantage of increased exportation of agric products.

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