EFFECT OF EXCHANGE RATE AND INFLATION RATE ON AGRICULTURAL SECTOR OUTPUT IN NIGERIA

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ABSTRACT
The study examined the effect of exchange rate and inflation rate on agricultural sector output in Nigeria from 1981 to 2020. In other to achieve the objective of this study, the Autoregressive Distributed Lag (ARDL) approach was used to analyse the effect of the data on agricultural sector output. The findings reveal that exchange rate and inflation rate has negative insignificant effect on agricultural output (AGDP) while commercial bank credit to agriculture has positive insignificant effect on agricultural sector output (AGDP) in the longrun. In addition, the short-run results revealed that the current value of exchange rate and its lag value (-2), inflation rate current value and commercial bank credit's current value and its lag value (-1) have negative effect on agricultural output in the short-run. Similarly, the short run result also showed that the lag values of exchange rate (-1, -3), the lag values of inflation rate (-1, -2 and -3) has positive relationship with agricultural sector output (AGDP)in the shortrun. Consequently, the study recommends among other things that Government should ensure adequate and effective implementation of *policies that would enhance stable exchange rates, as effective* and prudent management of exchange rate policies will significantly ensure stability of country's exchange rate (naira). So also government should put in place policy that will help curb inflation. Policy such as selective credit control can be introduced by the central bank of Nigeria with full implementation. As this will help increase production forcing the price of agricultural goods and services to reduce.

Keywords: Agriculture, Agricultural sector, Exchange rate, Inflation rate
JEL: Q17, Q18, Q28.

1. INTRODUCTION

Agriculture constitutes one of the most important sectors of the Nigerian economy. It is also a veritable tool in combating poverty in the third world countries and achieving long term economic development. Although Nigeria depends heavily on the oil industry for its budgetary revenues, the country is predominantly still an agricultural society with approximately 70% of the population engaging in agricultural production at subsistence level, hence the role of agriculture in human development cannot be overemphasized. The agricultural sector is seen as one of the major sectors in the economy, contributing to its development through production of goods, foreign exchange and exports. Agriculture is necessary for the sustenance of life and it is the bedrock of a country's economic development, especially in the supply of adequate and nutritious food so vital for the development of humans and industrial raw materials. Based on the varying climatic conditions of regions and the vast and rich soil, the country produces varieties of crops while a significant portion of the agricultural sector in Nigeria involves in livestock production, fishing, poultry, and lumbering. The sector is made up of four sub-sectors: Crop Production, Livestock, Forestry and Fishing.

Available statistics from World Bank Development Indices shows that agriculture is the most important Nigerian economic sector and remain the largest sector that contributes an average of 24% to the nation's GDP and providing employment for about 35% of the population including about 80% of the rural population as of 2020 (World Bank, 2020). As reported by the (FAO, 2020). A feat which ranks the sector as the largest employer of labour in the country. Agriculture remains the foundation of the Nigerian economy, despite the presence of oil in the country. It is the main source of livelihood for most Nigerians.

Due to the sector's importance, successive governments have propounded policy programmes and strategies both monetarily and otherwise to revitalize agriculture in Nigeria from 1960 with all programmes aimed at increasing agricultural output for consumption and export, provide inputs and subsidies to small scale farmers, make credit facilities accessible to a large segment of rural farmers, eradicate poverty, create employment and raise the standard of living. These programmes included the Farm Settlement Scheme policy of 1959, the National Accelerated Food Production Programme (NAFPP) launched in 1972, the Agricultural Development Programme (ADP) of 1974 and 1989, Operation Feed the Nation (OFN) in 1976, the River Basin Development Authorities (RBDAs) launched in 1976, and the Green Revolution (GR) launched in 1980. The Directorate for Food Roads and Rural Infrastructure (DFRRI) launched in 1986, the Better Life Programme (BLP) For Rural Women introduced in 1987, the National Agricultural Land Development Authority (NALDA) , launched in 1992 , the Family Support Programme (FSP)/ Family Economic Advancement Programme (FEAP) launched in 1994 and 1996 respectively, the National Fadama Development Project (NFDP) of the early 1990s , the National Economic Empowerment and Development Strategy (NEEDS) launched in 1999, the National, Special Programme on Food Security (NSPFS) launched in 2002, the Root and Tuber Expansion Programme (RTEP) launched in 2003, Seven Point Agenda of 2007 and Transformation Agenda of 2011.

