Exchange Rate Shocks and Performance of Agricultural Subsector in Nigeria

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Abstract: *The study investigated the effect of exchange rate shocks (EXCRS) on the performance of agricultural subsector (PFASS) in Nigeria, for the period of 2001-2020 (20years). The specific objectives is to examines the measures of EXCRS, namely; exchange rate (EXR), foreign direct investment (FDI), maximum lending rate (MLR) and consumer price index (CPI) on Agricultural Sector performance proxied with aggregate agricultural output (AAO) in Nigeria. Secondary data were sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics (NBS) statistical databases, and the data set was described using descriptive statistics and the unit root test was conducted (using Augmented Dickey Fuller and Phillips Perron Tests) to ascertain if the data are stationary in order to have accurate result. The SVAR where analyzed in terms of SVAR Forecast Error Decomposition (FEVDs) and the Impulse-Response Function result with the aids of E-VIEW version 9.0 for the purpose of testing the research hypotheses raised The findings revealed that EXR, MLR and CPI have negative and insignificant effect on AAO in Nigeria while FDI positive and significant effect on AAO in Nigeria. Hence, the study concluded that EXCRS and has an insignificant influence on agricultural sector performance in Nigeria. It is recommended that Nigerian government should re-position it fluctuating EXR in the bids to increase its agricultural sector output.*

Keywords: *Exchange Rate Shocks, Agricultural Subsector, Performance, Discovery, Exploration*

Introduction

Before the discovery and exploration of oil in the years immediately before and after independence in Nigeria, agriculture was the mainstream of the economy with a contribution of 60 to 70 percent of Gross Domestic Product (GDP). From 1980 a drastic reduction of agricultural contribution to GDP was observed. The reduction was observed as follows: 20%, 21%, 36%, 24% and 21%, in 1980, 1990, 2000, 2010 and 2016, respectively (Akpaeti et al, 2014).

Regrettably, Nigeria has not fared well since the oil exploration. The over dependence on oil brought in easy money, even when Nigeria's agricultural and mineral exports dipped, no attention was paid. However, there was no serious concern on the growth of agricultural industry until the time oil prices plummeted to less than $10 per barrel. The overall stagnation occasioned by this together with the inability of the government to fund budget showed that the Naira was overvalued hence the introduction of Structural Adjustment Program (SAP). The need to revamp the economy before the introduction of SAP and after the introduction of SAP led to various stabilization policies. This consequently brought about changes in the EXR policy, which have significant consequences for the Nation's domestic relative prices and economic growth through their effect on real EXR.

The exchange rate is the rate at which one currency is exchanged for another. Simply stated it is the price of one currency in terms of another currency. This gives room for the expression of the cost or price of a good or service in a common currency (Sanni, G.K et al, 2020). Exchange rate plays a vital role in the economy as a result of trade between or among Nations. Predominantly, Exchange rate changes affect the prices of imported goods, services and exports. Therefore the Agricultural sector like any other sector has largely been affected by exchange rate fluctuations. This has been usually in area of importation of raw materials and modern farm implements, and the exportation of its output. Exportation of Agricultural products have low yield due to the depreciation of the value of the Naira.

Nigeria's agricultural sector performance has been significantly affected by the nominal exchange rate as well as the swings or volatility in the real exchange rate. Due to the pressure for Nigeria to move from solely oil based economy to promotion of non-oil production, there is need to present empirical evidence of the effect of real exchange rate on the agricultural sector in Nigeria.

There exist apparent agreement on the effect of exchange rate swing on agricultural sector at the aggregate level; the effect of the shocks on agricultural subsector on a disaggregated level is a virgin area of study. This study is significant because the empirical

understanding of the nexus between the dynamics of exchange rate and agricultural sector is critical to sound policy formulation. In otherwise, the knowledge of the relationship will serve as a guide to monetary authority for the formulation and implementation of sound exchange rate policies to boost agricultural output.

Econometric analysis was conducted with the Structural Vector Autoregression (SVAR) approach. This model enables the evaluation of the effect of exchange rate changes on the agricultural sector and the response of agricultural output to EXCRS.

Statement of the Problem

Agricultural sector in Nigeria is the largest sector of the Nigerian economy, but this has not significantly benefited the Nigeria Nation due to low productivity occasioned by currency fluctuations effects exerting huge influence on agricultural production amongst other factors. Agricultural sector has lost billions of Dollars in annual export earnings from cocoa, groundnut, cotton and palm oil alone following the decline of production of these commodities because of the inability to cope with the exchange rate volatility (IFPRI-Policy Note No. 32, 2012 in Awolaja and Okedina, 2020).

There have been hands on the drawing board in recent years to galvanize the agricultural sector for higher productivity or optimum performance. The new polices formulated towards the agricultural sector have led to some improvements. The Agricultural sector has recorded an annual growth rate of 8.94% output, on the average, between 2012 and 2016. Looking at the agricultural sub sector in this period under discussion, average annual growth rate for crops, fishing, forestry and livestock were 4.4, 5.7, 3.8 and 3.5 percent respectively (Central Bank Statistical, 2017 in Awolaja et al 2020).

