OPENNESS AND AGRICULTURAL PERFORMANCE IN NIGERIA

Eshiozemhe
Micheal Inusa[1]
Aminu Umaru[2+]

[1,2]Real Sector Division, Research Department, Central Bank of Nigeria, Central District Area, Abuja, Nigeria.
[1]Email: Eshiozemheinusa@gmail.com Tel: +2347063710256
[2]Email: aminu_umaru2007@yahoo.com Tel: +2348082837043

(+ Corresponding author)

ABSTRACT

The paper examined the effect of openness on agricultural output in Nigeria. Data for the study was sourced from CBN statistical bulletin 2019 and quarterly report 2020 covering the period 2010Q1 to 2020Q2. ADF unit root test, Johansen cointegration and Autoregressive Distributed Lag Methods were employed in the study. The unit root test results revealed that the variables are a mixture of I(1) and I(0) order of integration. Empirical result of the study shows that increase in trade openness will lead to a positive but insignificant increase in agricultural output while increase in financial openness will lead to a significant decrease in agricultural output in the country. The study concluded that trade openness affect agricultural output positively, while financial openness affect agricultural output negatively. The study therefore recommended that efforts should be put in place to ensure that trade openness is encouraged, also, government and relevant stakeholders in agricultural sector should make sure that foreign direct investment to agricultural sector are accountable and properly utilized in the sector.

Contribution/ Originality: The study contributes by improving the body of existing literature on the effect of openness on agricultural output in Nigeria, as it will serve as a reference to other researchers in the area. In addition, the study will serve as a policy document to the government and policy makers.

1. INTRODUCTION

Agriculture is as fundamental to a nation as food is fundamental to man. In most developing countries, like Nigeria, over half of the population depends directly or indirectly on agriculture. Whether it is a producer who harvest his produce from the farm, or a retailer who sells such products to the final consumer, agriculture remains a very vital part of an economy. Oyakhilomen and Zibah (2014) emphasised that a greater part of the poor live in rural areas and, largely, all of them depend on agricultural activities for their source of revenue. In a similar vein, they emphasised that in developing the economy, agriculture cannot be overlooked due to its large size not only in Nigeria but in Africa at large. Kenny (2019) stressed that growth in the agricultural sector for most countries is a precondition for industrialisation. The study also accentuated that agriculture is the best way to alleviate poverty as it provides for about 75 per cent of employment and also the major source of the food supply in Nigeria. Similarly, agro-based exports product, for example, palm kernel, groundnut, cocoa and sesame seeds are still well underutilised for industrial and agribusiness (Verter, 2016).

Openness as a concept is becoming increasingly important to every government especially in less developed countries (LDCS). This is because a LDC cannot be self-sufficient in all aspect and thus requires to trade with other

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nations. It also enhances the welfare of customers and decreases poverty as it proffers a wider platform for choice from among broader diversity of quality goods and low-priced imports (Nduka, 2013). Nigeria's trade policy has been in debate for a while, as the country belongs to several multilateral and regional trade agreements. Early economics spun by Adam Smith and David Ricardo argued that free trade does not only promote efficiency in the allocation of resources but also needed for dissemination of knowledge and technology among countries. One would think having a country open its borders for free trade will bring about faster growth and development, however, this has not been the case. The existence of the shortcomings in the real-life international markets has its effect on free trade especially in developing economies having several institutional imperfections (Ijirshar, 2019). Free trade has been argued to stifle growth and development in some developing countries because infant industries will begin to compete with multinational corporations, making it difficult to receive the necessary environment for growth.

Putting these imperfections and shortcomings of free trade into perspective, the government of Nigeria has at different times put in place various trade policies such as the African Continental Free Trade Agreement (AfCFTA) and the African Growth & Opportunity Act (AGOA) to stimulate important sectors of the economy, of which the Agricultural sector is at the limelight. However, the agricultural sector still falls short of its potential with the sector contributing 24.6 per cent to the Gross Domestic Product (GDP), which is far less than 60 per cent contribution to GDP recorded before the oil boom (National Bureau of Statistics, 2020). Nigeria is bestowed with clement climate condition and soil type, with a massive landmass good enough to cultivate almost any agricultural produce in the world. As a result, Nigeria is the world's largest producer of cassava, yam, cowpea, cocoyam and Karite nut (shea nuts) while ranking second-largest producer of Sorghum, and third world largest producer of sweet potatoes and groundnut according to FAO (2018). Also, with its large labour force, this implies that Nigeria has a comparative advantage in producing agricultural products. However, food inflation, food insecurity, low productivity are still issues facing the agricultural sector in the country.

With the immense potential of the agricultural sector and the potential to generate foreign earnings for the country, it is pertinent to understand if openness -including trade and financial openness- will improve the agricultural sector. It is against this backdrop that this study tries to examine the effect of openness on the agricultural sector performance in Nigeria. It is apt to evaluate how well openness to trade and finance affect a vital sector of the economy like the agricultural sector.