Other recent initiatives and programmes of government on agriculture includes; Action Against Desertification (AAD) Programme launch in 2014, the Agriculture Promotion Policy (APP) 2016-2020 which is expected to unlock the sectors potentials, reduce dependence on crude oil., Nigeria–

Africa Trade and Investment Promotion Programme, Presidential Economic Diversification Initiative launch in July 2017, Economic and Export Promotion Incentives and the Zero Reject Initiative also conceived in 2017, Reducing Emission from Deforestation and Forest Degradation (REDD+) 2015; Nigeria Erosion and Watershed Management Project (NEWMAP) in 2018. All the above mentioned strategy and programmes has direct link to macroeconomic policy aimed to provide a stable economic environment that is conducive to fostering strong and sustainable economic growth in the country. However, with oil discovery and the oil boom of the 1970s, the sector suffered neglect with the sector's contribution to GDP declining to around 21.91% in 2019 from 65.7% in 1957 leading to food insecurity and increased level of poverty in the country. As of 2019, the population growth rate is higher than the economic growth rate, leading to a slow rise in poverty. According to report by the World Bank, almost half the population is living below the international poverty line ($2 per day), and unemployment peaked at 33.30% in the fourth quarter of 2020 (World Bank 2020). Despite the contribution to the economy, Nigeria's agricultural sector faces many challenges which impact on its productivity.

Consequently, the questions that arises from this study are: what are the effect of exchange rate and inflation rate on agricultural sector output in Nigeria? Is there a long-run relationship between the variables mentioned and agricultural sector output in Nigeria? The main objective is therefore to examined the effect of exchange rate and inflation rate on agricultural sector output in Nigeria, from 1981 to 2020. With the following specific objectives: to analyse the effect of exchange rates on agricultural output in Nigeria, to evaluate the effect of inflation rates and its consequences on agricultural output in Nigeria and to investigate the long run relationship between the variables and agricultural sector output in Nigeria. The rest of the paper is divided into the following sections; section two s literature review which comprises of conceptual literature, theoretical review and empirical literature; section three is the methodology; section four unveil data analysis and results interpretation; section five is conclusion and recommendations.

2. LITERATURE REVIEW

2.1 Conceptual Literature

Concept such as agriculture, agricultural industry, exchange rate and inflation rate are empirically define in this section.

Agriculture

Agriculture, according to Egwu (2016), is an activity that primarily supplies food for humans and raw materials for industry. It includes all of man's creative efforts in conjunction with nature to develop plants and rear animals for a higher output. Akinboyo (2008) described agriculture as the study of using land to grow plants and animals. It entails the commercialization of nature's food webs as well as the redirection of energy for human planting and animal consumption.

Agricultural Industry

According to Okopi (2008), the agricultural industry in Nigeria encompasses all sub-sectors of the primary industries. Farming (including livestock husbandry and agricultural cultivation), fishing, and forestry are among them. Agriculture is the backbone of the majority of Nigerian households and a substantial part of the Nigerian economy (Ayeomoni & Aladejana, 2016). The agricultural

industry provides significant economic advantages to Nigeria, including the provision of food, contribution to GDP, employment, raw materials for agro-allied businesses, and the creation of foreign currency (Ogbonna & Osondu, 2015). Okolo (2004) posit that the agricultural sector is the most significant sector of the economy, with a lot of promise for the nation's future economic growth, as it has done in the past.

Exchange Rate

The exchange rate, often known as the international exchange rate, refers to how much one currency is worth in comparison to another. It is the cost of exchanging one currency for another. According to Ngerebo-a and Ibe (2013), an exchange rate is the ratio of a unit of one currency to the amount of another currency for which that unit may be exchanged at a given moment. Jhingan (2003) also defined exchange rate as the price at which one currency is exchanged for another. It is the value of one currency in terms of another. Mordi (2006) defined exchange rates as the price of one currency relative to another, as well as the number of units of one currency necessary to purchase another. Exchange rate connects the local and international prices of goods and services. In addition, the currency rate might rise or fall.