Agriculture is the broadly divided into four sector in Nigeria, they are crop production; fishing; livestock and forestry. Crop production gives the largest output with about 87% of the sector's total output. This is followed by livestock; fishing and forestry at 8.1%; 3.2%; 1.1% respectively. Agriculture is contributing an average of 24% to the GDP it maintains the largest sector for almost a decade now (2013 to 2021). In addition, Nigeria agricultural sector is the largest employer of the labour force with the sector employing more than 36% of the labour force in Nigeria. But, in four years (2016 to 2019), Nigeria's cumulative agricultural imports stood at N3.35 trillion, four times higher than the agricultural export of N803 billion within the same period. The share of agriculture in Nigeria's total export earnings remains small compared to crude oil exports. For instance in 2019, agriculture accounted for less than 2% of the total exports compare to crude oil (76.5%). Agriculture export declined by 11% from N302.2 billion in 2018 to N269.8 billion in 2019. With a population of about 200 million people, Nigeria's agricultural productivity is inadequate to meet the food demand of its population (Federal Ministry of agriculture, 2020).

It appears that exchange rate has overriding effect in the inability of the agricultural sector to grow as expected. The central Bank of Nigeria in June 2015, excluded 41 items from accessing foreign exchange from the official window. This was followed by the depreciation of the value of the currency from N150/$ to N199/$ in February 2015. This was followed by a reform in June 2016 which led to further depreciation from N199/$ to N305/$. This period also witnessed acute shortage of the supply of foreign exchange. In subsequent years to date the foreign exchange has always be on the rise. Perhaps, the consequences of this are: agricultural low productivity, lack of access to agricultural inputs, higher level of import of produce than export due to inaccessibility to exchange rate and high exchange affecting farm inputs.

Nonetheless, the agricultural sector needs to be repositioned to drive growth. It appears that the key to reversing the poor performance of the Nigerian agriculture sector is to provide incentives for farmers to become more export oriented. This measure which will reduce the cost of production, includes improvement in access to foreign exchange, together with sound exchange rate policy, access to affordable or subsidized agricultural equipment, inputs and infrastructures, and provision of agricultural loans to farmers. The study will therefore have the objective to examine the effect of EXCRS on the PFASSs in Nigeria.

LITERATURE REVIEW

The consistent abysmal poor performance of Nigeria in the area of Agricultural sector the so called largest sector of the Nigeria economy with current contribution of 22% percent to the economy is naturally a call for alarm because the Nation is blessed with abundance fertile land and other resources that foster high yield of agricultural sub sectors. The agricultural sector is unable to meet the food needs of Nigerians over the years and the attendant degenerating level of poverty in the Nigeria nation. Before the exploration oil in Nigeria Agriculture used to be the mainstay of the economy. The exploration and trade in oil has made Nigeria pay less attention to agriculture and Nigeria veered into unexplainable economic problems from one regime to the other with policies that are unable to bring Nigeria to the path of recovery and abundance. The link between exchange rate and the agricultural sector therefore, need be investigated empirically, and come out with policy statement that could help the government to enhance the agricultural performance and revamp the Nigerian economy. This chapter therefore focuses on conceptual issues, theoretical review and empirical literature.

Conceptual Review

Agriculture

Agriculture refers to the practice of cultivating crops and plants, and the raising of livestock through farming. Agriculture was the key development in the emergence of sedentary civilization which created enough food that makes it possible for people to live in cities. Agriculture is broadly divided into four sectors in Nigeria; they are crop production; fishing; livestock and forestry. Crop production gives the largest output with about 87% of the sector's total output. This is followed by livestock; fishing and forestry at 8.1%; 3.2%; 1.1% respectively. Agriculture is contributing an average of 24% to the Nigerian GDP to emerge as the largest sector of the economy for almost a decade now (2013 to 2021). In addition, Nigeria agricultural sector is the largest employer of the labour force with the sector employing more than 36% of the labour force in Nigeria.

Exchange Rate

The exchange rate is the system at which one currency is exchanged for another; it is simply the price of one currency in terms of another currency (Sanni, G.K et al, 2020). Exchange rate is important in the economy in that it plays a critical role in the economy in relation to trade. Exchange rate is the determination of the cost price of a good or service in a common currency. Principally, exchange rate changes affect the price of imported goods and services as well as the price of exported goods (Alberta, 2022).

Government policy is fundamentally the drivers of exchange rate fluctuations, apart from demand and supply factor in the foreign exchange. Others are the activities of the stock exchange and the level of economic activities. The government in its function to stabilize the economy ensures a reliable and stabilized exchange rate consistent with other macroeconomic fundamentals through the agency of monetary authorities. The strength of foreign exchange inflow and outflow, reserve stock, and balance of payment equilibrium is determined by a stable and reliable exchange rate, this done because unstable and unreliable exchange rate has adverse effects on price, investment and other trade decisions (Ojo, 1998).