This study is unique to the existing literature in several ways. Firstly, there has been scarce literature that understudies the relationship between openness and agricultural performance in Africa and even fewer in Nigeria, especially in an economy with the continuous dwindling exchange rate and non-stop advocation to consume locally made food. Secondly, the study will review the period beginning from the first quarter of 2010 to the second quarter of 2020 to capture the period after rebasing as these periods captured a true reflection of the economy and encapsulated greater number economic activity in the computational framework. Lastly, the study adopts the Autoregressive Distributed lad (ARDL) model with the inclusions of variables like credit to the agricultural sector, financial openness which is the proportion of FDI and FPI to Gross Domestic Product, foreign direct investment to the agricultural sector, among others. Thus, while other studies relating to openness focus on trade openness, this study also used financial openness to consider wider forms of openness and how it impacts on the agriculture sector.

The rest of this paper is categorised into four sections. Section 2 presents a review of literature while Section 3 presents the methodology. Section 4 presents the estimation results and findings while the last section summarises, concludes, and provides the policy implications.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Various theories have discussed the issue of trade openness; however, the study adopts the Ricardian model (1817) of comparative advantage theory. The story of comparative advantage is one of the most important and misunderstood theories of international trade as it is commonly associated with the absolute theory. David Ricardo

postulated the comparative advantage theory using the famous illustration of Portugal and England as the only economy in the world producing just two goods, cloth and wine. He explained that both economies would be better off specialising in producing a good that it can produce more efficiently regardless of whether one has an absolute advantage in producing both goods than the other. For example, if there is no transportation cost and trade occurred under a perfect market, from the illustration given by Ricardo, using labour as the only input of production, Portugal was taken to have an absolute advantage in producing both goods. Nevertheless, the comparative advantage expounded that regardless of the absolute advantage Portugal enjoys, England should specialise in the good it has a comparative advantage in producing. If this happened, the total output produce will be higher and with free trade, both countries will have a greater number of both good than they had before specialization.

Another theory relevant for the study is the international trade theory postulated by Heckscher and Ohlin (1967) also called the Factor Proportions model. The Heckscher-Ohlin Model (or H-O Model) builds upon the Ricardian model to include labour and capital as the factor of production used in producing two final goods. The model suggests that a nation should specialise in exporting a product that uses the factor of production they have abundantly and importing product that that uses the country's scarce factors. This is because given that country A is capital abundant while country B is labour abundant, the price of capital, therefore, will be higher in country B while the price of labour will be higher in country A. this can be expressed in Equation 1 form below:

$$\text{If, } (^C/_L)\, A > (^C/_L)\, B \tag{1}$$

$$\text{Therefore, } (^{PC}/_{PL})\, A < (^{PC}/_{PL})\, B \tag{2}$$

Where in C is capital, L is labour, PC is the price of capital and PL is the price of labour. Thus, based on the above equation, country A capital to labour ratio is greater than that of country B. This translate to Equation 2 such that, the price of capital is lower in country A than that of Country B, therefore, it is economically profitable for country A to focus on producing capital intensive goods while country B focus on labour-intensive goods.

The Ricardian and H-O Model were hinged on the assumption of constant technology across all trading countries, as such, the effect of technological changes was not considered. The comparative advantage theory and the Heckscher-Ohlin Model, therefore, provide the basis for understanding international trade and trade openness and how it affects productivity in the economy, therefore, this study hinges on these theories.

2.1. Empirical Literature

In Nigeria, many studies have attempted to examine the relationship between trade openness and economic growth; however, there are scanty studies that link trade openness and economic growth in Nigeria. Olufemi (2004) investigated the causality between the openness and economic growth in Nigeria using the Vector Error Correction Method (VECM) and found that openness affects economic growth positively. Employing the Ordinary Least Square (OLS) regression method, Echekoba, Okonkwo, and Adigwe (2005) found that positive effect of trade liberalisation on economic growth but noted the need for trade liberalisation to be handled carefully as it also has some negative effects on the economy. In addition, on the effect of trade liberalisation on poverty reduction, Yusuf, Malarvizhi, and Khin (2013) used the ARDL approach covering the period 1980 to 2011 and the result from the study showed that trade liberalisation does not cause poverty reduction in Nigeria.

In a more recent study, Yakubu and Akanegbu (2018) using data for the period 1981 to 2017, examined the effect of trade openness on economic growth in Nigeria. The result of the study showed that openness has a positive effect on growth in Nigeria. Similarly, Anowor, Ukweni, and Martins (2013) using the Error Correction Model (ECM) determined the impact of trade liberalisation on agricultural productivity and export in Nigeria. The study found that trade liberalisation was significant in increasing the agricultural sector productivity in Nigeria. In addition, using the Variance Decomposition Approach (VDA), Verter (2016) examined the relationship between external financial flows, trade, and agricultural performance and found that a shock to agricultural exports, imports,

and openness contribute to the fluctuation in the variance of agricultural performance in the country. Iheanacho (2017) measured trade liberalism and economic growth using the Autoregressive Distributed Lag (ARDL) bound test approach over the period 1981 to 2014 and found that the Nigerian economy is yet to fully gain from the international trade as the growth in the economy is not commensurate to the level of international trade.