Inflation

Inflation is defined as a continuous increase in the overall price level of goods and services in an economy over time. Inflation, according to Jeremiah and Emmanuel (2015) is a persistent and ongoing rise in the general price level of goods and services in an economy. Inflation also refers to a steady increase in the economy's overall price level, which impacts the value of the native currency (Fatukasi, 2004).

To Lipsey and Chrystal (1995), Inflation refers to as generalised increase in the level of price in an economy over time, i.e., a persistent rise in the price levels of goods and services, resulting in a decrease in the currency's buying power. Each unit of money buys less goods and services when the general price level rises. As a result, inflation represents a loss in purchasing power per unit of money. It is a loss of real value in the economy's medium of exchange and unit of account.

2.2 Theoretical Literature

There are several theories establishing the relationship between exchange rate, inflation rate and agricultural sector output in Nigeria. These theories are based on justifiable reasoning of rationality. We take a look at some of them as related to this study.

2.2.1 Neo-classical Growth Theory

Neo-classical growth theory is an economic theory that outlines how a steady economic growth rate results from a combination of three driving forces; labour, capital, and technology. The National Bureau of Economic Research names Robert Solow and Trevor Swan as having the credit of developing and introducing the model of long-run economic growth in 1956. Growth in the Solow sense is an exogenous model of long-run economic growth set within the framework of neoclassical economics. Solow (1956) postulated that economic growth results from the accumulation of physical capital and an expansion of the labour force in conjunction with an

"exogenous" factor, technological progress that makes physical capital and labour more productive. This growth theory posits that the accumulation of capital within an economy, and how people use that capital, is important for economic growth. Further, the relationship between the capital and labour of an economy determines its output. Finally, technology is thought to augment labour productivity and increase the output capabilities of labour.

2.2.2 Endogenous Growth Theory

In reaction to the important drawback of the neoclassical growth theories which is their inability to explain the component of output growth attributable to technological progress termed the "Solow residual" in the Solow growth accounting equation, the endogenous growth models, pioneered by Romer (1986, 1990) came on board to shed light on the determinants of technological progress. The theory offered a fresh perspective on what propelled economic growth. It argued that a persistent rate of prosperity is influenced by internal processes such as human capital, innovation and investment capital, rather than external, uncontrollable forces, challenging the view of neoclassical economics. Endogenous growth economists believe that improvements in productivity can be tied directly to faster innovation and more investments in human capital. As such, they advocate for government and private sector institutions to nurture innovation initiatives and offer incentives for individuals and businesses to be more creative, such as research and development (R&D) funding and intellectual property rights. The idea is that in a knowledge based economy, the spillover effects from investment in technology and people keep generating returns.

This is due to the fact that investments in physical and human capital can generate external economies and productivity improvements that are greater than private gains by an amount sufficient to offset diminishing returns, the net result of which is sustained long-run growth; an outcome that is neglected by the traditional neoclassical growth theory (Todaro & Smith, 2012).

2.2.3 Export -Led Growth Theory

The export-led growth hypothesis postulates that export expansion is one of the main determinants of growth. It holds that the overall growth of the countries can be generated not only by increasing the amounts of labour and capital within the economy, but also by expanding exports. In addition, growth in export encourages the domestic firms to specialize on the production of export goods which will lead to an increase in productivity level. Trade enables a country to access more advanced production technique in order to improve its production and to accelerate its growth rate. Therefore, country will develop its production in accordance with its comparative advantage and will achieve economies of scale to reach foreign markets (Giles & Williams, 2000).

Export contributes to the balance of payments and increases the employment opportunities of a country. The origin of export-led growth theory is traceable to the great depression of 1929 which brings hardship to many economies. After the depression is over during the 1950s and 1960s, the Asian countries such as Taiwan and South Korea started focusing their development outward, resulting in an export-led growth strategy. The export-led growth hypothesis claims that export is capable of affecting economic growth by encouraging the domestic producers to use better production techniques and to be more competitive in the world market.