Exchange Rate Fluctuations

Exchange rate fluctuation means all possible changes or swing in the values of currencies quoted in the tender relative to each other, arising as a result of market forces, formal devaluation or revaluation of those currencies (lawinsider, 2013). This swing or movement result to either appreciation or depreciation of the domestic currency in relation to a reference currency (Sanni, G.K, 2020).

The money market theories of exchange rate expose various channels through which changes in exchange rate influence agricultural output performance in an economy. Practically, currency depreciation could lead to an initial decline in the prices of exported agricultural commodity relative to imported commodity. This result to cheaper prices of exported commodities, thereby a discouragement to domestic agricultural farms and exporters. More so, exchange rate will affect the cost of farm inputs, such as imported machinery and pesticides. An increase in the Naira will decrease the cost of imported products and a decrease in the Naira will increase the cost of imported inputs.

The Nigerian trade balance affects the value of the Naira. A trade surplus arises when Nigeria earns more from sales of exports than it pays for imports. And this increases the demands for the Naira which lead to a higher value of Naira. On the other hand, a trade deficit will lead to lower demand for Naira and cause a decrease of the value of the Naira exchange rate, the confidence of foreign investors dependent on political and economic stability which will also influence the exchange rate outcome.

Theoretical Review

For the purpose of this study, some relevant exchange rate determination theories are discussed together with a relevant theory of production, namely: Cobb Douglas Production Function as guide to this research work. Exchange Rate determinations have different approaches (Havey, 1996 in Sanni, G.K et al, 2020), some of them are presented below:

Purchasing Power Parity (PPP)

The purchasing power parity is predicated on the law of one price. This law states that if the market is competitive, no transaction cost and no barriers of trade, the identical products in different countries should be sold at the same prices, adjusted by currency determination (exchange rate). The PPP has been widely used to measure the equilibrium value of currencies. The knowledge of PPP gives the ideas as to what happens when a country is over-valued or under-valued.

Monetary Model

The monetary model availed that disequilibrium in the money market (asset) influences the behavior of the exchange rate. Equilibrium are maintained between domestic and international money markets through the adjustment of capital flows which naturally becomes faster to make under floating rates than fixed rates. It follows that balance of payment under a fixed regime would lead to depreciation in exchange rates under floating regimes. Conversely, variables influencing a surplus in fixed rates would lead to a currency appreciation under flexible rates. This means that increase in domestic income would lead to increases in domestic expenditures by increasing domestic demand for money thereby reducing domestic prices that would lead to restoration of equilibrium and currency appreciation through the 'law of one price' (Jimoh, 2004 in Sanni, G.K 2020).

An important implication of the monetary approach is that the central bank money supply policy would have predominant influence to exchange rate. If there is a sudden substantial money supply through a domestic central bank with other domestic and foreign variables unchanged, the implication would be rise in money supply without increase in the real output. This will increase the domestic price level thereby causing inflation. The increase in domestic price level will induce the purchase of more foreign products and cause the exchange rate to depreciate. This is also how mechanism of equilibrium is attained under the PPP system. This view assumed proportionality between money supply and exchange rate. Exchange rate is believed to be directly proportional to the money supply. This means a given percentage increase in the money supply will lead to the same percentage increase of depreciation of currency (UkEssay, 2018)

Portfolio Balance Model

This model extends the monetary approach in that it states that there are investment assets in the global economy for people to hold, which they do by holding money, domestic assets and foreign assets alternatively in their portfolio balance. It follows that the relative demand and supply of these investment assets would determine the exchange rate.

Traditional Flow Model

Exchange rate under this model is determined by the forces of demand and supply of foreign exchange. The model stipulate that the variable of relative income and interest rate differentials must interact to determine the exchange rate (Sanni, 2020)

The Cobb-Douglas Production Function

Sanni (2020) finds the Cobb-Douglas model useful to investigate exchange rate and manufacturing sector performance in Nigeria. This model too can be used to study exchange rate and agricultural performance in Nigeria since agriculture involves production which utilizes input and result to output.This model which was developed in 1928 as a functional form that expresses the technological relationship between inputs (labour and capital) and output. The production function assumes constant returns to scale and that the marginal productivity of inputs is proportional to the amount of output per unit employed.

The production function is expressed as follows:

$$Y = bL^\alpha K^\beta$$

Where ;

Y = total production (the monetary value of all agricultural goods produced in a year)

L = labour input

K = capital input

b= total agricultural productivity

α and β are the output elasticity of labour and capital, respectively.

These values are constantly determined by available technology.

Empirical Review

There exist few extant literatures on the study of the relationship between the exchange rate and the agricultural sector in Nigeria and other countries. There seems not to be agreement in their findings.