Umoh and Effiong (2013) studied the impact of trade openness on Nigeria's manufacturing sector using the ARDL model and found that trade openness has a significant positive impact on manufacturing productivity in Nigeria. The study suggested for more trade liberalisation policies directed toward the manufacturing sector.. In the same vein, Adamu and Doğan (2015) employed the Error Correction Model (ECM) l to study the relationship between openness and industrial growth in Nigeria. The result showed that openness has a significant and positive influence on industrial production. Nnadozie and Joshua (2017) examined the relationship between trade and unemployment in Nigeria and the result based on the ARDL model showed that oil trade negatively affects employment while non-oil trade helps reduce unemployment.

On related international literature, Dodzin and Vamvakidis (1999) assessed trade liberalisation on industrialisation in several agricultural economies from the period 1970 to 1995 and established that the economies that increased their openness experienced an increase in industrial production at the expense of the agricultural sector. Ghana, Djokoto (2013) investigated the relationship between openness and economic growth from 1995 to 2009 and discovered that openness, both trade and financial openness isdetrimental to the agricultural sector performance. Similarly, Siyakiya (2017) examined the impact of trade openness on the productivity of selected African countries from 1980 to 2014 and found that trade openness help stimulates output in most developing countries. In Sri Lanka, the impact of trade liberalisation on agricultural production was analysed by Silva, Malaga, and Johnson (2013) utilising the Ordinary Least Square (OLS) method. The result showed that increased trade openness had a positive impact on the agricultural sector. Shobande (2019) examined the effect of economic integration on agricultural export performance in West African economies and found that trade openness, is a strong predictor of export performance in the region.

The reviewed studies have thus illustrated that openness positively affects economic growth in general and specifically, other sectors like the manufacturing sector in most developing countries and Nigeria is no exception. However, a little study was found to examine openness (trade and financial openness) and agricultural productivity in Nigeria. To this end, this study intends to fill this identified gap.

2.2. Stylised Fact on Openness and Agricultural Sector in Nigeria

As globalisation continues to be prominent, the degree of openness of a country to external factors has been increasingly significant to the development of that country and the case of Nigeria is no different. For this reason, the trade policy stance has changed a lot in the country, moving from high protectionism propelled by the strategy of import substitution to a more liberal stance (Nnadozie & Joshua, 2017). Imports and exports in Nigeria have gradually increased over time as seen in Figure 1. A salient feature of exports in Nigeria is that it was, largely, driven by fluctuations in oil prices hence making exports more volatile than imports.

In 1986, the total trade was valued at ₦14.9 billion with exports accounting for 59.8 per cent of the total trade. Between 1988 and 1993, total trade increased from ₦52.64 billion to ₦384.40 billion as export accounted for ₦31.19 billion and ₦218.77 billion while import accounted for ₦21.45 billion and ₦165.63 billion respectively. Total trade temporarily dropped in 1994 to ₦368.85 billion and grew to ₦1,705.79 billion in 1995, largely, due to tariff reform programmes and increased in world oil prices. Exports, imports, and total trade continue to increase from the late 1990s to the early 2000s, however, in 2015, export decreased by 31.7 per cent to ₦8,845.16 billion from ₦12,962.03 billion in 2014.
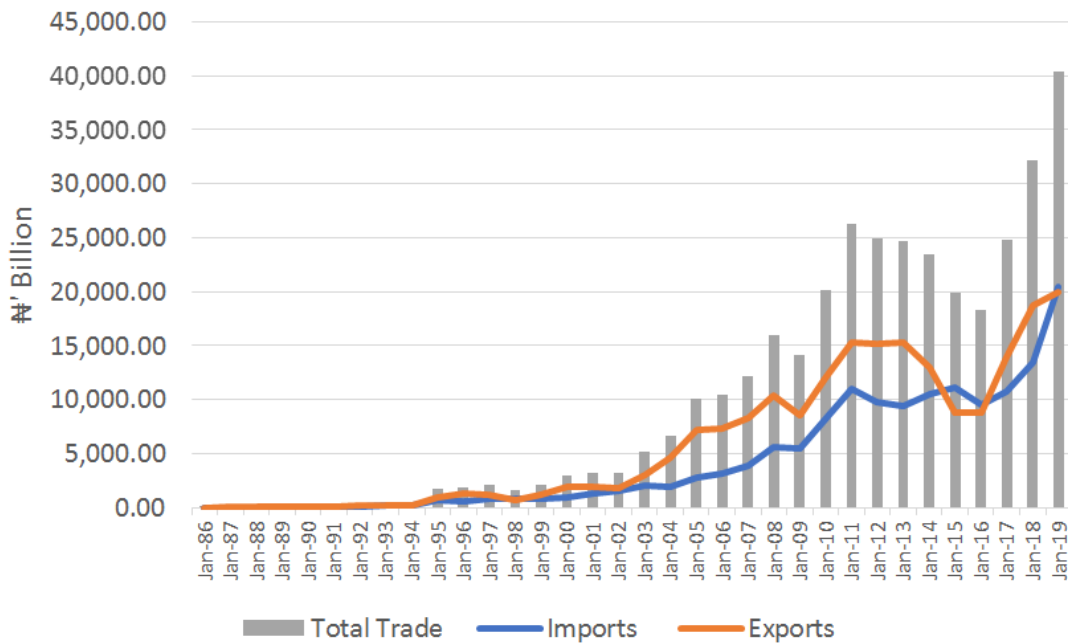
Figure-1. Total Trade, Imports and Exports in Nigeria.