Child (2008) and Marc (2006) observed that countries at the early stages of development depend almost fully on agricultural growth for employment, foreign exchange, government revenue and

food supply to the teeming population. In this sense, agricultural growth is the key impetus to the growth of underdeveloped and developing countries (Enoma & Anthony 2010). Therefore, this study adopted the export-led growth theory as a working framework because it lays more emphasis on output growth especially agricultural output, both for domestic consumption and exports, which results into self-sufficiency in food production, foreign exchange earnings, increase in GDP, and improved standard of living etc.

2.3 Empirical Literature

A considerable number of previous studies are reviewed in this study. Chukwuemeka and Ibekwe (2020) examined the effects of Exchange Rate on Agricultural Sector Output in Nigeria from 1987 to 2019. The study adopted the use of Ordinary Least Square (OLS). The result of regression indicate that nominal exchange rate and money supply has positive and significant effect on agricultural sector output while interest rate and inflation rate has negative and insignificant effect on agricultural sector output.

Adisu (2019) examined the effect of some macroeconomic variables on agricultural sector output in Ethiopia from the year 1991 to 2017. The study employed Autoregressive Distributed Lag (ARDL) bounds test approach and error correction model (ECM)., accordingly, the study found a long-run relationship between agricultural sector output and macroeconomic variables such as; inflation rate, lending rate, trade balance, foreign direct investment, exchange rate and external debt stock. Trade balance which is negative throughout the study year and, external debt stock has a negative effect on agricultural sector output; both in the long-run and in the short-run. The official exchange rate and lending rate have a positive and significant effect. However, inflation rate and foreign direct investment have insignificance effect on agricultural output.

Obasaju and Baiyegunhi (2019) assessed the short-run and long-run linkages of macroeconomic policies with real agricultural output in Nigeria (1980: Q1 – 2014: Q4) by a vector error correction model (VECM) and Variance Decomposition techniques. Data were sourced from Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. their study showed that in the longrun, inflation and money supply are the two macroeconomic variables that are statistically significant in explaining variation in real agricultural output, with inflation having greater impact on real agricultural output. Also among his findings are that inflation rate Granger-causes real agricultural output in Nigeria.

Onakoya et al., (2018) took a critical long run and short run analysis of value addition in agriculture between 1970 and 2016 was the main objective. The Vector Error Correction Model (VECM) technique was used to analyse the data. Their finding showed that in the long run, inflation rate, exchange rate and agricultural employment rate were positively related and significant in forecasting the value added in agricultural output.

Shakira (2018) assessed the determinants of agricultural productivity in Malawi. Using a time series data sourced from Food and Agricultural Organization, World Bank and locally from National statistics office between 1980 and 2013. Also, Autoregressive Distributed Lag (ARDL) Model was applied to analyze the data, the study found in the long run, an increase in agricultural

expenditure increases agricultural productivity. In the short run, an increase in inflation will increase agricultural productivity; however, there is no significant relationship in the long- run.

Udoka et al., (2016), examined the effect of commercial banks' credit on agricultural output in Nigeria covering the period 1970 to 2014. The study employed data sourced from Central Bank of Nigeria Statistical bulletin. Ordinary Least Square technique was employed to estimate the parameter which shows the relationships between the explanatory variables and the agricultural production in Nigeria. The result showed that there was positive and significant relationship between commercial banks' credit to the agricultural sector and agricultural production in Nigeria.

Oluwatoyose et al., (2016) examined the macroeconomic factors affecting the Nigeria's agricultural sector between 1981 and 2013 using data sourced from CBN statistical bulletin. Modified OLS and Multivariate Cointegration approach methodology was employed for the analyses respectively. They found that commercial bank loan to agriculture, interest rate and food imports are significant factors affecting agricultural output, whereas exchange rate, inflation rate and unemployment rate turned out to be insignificant factors driving Nigeria's agricultural output.

Oyinbo et al., (2014) examined the nexus between exchange rate deregulation and Agricultural share of gross domestic product in Nigeria over the period 1986-2011 by employing Granger causality test and VECM. Data were obtained from Central Bank of Nigeria (CBN) Statistics Bulletin. The study found that there was unidirectional causality from exchange rate to agricultural share of real GDP. They also showed that exchange rate deregulation has negative influence on agricultural share of real GDP.