Adekunle,Wasiu, and Ndukwe (2018) studied exchange rate fluctuations on agricultural output in Nigeria. The study used stationary and nonstationary variables, according to the ADF unit root test. According to the study, the exchange rate (log level), real appreciation and depreciation, industrial capacity utilisation rate, and government affect agricultural output. The study found no uneven influence of real exchange rate changes on agricultural output in Nigeria. The fiscal and monetary authorities in Nigeria should work together to maximise the agriculture sector's growth and development potential.

In the same spirit, Awolaja and Okedina (2018) studied the asymmetric influence of currency rate on agricultural output in Nigeria during 1981-2017. This study examined the impact of real exchange rate increases and declines on aggregate and sectorial agricultural output using the ARDL cointegration methodology. Real exchange rate appreciation has a considerable beneficial influence on agricultural output in the long run, while depreciation has a significant negative effect. Long-run estimations show that real exchange rate rises affect agricultural production more than declines. The recommendation called for a realistic exchange rate regime to boost agricultural sector growth. This analysis agrees with Abiola (2017), who discovered a positive relationship between

agricultural supply and real exchange rate, average product price, and degree of openness. And the nominal exchange rate hurt agriculture.

Odior (2014) evaluated the effect of macroeconomic policy on Nigerian agricultural performance from 1970 to 2012 using one-step dynamic forecasting. Imoughele and Ismaila (2015) studied the impact of exchange rate on non-oil exports in Nigeria between 1986 and 2013 using Ordinary Least Square approach. Odior (2014) identified real monetary aggregate and technical change as key agriculture GDP factors. Credit to agriculture and government spending on agriculture had little effects on agriculture GDP in Nigeria. In a dissenting position, Imoughele and Ismaila (2015) theorised that exchange rate, money supply, lending to private sector, and real GDP have substantial impacts on the growth of non-oil exports, while appreciation in exchange rate has a negative impact on Nigeria's non-oil exports.

Before now, past studies such as Omojimite and Akpokodje (2012) found a negligible positive impact of exchange rate depreciation on non-oil exports and concluded that exchange rate reforms are not sufficient to diversify the economy. Yaqup (2013) found output that different sub-sectors responded to the exchange rate changes differently. While the exchange rate has negative effects on crop production and fisheries output, they had positive effects on livestock and forestry.

Beyond Nigeria, Bahmani-Oskooee and Kandil (2007); used annual data on real and nominal measures of the effective exchange rate for Iran between 1959 and 2003. Using a cointegration analysis framework to examine the effect of exchange rate fluctuations on output, the study found no evidence of cointegration between output growth and the parallel real-dollar rate for both real and nominal exchange rates. Currency appreciation was also found to be contractionary in the long run and expansionary in the short run.

As the review has it, some researchers have found out proof for the contractionary effect of exchange rate depreciation on agricultural output, while other studies found confirmation for expansionary effects of exchange rate depreciation on agricultural output.

RESEARCH METHODOLOGY

The study used secondary data to analyze the effects of exchange rate on the agricultural sector output in Nigeria. Secondary data were sourced from the CBN and National Bureau of Statistics (NBS) statistical databases. The data were quarterly data spanning the period of 2001Q1 to 2020Q4.

The variable of the study consist of agricultural output with its four subsectors namely: crop production, fishery, livestock, and forestry. Other variables are the real exchange rate, consumer price index, maximum lending rate and foreign direct investment. All series were transformed into natural logarithm form with the exception of maximum lending rate since it is already in percentage.

Agricultural output was used as a measure of the sector's performance. The essence is to determine how EXCRS influence agricultural output. The CPI was included as a measure of the general price level, maximum leading rate was used in the model to cover the relationship between policy and the financial market, and foreign direct investment was included to capture the impact of foreign investment. The study assumes that shocks effect must be originating from exchange rate and that these have effects on agricultural sector through different channels, such as price of imported inputs.

Analytical Framework

The econometric framework was done with the aid of Structural Vector Autoregression to examine the effect of EXCRS on the agricultural sector of the Nigerian economy. The SVAR approach is seen to be suitable and offers the benefit of identifying EXCRS, as well as other shocks. This technique has three advantages over other techniques in that, apart from being amenable to be used to investigate the impact of shock on a given macroeconomic variable, it is used for forecasting and investigating causal relationship between two or more variables.

Model Specification

The model adopted is Cobb-Douglas production function in line with Adenekan and Nwanna (2004) in Sanni et al (2020), to examine the effect of the exchange rate shock on the agricultural output. This goes down well with assumption of the Cobb-Douglas production which stipulate that inputs combined gives outputs. Compensation of inputs as the modified version are as follows:

$Y = g\ (P_I^m, P)X_t;\ g_{1<o};g_{2>0},\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$..Eq. 1

Where Y, represent the agricultural output levels equals P_I^m is the price of imported inputs, P is the domestic price level for agricultural output, X_t is total agricultural productivity.