The decline was due to the drop in the oil price in the global market and the activities of Niger Delta militant which hampered production of crude. Total trade also dropped to ₦19,921.23 billion while imports increased to ₦11,076.07 finally surpassing exports. Further analysis of Nigerian trade shows that oil export has largely dominant trade and accounts for a large proportion of total trade leaving the country vulnerable to oil price shocks as seen in 2015.
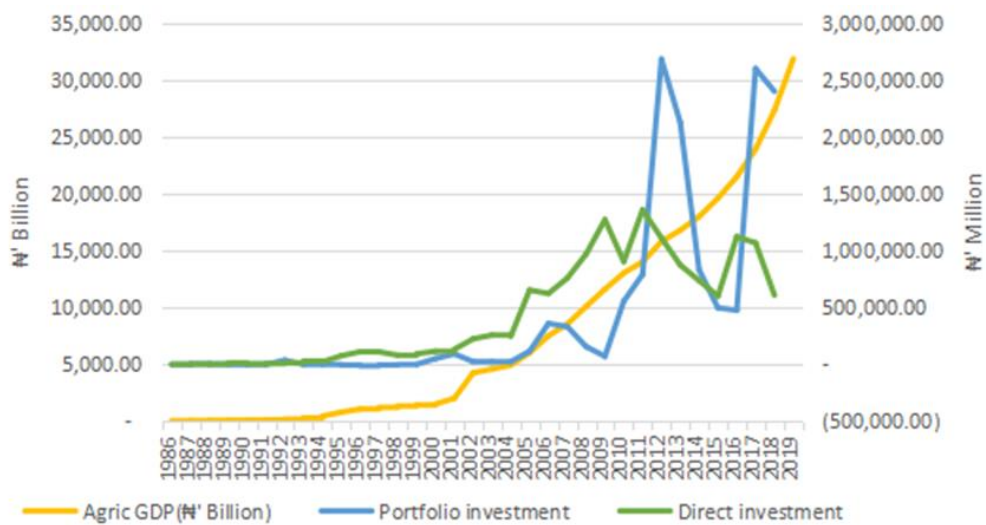

Figure-2. Foreign Portfolio Investment, Foreign Direct Investment and Agriculture output in Nigeria.

Figure 2 represents a graphical plot of portfolio investment, direct investment and agricultural output represented by agricultural gross domestic product. The a priori expectation of the variable is such that, portfolio investment and direct investment have a positive relationship with agricultural output such that increase in these types of investment will lead to an increase in agricultural output. This is because the direct investment will be channeled into various sectors of the economy including the agricultural sector and in turn, leading to an increase in output. However, from Figure 2 portfolio investment and direct investment tend to be more volatile over the review period while the agriculture GDP continued its steady rise.

For most of the 1980s to 1990s, the portfolio investment and direct investment was relatively stable however, from 2002 to 2007, portfolio investment rose substantially with an average growth rate of 86 per cent. The growth

was cut short in 2008 because of the global financial crisis, falling through 2008 to 2009 and recovered in 2010, increasing by over 600 per cent. The portfolio investment continued to rise till 2013, however, from 2014 to 2016, due to the recession of 2016 caused by the drop in international crude oil price and reduction in the local production of crude.

3. DATA AND METHODOLOGY

The study used quarterly data from 2010Q1 to 2020Q2. The set of variables include agricultural output (AGDP), Trade openness (TO), agricultural FDI (AFDI), food consumer price index (FCPI), Credit to Agricultural sector (ACRE) and Financial Openness (FO). The AGDP was proxied by agricultural GDP as it is most appropriate to measure agricultural output, trade openness was measure as a ratio of export plus import divided by GDP while financial openness was measured by FDI plus FPI divided by GDP. All data were sourced from the statistical database of the CBN.

3.1. Model Specification

The study tackles openness from two perspectives, financial openness, and trade openness, therefore, they form the basic variables of this study. Furthermore, agricultural foreign direct investment was also important to account for the actual amount of foreign direct investment that was directed towards the agricultural sector. Two other control variables, namely, Credit to the agricultural sector and food consumer price index were also added as they greatly affect the agricultural sector in Nigeria.

The study adopted the Auto-regressive Distributed Lag (ARDL) model and bound test approach as it can be applied to data series integrated of both orders I(0) and I(1) unlike the Engle and Granger (1987) and Johansen and Juselius (1990) approach for the long run test (cointegration). To curtail the influence of outliers, four of the variables in the study, that is, ACRE, RER, AFDI, FCPI have been logged.

The study adopted and builds on the model by Djokoto (2013) and the functional form is specified as follows:

AGDP = f (TO, FO, ACRE, AFDI, FCPI)

While the mathematical form of the model is expressed as follows:

LAGDP $= \beta_0 + \beta_1 TO + \beta_2 FO + \beta_3 LAFDI + \beta_4 ACRE + \beta_5 LFCPI + v$

Where:

AGDP = Agricultural Gross Domestic Product.

TO = Trade Openness.