Yaqub (2010) examined the exchange rate changes and output performance in Nigeria from 1970 to 2007. The study adopted the modified IS-LM framework and estimated the behavitheal equations as a system using the seeming unrelated regression estimation technique. The results obtained indicated that exchange rate had significant contractionary effects on agricultural and manufacturing sectors while it had expansionary effect on services sector.

From the several literatures reviewed both empirically and theoretically in this study, it is evident that there is divergent opinion from different authors regarding effects of exchange rate and inflation rate on the output of agricultural sector. Chukwuemeka and Ibekwe (2020), Adisu (2019), Obasaju and Baiyegunhi (2019), Onakoya et al., (2018), Shakira (2018), Udoka et al., (2016), Oluwatoyose et al., (2016), Oyinbo et al., (2014) and Yaqub (2010). Some of the gaps discovered was in the area of methodology while some was the scope, some findings revealed positive effect in the relationship as in the case of Chukwuemeka and Ibekwe (2020), Onakoya et al., (2018), Oyinbo et al (2014), Yakub (2010) etc. while others Adisu (2019), Obasaju and Baiyegunhi (2019) reported negative relationship between those variables used and agricultural output. It was also discovered that none of these studies has been able to capture the effect of exchange rate and inflation rate on agricultural sector output in the long and short run using Nigeria as their case study. All these aforementioned gaps premeditated this work. Hence, the study examined the effect of exchange rate and inflation rate in the long run on the output of Nigerian agricultural sector from 1981 to 2020.

3. METHODOLOGY

3.1 Theoretical framework

This study is anchored on the export-led growth theory because it lays more emphasis on output growth especially agricultural output, both for domestic consumption and export, which results into self-sufficiency in food production, foreign exchange earnings, increase in gross domestic product and improved standard of living etc., as observed by Child (2008) and Marc (2006) that countries at the early stages of development depend almost fully on agricultural growth for employment, foreign exchange, government revenue and food supply to the teeming population. In this sense, agricultural growth is the key impetus to the growth of underdeveloped and developing countries (Enoma & Anthony, 2010).

3.2 Sources of Data

This study makes use of secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin (2021). The variables on which data were collected were agricultural gross domestic product (AGDP) as a ratio of total GDP (Used as a proxy for agricultural sector output) which is the dependent variable, while the independent variables are nominal exchange rate (EXCR) in naira per US dollar (₦/$) and annual rate of inflation (INFR) in percentage (%) respectively.

3.3 Model specification

This study adopted the model of Adisu (2019) who applied the Autoregressive Distributed Lag (ARDL) model approach to establish the effect of some macroeconomic variables on agricultural sector output in Ethopia from 1991 to 2017. The model is specified as follows:

$AGDP = f\ (laggedINF, LR, TB, FDI, ER, DBT)$ ……..*1*

Where: AGDP, INF, LR, TB, FDI, ER and DBT stands for agricultural output, inflation rate, lending rate, trade balance, foreign direct investment, official exchange rate and external debt stock respectively. The multiple regression equation models to explore the macroeconomic factors that influence agricultural output in Ethiopia is stated as:

$lnAGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 LR_t + \beta_3 TB_t + \beta_4 lnFDI_t + \beta_5 lnER_t + \beta_6 lnDBT_t + \upsilon_t$ ……*2*

Where: *LnAGDPt* = the natural log of agricultural output, *INFt* = inflation rate, *LRt* = lending rate, *TBt* = trade balance, *lnFDIt* = the natural log of foreign direct investment, *lnERt* = the natural log of official exchange rate, *ln*DBTt = external debt service, β_1- β_7 = the parameter to be estimated and υ_t = the stochastic error term.