Log transformation

$InY = \alpha_{0} + \alpha_1 InP_I^m + \alpha_2 InP_I^m + \alpha_3 InX_t$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots…Eq. 2

PPP suggest that $P = EP_I^m$ or $P_I^m = P/E$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots….Eq. 3

Therefore $InP_I^m = InP-InE$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..Eq. 4

Substituting (16) into (15)

$$InY = \alpha_{0+} \alpha_1 (InP - InE) + \alpha_2 InP + \alpha_3 InX_t \dotfill \text{Eq. 5}$$

$$InY = (\alpha_{0+}InX) + (\alpha_{1+} \alpha_2)InP - \alpha_1 InE_t \dotfill \text{Eq. 6}$$

$$\text{Rewrite } InY = (\alpha_{0+}InX) - \alpha_1 InX + (\alpha_{1+} \alpha_2)InP \dotfill \text{Eq. 7}$$

It should be noted that the effect of exchange rate is captured in α_1. Effect of the price of imported input on domestic price coefficient is $\alpha_1 - \alpha_2$, while the constant term $\alpha_{0+}InX$ represent the drift and the technological contribution to output. This model was implemented in Structural Vector Autoregressive (SVAR) model.

Result and Discussion

It is evident from above, that FDI and AAO are in billion. EXR and MLR are in rate while CPI is in Index. In bids to avoid spuriousity in the analysis, the FDI and AAO that are in billion were subjected to natural logarithm.

Table 4.2.1: Descriptive Statistics for the Independent and Dependent Variables

	LOGAAO	EXR	LOGFDI	MLR	CPI
Mean	7.322314	2.917985	3.730037	1.605986	5.456174
Median	7.289194	3.008460	3.484315	1.927236	5.724294
Maximum	7.697718	4.586470	4.608628	3.371230	6.548467
Minimum	7.099801	0.819544	3.299202	-0.647046	4.312283
Std. Dev.	0.162502	1.261387	0.450040	1.424946	0.755153
Skewness	0.883631	0.333059	0.467420	0.349843	0.200272
Kurtosis	2.731582	1.672752	1.569199	1.505738	1.438712
Jarque-Bera	4.792898	3.307953	4.381678	4.083573	3.897083
Probability	0.021041	0.011288	0.011823	0.029797	0.042482
Sum	263.6033	105.0475	134.2813	57.81551	196.4223
Sum Sq. Dev.	0.924242	55.68838	7.088754	71.06652	19.95894
Observations	20	20	20	20	20

Source: Eviews9.0 Output, 2022.

Table 4.2.1 above is the presentation of the descriptive statistics. The mean value for the AAO recorded a mean value of 7.3223 with a standard deviation of 0.1625. Also, EXR, recorded a mean of 2.9180 and standard deviation of 1.2614, FDI recorded a mean of 3.7300 with a standard deviation of 0.4500, MLR recorded a mean of 1.6060 with a standard deviation of 1.4249 and CPI recorded a mean of 5.4562, with a standard deviation of 0.7552. Since the standard deviations for all the variables are lesser than respectively means, it shows that the data are not widely dispersed.

Stationarity Test

The Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) test unit root tests are used to conduct this test. The test is used to determine the long-term qualities of the study's variables. If the time series are determined to be stationary, it means that their variance, mean, and covariance remain constant throughout time, and that the result of their analysis is dependable and can be used to forecast future capital market actions. The unit root was tested in this study by first evaluating the series at the level, which included a trend, and then trend and intercept, which took into account the series' features. However, we don't have any in order to dig deeper into our series. The sequence was then put to the test at the level and first difference in the investigation. The unit root tests will be performed using the ADF method, which will be confirmed by the PP test (Ihugba, 2020).

ADF Test

The ADF test was utilized in this study since it is the most widely used and approved approach for testing time series stationary characteristic. In the study of time series models and co-integration, testing for the presence of unit roots is a major concern. This test is designed to eliminate the problem of spurious regression, which is typical when dealing with time series data. A unit root indicates that the time-series data under consideration is non-stationary, whereas the absence of a unit root indicates that the stochastic process is stationary. The ADF evaluates the null hypothesis of the absence of a unit root in a time series sample, and if the ADF value is less than the critical value, the time series is considered non-stationary. The underlying times series, on the other hand, is stationary when the ADF value is bigger than its critical value.