ACRE = Credit to Agricultural Sector.

AFDI = Foreign Direct Investment to Agriculture.

FCPI = Food Consumer Price index.

The Autoregressive Distributed Lagged model for this study was specified as follows;

$$lnAGDP_t = \alpha_0 + b_{11}\, lnAGDP_{t-1} + b_{21}\, TO_{t-1} + b_{31}\, FO_{t-1} + b_{41}\, lnACRE_{t-1} + b_{51}\, lnAFDI_{t-j}$$

$$+ b_{61}\, FCPI_{t-1} + \sum_{i=1}^{p} \alpha_{1i}\, \Delta lnAGDP_{t-i} + \sum_{i=1}^{p} \alpha_{2i}\, \Delta TO_{t-1} + \sum_{i=1}^{p} a_{3i}\, \Delta FO_{t-i}$$

$$+ \sum_{i=1}^{p} a_{4i}\, \Delta lnACRE_{t-i} + \sum_{i=1}^{p} a_{5i}\, \Delta lnAFDI_{t-i} + \sum_{i=1}^{p} a_{2j}\, \Delta lnFCPI_{t-j} + \varepsilon_{1t}$$

Where

p is the ARDL model maximum lag order.

3.2. Pre-Estimation Analysis

3.2.1. Graphical Representation

Figure 3 below shows the graphical representation of the data. The graphical representation of the variable shows that the food consumer price index and credit to the agricultural sector exhibit a linear upward and deterministic trend. Other variables like agricultural output and foreign direct investment to agriculture exhibited a more volatile trend upward.
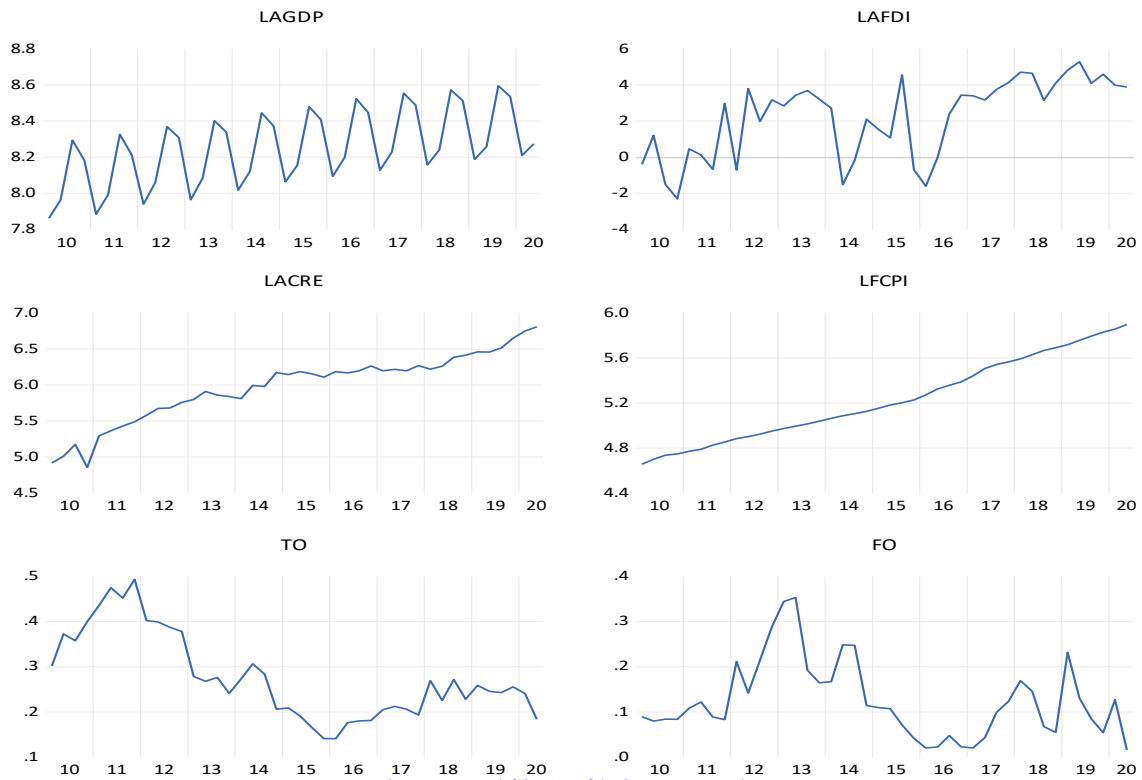

Figure-3. Variable Graphical Representation.

3.2.2. Descriptive Statistics

The descriptive statistics was done to ascertain the behaviour of the data and Table 1 presents the result of the descriptive statistics. Forty-two observations were used to prepare the descriptive statistics, which is large enough to produce normal distribution and robust results.

Table-1. Descriptive Statistics.