Therefore, this study adopted the model used by Adisu (2019) by retaining variables such as AGDP, EXCR and INFR and removing LR, TB, FDI and DBT respectively. Given the above, the model for this study is stated as:

$AGDP = f(EXCR, INFR\ CBC)$ ……..*3*

Where: AGDP = Agricultural GDP as a ratio of total GDP (Used as a proxy for agricultural sector output), EXCR= Nominal exchange rate in naira per US dollar (₦/$), INFR = Annual rate of

inflation in percent (%) and CBC = Commercial Bank Credit to Agriculture incorporated in the model as a control variable due to the role it plays at macro level in aiding agricultural productivity in Nigeria.
This is expressed in an explicit econometric equation as:

$$AGDP_t = \lambda_0 + \lambda_1 EXCR_t + \lambda_2 INFR_t + \lambda_3 CBC_t + \upsilon_t \quad \ldots\ldots 4$$

For estimation purpose, equation (4) is re-specified in a log – linear functional form in order to linearize non-linear variables and also to minimize spurious results, the study therefore, converted the data of the parameters above into their natural log form. Hence, the new equation is of the form:

$$lnAGDP_t = \lambda_0 + \lambda_1 EXCR_t + \lambda_2 INFR_t + \lambda_3 lnCBC_t + \upsilon_t \quad \ldots\ldots 5$$

Where: $lnAGDP_t$ = the natural log of agricultural GDP as a ratio of total GDP (Used as a proxy for agricultural sector output), $EXCR_t$ = nominal exchange rate in naira per US dollar (₦/$), $INFR_t$ = the annual rate of inflation in percent (%), $lnCBC$= the natural log of commercial bank credit to agriculture, υ_t = error terms, *ln* = natural log transformation and $\lambda_0 - \lambda_3$ = parameters to be estimated.

The above equation (5) is re arranged into ARDL form adapted from the work of Adisu (2019) to estimate both short-run and long- run relations and error correction term (ECT). The resulting new equations (6) is as follows;

$$\Delta \ln AGDP_t = \lambda_0 + \sum_{i=1}^{P} \lambda_1 \Delta \ln AGDP_{t-i} + \sum_{I=0}^{q} \lambda_2 \Delta EXCR_{t-i} + \sum_{i=0}^{q} \lambda_3 \Delta INFR_{t-i} + \sum_{i=0}^{q} \lambda_4 \Delta \ln CBC_{t-i} + \beta_1 \ln AGDP_{t-1} +$$

$$\beta_2 EXCR_{t-1} + \beta_3 INFR_{t-1} + \beta_3 \ln CBC_{t-1} + \Phi ECT_{t-1} + \upsilon_t \quad \ldots\ldots 6$$

Where: $\beta_1, \beta_2, \beta_3, \beta_4$ = Partial coefficient of the longrun equation, $\lambda_1, \lambda_2, \lambda_3, \lambda_4$ = Partial coefficient of shortrun equation, Φ = coefficient of error correction model, p = Lag of dependent variable, q = Lag of independent variables, $\sum$ = Summation sign, Δ = Difference operator, Ln = Log transformation, U_t = Error terms

The F-statistics is used to test for levels or longrun relationship among the variables. The null hypothesis is being tested by;

$\beta_1=\beta_2=\beta_3=\beta_4=0$ which means there is no cointegration among the variables. Ones cointegration is established, the longrun relationship is estimated using linear ARDL model as specified.

The reason for adapting ARDL model for this work was as a result of the Unit root test for stationarity which shows different other of integration I(1) and I(0). Hence the model was used to analyse the effect of the data on agricultural sector output (AGDP).

4. RESULTS AND DISCUSSION

Table 1: Results of the ADF Unit Root Test

Variables	T-statistic	Level of Significant 5%	P- Value	Remarks
LAGDP	-5.872816	-3.533083	0.0001	I(1)
EXCR	-4.716320	-3.533083	0.0028	I(1)
INFR	-4.059406	-3.568379	0.0163	I(0)
LCBC	-7.093479	-3.533083	0.0000	I(1)

Source: Authors computation using E-views 10

The unit root test of stationarity was carried out using Augmented Dickey Fuller (ADF) unit root test. The result of the ADF tests shown in table 1 showed that LAGDP, EXCR and LCBC are stationary at first difference I(1) while INFR was stationary at level I(0). Therefore, the variables under study are not integrated of the same order and this justifies the use of bounds approach to cointegration over other conventional approaches that require the variables to be integrated of the same order and therefore qualifies to test the long run relationship among the variables using ARDL bound testing technique.