Table 4.3a   Summary of ADF Test

ADF TEST @ LEVEL

Test Variables	ADF Test Statistic Value	Mackinnon Critical Value @ 5%	Order of Integration	P-Value	Decision
LOGAAO	-2.022307	-3.544284	1(0)	0.5693	**Non Stationary**
EXR	-0.958860	-3.544284	1(0)	0.9370	**Non Stationary**
LOGFDI	-1.887912	-3.544284	1(0)	0.6394	**Non Stationary**
MLR	-0.886816	-3.544284	1(0)	0.9464	**Non Stationary**
CPI	-0.953441	-3.544284	1(0)	0.9378	**Non Stationary**
ADF TEST @ 1ST DIFFERENCE					
LOGAAO	-5.941225	-3.548490	1(1)	0.0001	**Stationary**
EXR	-4.544916	-3.552973	1(1)	0.0050	**Stationary**
LOGFDI	-5.172271	-3.548490	1(1)	0.0010	**Stationary**
MLR	-5.094095	-3.548490	1(1)	0.0012	**Stationary**
CPI	-5.068426	-3.548490	1(1)	0.0013	**Stationary**

Source: E-VIEW 9.0 Arranged Result, 2022.

All of the variables under investigation, including; AAO, EXR, FDI, MLR and CPI, contain unit root tests at their first difference 1(1), implying that the series are non-stationary at the level but stationary at the level. The value of their respective ADF statistics, which is more than the threshold value of 5%, is evidence of this. Furthermore, the p-value for all variables, which is less than 5% level of significance greater than 95 percent confidence level, provides additional proof of stationary series. At the first difference, i.e. at order one, they all achieved stationarity.

PP Test

In error terms, the PP test outperforms the ADF test since it corrects for heteroscedasticity and serial correlation. PP tests do not require lag selection and are frequently based on a serially correlated regression error term. The following is shown in table 4.3b:

Table 4.3b   Summary of PP Test

PP TEST @ LEVEL					
Test Variables	PP Test Statistic Value	Adj. t-Stat. Value @ 5%	Order of Integration	P-Value	Decision
LOGAAO	-2.022307	-3.544284	1(0)	0.5693	**Non Stationary**
EXR	-0.958860	-3.544284	1(0)	0.9370	**Non Stationary**
LOGFDI	-1.865235	-3.544284	1(0)	0.6509	**Non Stationary**
MLR	-0.886816	-3.544284	1(0)	0.9464	**Non Stationary**
CPI	-1.013393	-3.544284	1(0)	0.9291	**Non Stationary**
PP TEST @ 1ST DIFFERENCE					
AAO	-5.952980	-3.548490	1(1)	0.0001	**Stationary**
EXR	-4.621648	-3.548490	1(1)	0.0040	**Stationary**
FDI	-4.091193	-3.548490	1(1)	0.0147	**Stationary**
MLR	-5.066438	-3.548490	1(1)	0.0013	**Stationary**
CPI	-5.068426	-3.548490	1(1)	0.0013	**Stationary**

Source: E-VIEW 9.0 Arranged Result, 2022.

All variables are non-stationary when assessed at a level with a trend, as demonstrated by the PP Test Statistic value being less than the Adj. t-Statistic value of 5% and the p-values for the variables being more than the allowed threshold of 5%. (0.05). Because the series are non-stationary when measured at constant and trend, it is concluded that they are non-stationary at a level. All variables, on the other hand, are stationary at first difference, as evidenced by the fact that the PP Test Statistic value is greater than the Adj. t-Stat. value of 5% and the p-values for the variables are less than the allowed level of 5%. (0.05). As a result, the ADF test results are validated by the PP test. Based on the findings of the PP test, Table 4.3b reveals that the series are non-stationary at the level but stationary at the first difference. Table 4.3b shows the variables in their differentiated form. Hence, the usage of the SVAR model for estimation is warranted.

The Structural VAR Model

This research adopted SVAR by employing a nine variable to represent an open economy that include foreign block variables which is similar to that of Ojede (2015) that modelled the US economy in determining whether exchange rate shock affects the agricultural sector. The variables thus employed are Share of AAO, EXR, FDI, MLR and CPI. The SVAR where analyzed in terms of SVAR Forecast Error Decomposition (FEVDs) and the Impulse-Response Function were estimated on the various measures of EXCRS in relation to the agricultural sector.