	AGDP	AFDI	ACRE	FCPI	FO	TO
Mean	3899.440	34.09097	433.5022	200.1655	0.124721	0.276586
Median	3767.406	21.49908	468.1529	175.4852	0.107729	0.257299
Maximum	5408.979	197.8522	903.7041	363.9250	0.353426	0.494154
Minimum	2594.760	0.099980	128.4060	105.3033	0.015693	0.140725
Std. Dev.	784.2483	43.16958	184.7701	76.05071	0.085437	0.094325
Skewness	0.246748	1.814859	0.437958	0.649764	0.997074	0.708701
Kurtosis	2.027629	6.467068	2.992849	2.165182	3.462130	2.505587
Jarque-Bera	2.080825	44.09198	1.342742	4.174964	7.332835	3.943576
Probability	0.353309	0.000000	0.511007	0.123999	0.025568	0.139208
Sum	163776.5	1431.821	18207.09	8406.952	5.238299	11.61663
Sum Sq. Dev.	25216861	76408.13	1399740.	237132.1	0.299282	0.364787
Observation	42	42	42	42	42	42

The agricultural output averaged ₦3899.44 billion during the review period with minimum and maximum values of ₦5408.979 and ₦2594.760 respectively. The food consumer price index averaged 200.16 having a

maximum value of 363.9 and a minimum of 105.303. Concerning kurtosis, financial openness, credit to the agricultural sector, and trade openness appears to be normally distributed as they are approximately 3 (the kurtosis of any univariate normal distribution) while the other variables are platykurtic. The Jarque–Bera statistics also show that all the variables are normally distributed (p.values>0.05) except financial openness and foreign direct investment to the agricultural sector.

3.2.3. Unit Root Test

Table 2 shows the result of the unit root test conducted on the variables. From the result, it can be concluded that except for foreign direct investment to agriculture that is stationary at level I(0), all the other variables are integrated of order one, that is, I(1). Thus, this justifies the adaption of Autoregressive Distributed Lagged (ARDL) Model in estimating the parameters of the model of this study.

Table-2. Result of unit root test.

Variable: LAGDP							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	−1.755185	−0.015865	−0.015865	−24.61652*	−25.34647*	−0.665455	I(1)
PP	−8.105741*	−8.105741*	−0.011285				I(0)
Variable: AFDI							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	−3.355359**	−4.639919*	−4.639919**				I(0)
PP	−3.255239**	−4.595960*	−2.130720**				I(0)
Variable: FO							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	−2.391811	−2.391811	−1.424925	−6.685730*	−6.685730*	−6.685730*	I(1)
PP	−2.281228	−2.553154	−1.328251	−8.075912*	−9.954230*	−8.157138*	I(1)
Variable: TO							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	−1.134434	−2.092188	−0.812625	−7.514947*	−7.414066*	−7.414066*	I(1)
PP	−1.113154	−2.227359	−0.813879	−7.445165*	−7.350165*	−7.440996*	I(1)
Variable: ACRE							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	1.295317	−0.460175	3.913274	−6.556601*	−6.863732*	−2.175914**	I(1)
PP	1.409618	−0.460175	4.129471	−6.555439*	−6.863732*	−5.242565*	I(1)
Variable: FCPI							
	Level			**First Difference**			**Decision**
	Constant	Constant & Trend	None	Constant	Constant & Trend	None	
ADF	1.919072	0.546071	0.546071	0.674950	−2.550566	−2.550566	I(1)
PP	8.090976	1.233108	16.66602	−1.708230	−4.361543*	0.706802	I(1)

Note: * and ** imply significance at 1% and 5%, respectively.

3.2.4 Model Selection

From the graph, using Akaike Information Criteria, it shows that ARDL (1,2,0,0,2,2) is the best model, thus the study was estimated with the dependent variable having one lag while LACRE, LAFDI having no lags and FO, LFCPI, TO having two lags each
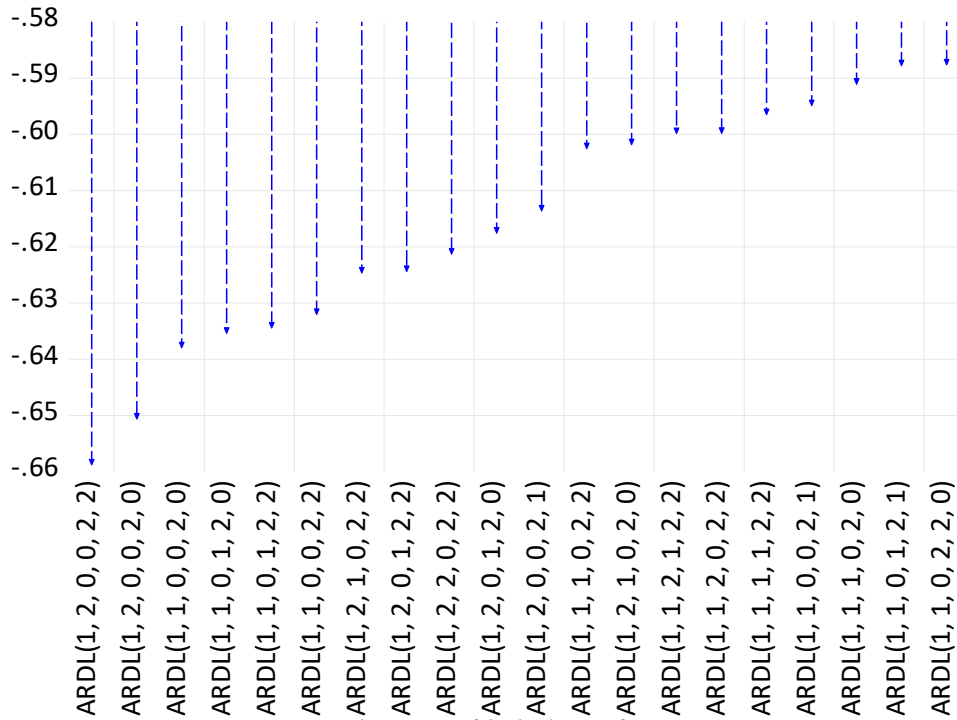
Akaike Information Criteria (top 20 models)

Figure-4. Model selection graph.