Table 2: Result of Lag selection for Co-Integration Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-413.1482	NA	72918.43	22.54855	22.72271	22.60995
1	-258.3183	267.8140*	40.42206*	15.04423*	15.91500*	15.35122*
2	-248.1083	15.45284	57.13980	15.35721	16.92459	15.90978
3	-238.2747	12.75719	86.84113	15.69052	17.95452	16.48869

Source: Authors computation using E-views 10

Table 2 presents the lag order selection by five different criteria i.e. LR, FPE, AIC, SC and HQ. All the five selection criteria(s) suggests one (1) lag selection. Hence, this study therefore adopted the use of optimal lags of one (1) for the cointegration test.

Table 3: F-Bound Test for Co-Integration

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.902272	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

Source: Authors computation using E-views 10

The result of the F-bound co-integration in table 3 revealed that the value of F-statistics is 4.902272, which is greater than both the upper bound critical value of (4.35) and lower bound critical value of (3.23) at 5% level of significance. This implies that there is a cointegration (long run relationship) between agricultural sector output (LAGDP), exchange rate (EXCR), inflation rate (INFR) and commercial bank credit to agriculture (LCBC). Therefore, the null hypothesis of no cointegration between the variables is rejected and the alternative hypothesis is accepted. Hence, the variables have long run equilibrium relationship with one another.

Table 4: Result of long-run ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCR	-0.020422	0.051650	-0.395391	0.6965
INFR	-0.072557	0.140163	-0.517659	0.6101
LCBC	0.732472	1.140798	0.642070	0.5278

Source: Authors computation using E-views 10

Table 4 shows the result of long-run ARDL estimation. The result shows that exchange rate (EXCR) have negative insignificant relationship with agricultural sector output (AGDP). The coefficient of the exchange rate (LEXCR) is -0.020422. This implies that a percent increase in exchange rate will decrease agricultural sector output by 0.0204%. This result conformed to the apriori expectation. The result also supports the findings of Oluwatoyese et al., (2016), Oyinbo et al., (2014) and disagreed with the findings of Yakub (2010). Adisu (2019), Shariff and Noor (2015) and Yakub (2010). Increase in exchange rate may discourage importation of farm machineries and inputs thus affecting the overall agricultural productivity

Similarly, Inflation rate (INFR) has a negative insignificant relationship with agricultural sector output (AGDP) in the long run with an estimated coefficient of -0.072557. This implies that agricultural sector output (AGDP) has a negative relationship with the rate of inflation in the country. The result is consistent with economic theories. because increase in inflation will raise the price of agricultural commodities which could result in reduction in agricultural commodity demand and supply in the long run period. Therefore, increasing inflation rate (INFR) by one percent will result to reduction in agricultural sector output (AGDP) by 0.073% and vice versa. This also support the findings of Chukwuemeka and Ibekwe (2020) and Adisu (2019).

The result also revealed that commercial bank credit introduced as control variable have a positive insignificant relationship with agricultural sector output (AGDP) in the long run with an estimated coefficient of 0.732472. it thus implies that a percent increase in LCBC will increase a AGDP by 0.733% in the long run.

Table 5: Result of Short-run ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.594641	0.113079	5.258629	0.0000
D(EXCR)	-0.000189	0.000530	-0.356816	0.7248
D(EXCR(-1))	0.000553	0.000567	0.974299	0.3410

D(EXCR(-2))	-0.000427	0.000580	-0.737377	0.4691
D(EXCR(-3))	0.003672	0.000598	6.143806	0.0000
D(INFR)	-0.000746	0.000717	-1.039975	0.3102
D(INFR(-1))	0.003184	0.000908	3.507037	0.0021
D(INFR(-2))	0.002327	0.000805	2.891686	0.0087
D(INFR(-3))	0.001447	0.000794	1.823543	0.0825
D(LCBC)	-0.019802	0.036173	-0.547420	0.5899
D(LCBC(-1))	-0.052570	0.038185	-1.376709	0.1831
ECT(-1)*	-0.057666	0.012181	-4.733961	0.0001