Variance Decomposition
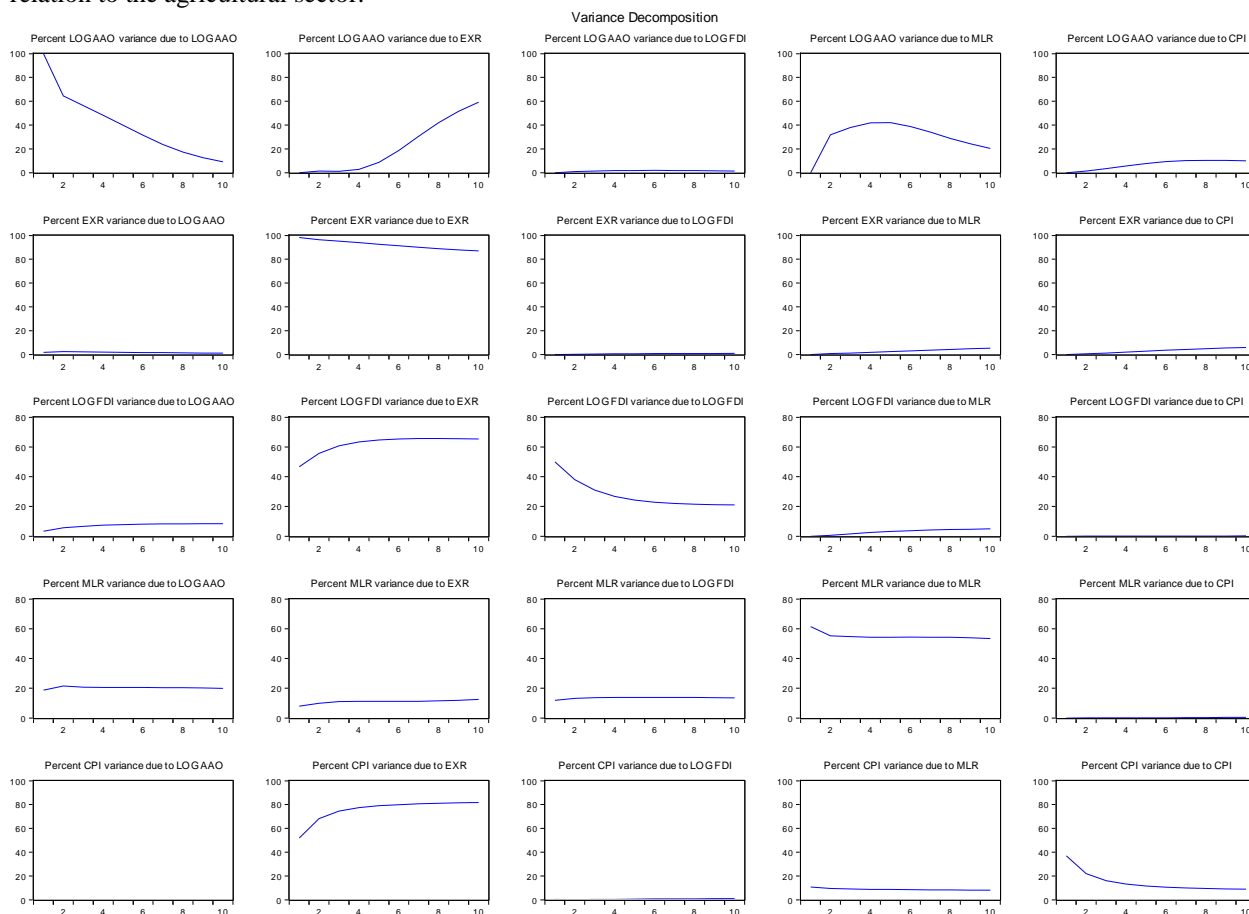
Source: EVIEWS, 9.0, 2022.

Response of LOGAAO: Period	LOGAAO	EXR	LOGFDI	MLR	CPI
1	0.030878	0.000000	0.000000	0.000000	0.000000
2	0.002970	-0.004586	-0.003593	-0.021730	0.004604

3	0.007910	-2.48E-05	-0.003311	-0.014739	0.006378
4	0.004714	0.006099	-0.003483	-0.014946	0.007847
5	0.003414	0.013045	-0.003568	-0.014166	0.009096
6	0.001861	0.020134	-0.003820	-0.014255	0.010405
7	0.000568	0.027348	-0.004201	-0.014721	0.011857
8	-0.000619	0.034782	-0.004709	-0.015627	0.013511
9	-0.001714	0.042601	-0.005336	-0.016928	0.015411
10	-0.002762	0.050990	-0.006081	-0.018624	0.017594

Response of EXR:

Period	LOGAAO	EXR	LOGFDI	MLR	CPI
1	-2.829240	20.66837	0.000000	0.000000	0.000000
2	-2.784731	15.30377	-1.035544	-2.129862	1.695412
3	-1.834335	13.71323	-1.325908	-2.437769	2.644500
4	-1.678863	13.77519	-1.473235	-3.031619	3.345584
5	-1.604309	14.71379	-1.589926	-3.573009	3.968811
6	-1.642995	16.18784	-1.737922	-4.196326	4.606900
7	-1.734406	18.07948	-1.929982	-4.894858	5.304001
8	-1.872739	20.36092	-2.170093	-5.685846	6.087544
9	-2.053462	23.04769	-2.459422	-6.580755	6.977992
10	-2.277754	26.17725	-2.800202	-7.594912	7.994281

Response of LOGFDI:

Period	LOGAAO	EXR	LOGFDI	MLR	CPI
1	0.011292	-0.042645	0.044059	0.000000	0.000000
2	0.015905	-0.043920	0.025005	-0.006243	0.000461
3	0.014766	-0.040940	0.013969	-0.010265	0.000939
4	0.013409	-0.035744	0.007753	-0.010931	0.001245
5	0.011496	-0.029858	0.004217	-0.010503	0.001456
6	0.009607	-0.024043	0.002202	-0.009535	0.001611
7	0.007856	-0.018669	0.001036	-0.008461	0.001749
8	0.006318	-0.013861	0.000344	-0.007459	0.001895
9	0.005000	-0.009617	-8.91E-05	-0.006613	0.002064
10	0.003887	-0.005875	-0.000381	-0.005949	0.002267