4. RESULT AND FINDINGS

4.1. Estimated ARDL Model

The result of the long-run model estimate Table 4 shows that there is an absence of serial correlation as the Durbin Watson statistics is above 2, signifying that the residuals of the model are not correlated. The R-squared of 0.56 denotes that 56 per cent of changes in agricultural output are explained by changes in the variables of the model. The probability value of the F-statistics also shows that all the variables in the model are jointly significant at the 5 per cent level while the Durbin-Watson statistics at 2.04 shows that the model has no serial correlation, however, serial correlation test will be done to further prove this point. Additionally, the estimates revealed that financial openness (FO) has a negative and significant effect on Agricultural output such that a per cent increase in financial openness would lead to a 1.1 per cent decrease in agricultural output in the long run. On the other hand, trade openness (TO) has a positive but insignificant effect on Agricultural output such that a per cent increase in trade openness would lead to a 0.13 per cent increase in agricultural output. This is in line with Djokoto (2013) and Silva et al. (2013) Furthermore, a percentage increase in foreign direct investment to the agricultural sector (AFDI) leads to a 0.0003 per cent decrease in agricultural output while a one per cent increase in credit to the agricultural sector (ACRE) will lead to a 0.15 per cent increase in the agricultural sector, however, AFDI and ACRE are not statistically significant. Lastly, the major driver of agricultural output in the model is Food consumer price index (FCPI) which have a negative effect such that a 1 per cent increase will lead to a 6.34 per cent decrease in agricultural output while an increase in the one lag, and two lags of FCPI will increase agricultural output by 15. And decrease output by 9.3 per cent.

4.2. Serial Correlation Test

Table 5 represents the serial correlation test with F-statistic 0.0948 and probability value of 0.7605. The probability value being higher than 5% significance level indicates that we cannot reject the null hypothesis of no serial correlation in the model.

Table-4. Estimated ARDL model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: LAGDP				
Model Selection method: Akaike Info Criterion (AIC)				
Selected Model: ARDL(1, 2, 0, 0, 2, 2)				
LAGDP(-1)	0.094618	0.186893	0.506269	0.6168
FO	-1.106714	0.436637	-2.534633	0.0174
FO(-1)	0.723459	0.652393	1.108932	0.2772
FO(-2)	0.669807	0.456460	1.467395	0.1538
LACRE	0.151988	0.227134	0.669155	0.5091
LAFDI	-0.000340	0.018425	-0.018427	0.9854
`LFCPI	-6.341925	3.088133	-2.053644	0.0498
LFCPI(-1)	15.68400	4.621297	3.393853	0.0021
LFCPI(-2)	-9.306261	3.103403	-2.998728	0.0058
TO	0.133404	0.897941	0.148566	0.8830
TO(-1)	1.228731	0.871073	1.410595	0.1698
TO(-2)	-1.344213	0.818762	-1.641761	0.1122
C	6.252956	1.706295	3.664640	0.0011
R-squared	0.559726	Mean dependent var		8.265537
Adjusted R-squared	0.364048	S.D. dependent var		0.192010
F-statistic	2.860448	Durbin-Watson stat		2.044525
Prob(F-statistic)	0.011371			

Table-5. Breusch-godfrey serial correlation test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 1 lag			
F-statistic	0.094888	Prob. F(1,26)	0.7605
R-squared	0.145451	Prob. Chi-Square(1)	0.7029

4.3. ARDL Bound test

The result of the ARDL bound test produces an F-statistics of 6.1385 (see Table 6) which is higher than the value of the upper-level bound of 4.68 at a 1% level of significance, implying that the null hypothesis of no levels relationship cannot be accepted, thus signifying that there is indeed a cointegration relationship among the variables, this implies that there is a long-run relationship between the variables.

Table-6. ARDL bound test.

Null Hypothesis: No levels relationship			
F-statistic	Level of Significance.	Lower bound	Upper bound
6.138484	10%	2.26	3.35
5	5%	2.62	3.79
	2.5%	2.96	4.18
	1%	3.41	4.68

4.4. Short Run Adjustment and Impact

Table 7 shows the error correction estimation for the ARDL model. The coefficient of the ECM variable is estimated to be negative and statistically significant at 1 per cent. The coefficient of the CointEq (-1) estimate which shows the short-run speed of adjustment of AGDP to its long-run equilibrium was found to be negative and statistically significant at 1 per cent level providing further evidence to the long run relationships among the variables in the model. The ECM indicates that it takes 90 per cent speed to adjust from disequilibrium to equilibrium.