Source: Authors computation using E-views 10

Table 5 shows the estimation of short run model. The result reveals that the current value of exchange rate and its lag value (-2), inflation rate current value and commercial bank credit current value and its lag value (-1) have negative effect on agricultural output in the short-run with coefficients of -0.000189, -0.000427, -0.000746, -0.019802 and -0.052570 respectively. This mean that, a percent increases in these variables will lead to a reduction in agricultural sector output (AGDP) by 0.0002%, 0.0004%, 0.0008%, 0.0198% and 0.053%. Similarly, the short run result also showed that the lag values of exchange rate (-1, -3), the lag values of inflation rate (-1, -2 and -3) are positive with coefficients of 0.000553, 0.003672, 0.003184, 0.002327 and 0.001447 respectively. This implies that a percent increase in the variables of study will increase agricultural sector output by 0.0006%, 0.0037%, 0.0032%, 0.00233% and 0.0015% in the shortrun.
The ECT which determines the speed of adjustment from the short run dynamics to longrun equilibrium is negative which is fine and appropriate. From the above estimation, the coefficient of ECT is negative (-0.057666) and statistically significant (0.0001). Suggesting that almost 0.058% of the discrepancy between the long run and short run is going to be corrected annually.

5.0 CONCLUSION AND POLICY RECOMMENDATION

The study examined the effect of exchange rate and inflation rate on agricultural sector output in Nigeria. The study employed ARDL model approach adopted from the work of Adisu (2019) to analyse the effect of the variables on agricultural sector output. The result shows that exchange rate has negative insignificant effect on agricultural sector output (AGDP) in the long-run. This result conformed to the apriori expectation. The result also supports the findings of Oluwatoyese et al., (2016), Oyinbo et al., (2014) and disagreed with the findings of Yakub (2010). Adisu (2019), Shariff and Noor (2015) and Yakub (2010). Therefore, the result fulfils objective number one of the study. Inflation rate also has negative insignificant effects on agricultural sector output (AGDP). This result is consistent with economic theories. This also conform with the findings of Chukwuemeka and Ibekwe (2020) and Adisu (2019), it therefore fulfilled objective two.

Results from the shortrun estimation revealed that the current value of exchange rate and its lag value (-2), inflation rate current value and commercial bank credit current value and its lag value (-1) have negative effect on agricultural output in the short-run with coefficients of -0.000189, -0.000427, -0.000746, -0.019802 and -0.052570 respectively. This mean that, a percent increases in these variables will lead to a reduction in agricultural sector output (AGDP) by 0.0002%, 0.0004%, 0.0008%, 0.0198% and 0.053%. Similarly, the short run result also showed that the lag

values of exchange rate (-1, -3), the lag values of inflation rate (-1, -2 and -3) are positive with coefficients of 0.000553, 0.003672, 0.003184, 0.002327 and 0.001447 respectively. This implies that a percent increase in the variables of study will increase agricultural sector output by 0.0006%, 0.0037%, 0.0032%, 0.00233% and 0.0015% in the shortrun. Result from F- bound test also reveal that there is long run relationship between the variables of study and agricultural sector output (AGDP) in Nigeria, this also conformed with objective number three which has been achieved

Based on these findings, it can be affirmed that exchange rate and inflation rate within the period of observation has effect on agricultural sector output in Nigeria both in the long run and short run. Therefore, the study made the following recommendations:

i. Government should ensure adequate and effective implementation of policies that would enhance stable exchange rates, as effective and prudent management of exchange rate policies will significantly ensure stability of country's exchange rate (naira), since exchange rate depreciation affects agricultural output negatively, maintenance of favourable exchange rate policy will help the farmers to import the needed technology to improve efficiency in the sector and operates in large scale.

ii. Government should also put in place policy that will help curb inflation. Policy such as selective credit control can be introduced by the central bank of Nigeria with full implementation. As this will help increase production forcing the price of agricultural goods and services to reduce.

iii. The study also recommends providing easier access to commercial bank credit at low interest rate as this will encourage more investors into the sector. With adequate financing which is easily accessible, purchase and maintenance of farm equipment used for production will be made much easier which will hasten the production process

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