Response of MLR:

Period	LOGAAO	EXR	LOGFDI	MLR	CPI
1	0.819902	0.533965	0.654528	1.484670	0.000000
2	-0.442458	0.340428	0.322317	0.149113	-0.000551
3	-0.073571	0.250731	0.211360	0.287594	-0.031016
4	-0.101262	0.141120	0.123736	0.153065	-0.036395
5	-0.054359	0.059170	0.077848	0.123863	-0.041637
6	-0.037076	-0.007010	0.051088	0.096427	-0.045752
7	-0.021316	-0.060570	0.037102	0.084741	-0.050740
8	-0.010629	-0.106739	0.030345	0.079629	-0.056771
9	-0.002193	-0.149077	0.027967	0.079733	-0.064044
10	0.004660	-0.190323	0.028255	0.083386	-0.072646

Response of CPI: Period	LOGAAO	EXR	LOGFDI	MLR	CPI
1	0.176167	3.940608	0.332497	-1.800316	3.319687
2	-0.327488	7.053943	-0.107954	-2.419445	3.161901
3	-0.569095	9.162016	-0.538949	-2.991591	3.352000
4	-0.749894	10.99802	-0.913017	-3.553839	3.727082
5	-0.920380	12.87392	-1.238379	-4.125385	4.221688
6	-1.104265	14.92945	-1.537875	-4.737254	4.814519
7	-1.309016	17.23983	-1.833108	-5.414515	5.503776
8	-1.538736	19.85928	-2.141516	-6.179163	6.296978
9	-1.796847	22.83880	-2.476768	-7.051000	7.206660
10	-2.087385	26.23340	-2.850055	-8.049362	8.248751

Cholesky Ordering:
LOGAAO
EXR
LOGFDI
MLR
CPI

Source: EVIEWS, 9.0, 2022.

The results from the Impulse-Response Function showed that EXR exert negative effects on AAO. The results imply that EXR have negative and insignificant effects on AAO in Nigeria. This implies that the fluctuation of EXR in Nigeria due shock has adverse effect AAO in Nigeria.

Also, FDI have positive effect AAO in Nigeria, this implies that attracting FDI to Nigeria with favourable exchange rate will go a long way in AAO output in Nigeria as display in the Impulse-Response Function of SVAR model.

More also, the results from the Impulse-Response Function showed that MLR exert negative effects on AAO. The results imply that MLR have negative and insignificant effects on AAO in Nigeria. This implies that the persistent increase of MLR in Nigeria would have adverse effect AAO in Nigeria.

Finally, the results from the Impulse-Response Function showed that CPI exert negative effects on AAO in Nigeria. The results imply that CPI has negative and insignificant effects on AAO in Nigeria. This implies that the persistent increase of general prices level of goods in Nigeria would have adverse effect AAO in Nigeria.

CONCLUSION

The study investigated the relationship between EXCRS and Agricultural Sector performance in Nigeria, for the period of 2001-2020 (20years). Secondary data were sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics (NBS) statistical databases. The specific objectives are to examine the measures of EXCRS, namely; EXR, FDI, MLR and CPI on Agricultural Sector performance proxied with AAO in Nigeria. The data set was described using descriptive statistics and the unit root test was conducted (using ADF and PP Tests) to ascertain if the data are stationary in order to have accurate. The SVAR where analyzed in terms of SVAR Forecast Error Decomposition (FEVDs) and the Impulse-Response Function result with the aids of E-VIEW version 9.0 for the purpose of testing the research hypotheses raised The findings revealed that EXR, MLR and CPI have negative and insignificant effect on AAO in Nigeria while FDI positive and significant effect on AAO in Nigeria. Hence, the study concluded that EXCRS and has an insignificant influence on agricultural sector performance in Nigeria.

RECOMMENDATIONS

Based on the findings gotten from this study, the following recommendations are therefore made from the results:

1.   Since EXR has insignificant effect on aggregate agricultural output, it is recommended that Nigerian government should re-position it fluctuating exchange rate in the bids to increase its agricultural sector output.

2.   Also, FDI has significant effect on AAO in Nigeria, hence, it is recommended that foreign direct investment level in the market should be maintained and improved upon, so as it will continue to contribute immensely to AAO in Nigeria.

3.   MLR has insignificant effects on AAO, thereby recommends that MLR should be improved upon in other for it to impacts the AAO in Nigeria, in a short and long run terms.

4.   Finally, the CPI is insignificant. Thus, it is recommended that modalities should be put in place to improve upon the CPI because this will go a long way in accelerating AAO in Nigeria.

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