Table-7. Estimated short-run relationship.

| Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM Regression				
Case 3: Unrestricted Constant and No Trend				
C	6.252956	0.967926	6.460157	0.0000
D(FO)	-1.106714	0.364607	-3.035358	0.0053
D(FO(-1))	-0.669807	0.390251	-1.716350	0.0976
D(LFCPI)	-6.341926	2.396118	-2.646750	0.0134
D(LFCPI(-1))	9.306261	2.317865	4.015014	0.0004
D(TO)	0.133404	0.624205	0.213718	0.8324
D(TO(-1))	1.344213	0.628629	2.138323	0.0417
CointEq(-1)	-0.905382	0.137035	-6.606924	0.0000
R-squared	0.715746	Mean dependent var		0.007757
Adjusted R-squared	0.653566	S.D. dependent var		0.238964
F-statistic	11.51078	Durbin-Watson stat		2.044525
Prob(F-statistic)	0.000000			
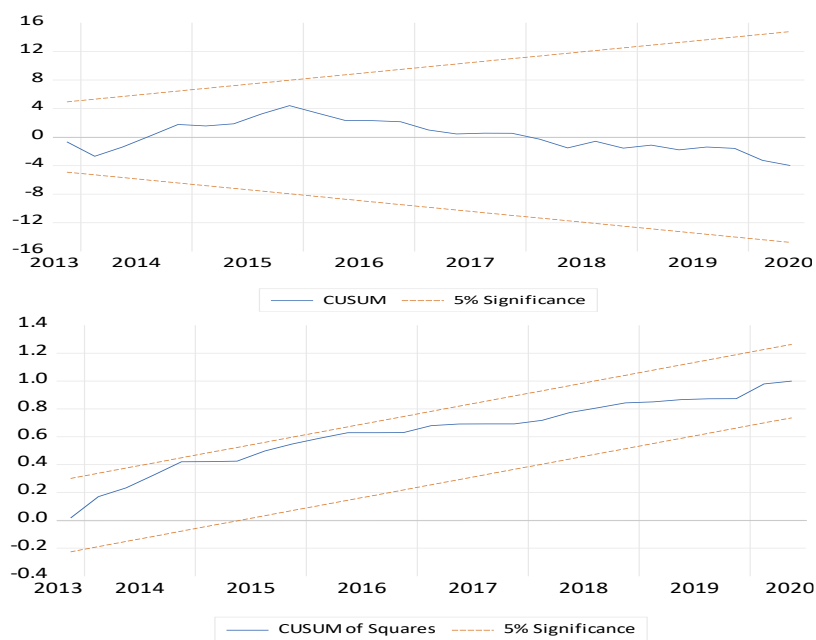
Figure-5. Graphical plot of CUSUM and CUSUSQ of recursive residual.

The CUSUM test and the CUSUSQ test were used to determine if the model was stable and from Figure 5 below, it shows that the recursive residual of the model is located within the two critical bonds. Therefore, the CUSUM and CUSUMSQ test indicates that the model was stable.

5. SUMMARY AND CONCLUSION

The study examined the effect of trade and financial openness on agricultural sector performance in Nigeria using the Autoregressive distributed lag (ARDL) model and bound test approach. Data was sourced from 2010Q1 to 2020Q2. The unit root test shows that the variables were of mixed order of integration. The long-run analyses of the estimate found that financial openness was negative and significant in affecting the agricultural output in the long run while trade openness was positive but insignificant in the long run. Other variables like credit to the agricultural sector and foreign direct investment to the agricultural sector were insignificant, however, while credit to the agricultural sector positively influences the agricultural sector, foreign direct investment to the agricultural affect the agricultural sector negatively. Lastly, the food consumer price index affects the output negatively and has the greatest effect on agricultural output in the model.

The findings of the study revealed also that while trade openness has a positive impact on the agricultural sector, financial openness and foreign direct investment to agriculture has a negative effect. While the findings on

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trade openness agree with that of Anowor et al. (2013) and Verter (2016) however, it noticeable that financial openness had a negative and significant effect on the agricultural sector under the review period. This could be due to the underdeveloped nature of the agricultural sector as it is dominated by rural farmers who have little access to finance, therefore, the sector attracts little of both FDI and FPI inflows over the review period. This is so as the Nigerian agricultural sector is still very unattractive to foreign investors compared to other sectors in the country and similar sector in other countries. However, the little FDI that was channelled into agriculture was also found to be negative and insignificant in affecting the output of the agricultural sector. Among the reasons for this are; a weak institution, corruption and mismanagement of investment directed towards the agricultural sector, therefore, it can be concluded that while trade openness positively affects the agricultural sector. On the other hand, the agricultural sector has not fully harnessed the full benefit that can be driven by financial openness.

The study, therefore, recommends that to boost the agricultural sector, the government should improve trade liberalisation, focused on exporting agricultural commodities to attain a wider market. Additionally, the government should ensure institutions and avenues are available to channel foreign direct investment to the rural areas of the nation and provide accountability measures. Agricultural infrastructure development is also encouraged by the government to attract the necessary amount of foreign direct investment needed to increase the output.

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