



TRADE OPENNESS AND THE IMPLICATIONS FOR AGRICULTURAL OUTPUT IN NIGERIA

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Abstract

Trade policy is a major determinant of agricultural output in Nigeria which is considered as one of the many ways through which the nation's economy could grow. Agricultural sector in the country is one of the sectors in which the economy has a comparative advantage. It provides raw materials for the teeming industries in the country and also constitutes the largest employer of labour (statistical Bulletin 2019). The objective of the study was to investigate the relationship that exists between trade openness and agricultural output in Nigeria. The methodology adopted was the Autoregressive Distributed Lag (ARDL) model, while the Cobb Douglas production theory was adopted. The data for the study was time series data spanning 39 year. Test of stationarity and the study was conducted using the Philips Perron (PP) approach. The findings revealed that the Degree of Openness had a positive relationship with agricultural output ($T= 0.72$). It further revealed that Government Expenditure on Agriculture had a negative correlation with the agricultural output or VAO ($T= 1.28$) which negate the a-priori expectation. Labour participation in agriculture was positively related and was significant to the value of agricultural output ($T=11.48$). The study recommends among others that government should regulate trade activities, most especially at the land borders of the country as it will help improve the outcomes of trade openness.

Keywords: Trade Openness, Agricultural Output, Nigeria

Introduction

With the world having evolved into a global village, it is a precept for a nation to be in alliance with other nation(s). One of the coherent ways to create such an alliance between or among nations is via international trade (Azeez, Dada & Aluko 2014). International trade is defined as the exchange of technology, goods, and services across countries or territories. It also allows for the exchange of goods and services cum foster healthy relations among countries irrespective of their level of economic development. A country involved in international trade need not have fear of hegemony or loss of its sovereignty because it is a mutual agreement to engage in trade across their border. In most countries, international trade represents a significant share of gross domestic product (GDP) (Jelilov, Celik & Abdallah, 2020). A nation not participating in international trade is at risk of a slow pace of economic development due to the cogent fact that a country cannot be fully endowed with all the resources essential to be utilized for sustainable economic development (Azeez, Dada & Aluko 2014). International trade can be interchangeably referred to as ‘foreign trade’ or ‘global trade’. It encompasses the inflow (import) and outflow (export) of goods and services in a country. A country’s imports and exports represent a significant share of her gross domestic product (GDP); thus, international trade is correlated to economic growth. In an open economy, development of foreign trade greatly impacts GDP growth (Li, Chen & San, 2010).

Trade is recognized as an indispensable tool for economic growth and development. For developing countries like Nigeria, the contribution of trade to overall economic development and poverty alleviation is enormous owing largely to the fact that most of the vital elements for development such as technology, capital goods, raw materials and technical know-how are mostly imported because of inadequate domestic supply. International trade is measured by net export in Nigeria. Net export is measured by the value of a country's total exports minus the value of its total imports. Abiola (2019) is of the opinion that agriculture is an important component of any given economy and even the most advanced countries of the world never neglect agricultural sector probably for the purpose of boosting science and technology. He also reiterated that Nigeria is the largest producer of cocoa, palm oil and cotton. She is the second largest producer of coffee and one of the largest producers of rubber in Africa. As a result of this assertion, Nigeria's main export includes; petroleum and petroleum products, vegetable products, cash crops among others while its imports includes; industrial supplies, machinery, appliances, vehicles, aircraft parts, chemicals, base metals (Jelilov, Celik & Abdallah, 2020).

Every country that is industrialized today passed through agrarian era. In fact, agricultural sector still remains the backbone of the industrial sector.

Despite Nigeria’s rich agricultural resource endowment, the agricultural sector has been growing at a very low rate (Ewetan, Fakile, Urhie and Oduntan, 2017). Some of the main factors undermining agricultural production include climate change, inadequate budget to agricultural sector and low productivity due to poor planting material amongst others. Productivity is low and basically stagnant. Farming systems, which are mostly small in scale, are still predominantly subsistence-based and for the most part depend on the vagaries of the weather which makes the food production profile in Nigeria to be at lower ebb, leading to a rise in import of stable food per annum (Anigbogu, Abosi & Okoli, 2015).

Statement of the Problem

The openness of a nation influences a country's growth rate by impacting upon the level of economic activities and facilitating the transfer of resources across borders. Nigeria is basically an open economy with international transactions constituting a significant proportion of her output (Emeka, Frederick & Peter, 2012). Nigeria's trade openness has increased the participation of foreigners in the economy by allowing the inflow of foreign capital and expertise, thereby impacting on her economic growth. Hence, agriculture constitutes one of the most important sectors of the economy. However the agricultural output has been on a decline rate from the past three decades now, which has resulted to both food and cash crop shortage. Despite the demonstrated and the potential gain from free trade by classicalist, the Nigeria Agricultural term of trade with other countries have not been too favourable, the domestic supply is very poor, the balance of payment is negative, export performance is very poor and negatively affected the level of food production, employment opportunities for the growing population (Ewetan, Fakile, Urhie and Oduntan, 2017).

Research Questions

To enhance proper investigation on the relationships that occur between trade openness and agricultural output led to the following questions

- i. What is the impact of degree of openness on agricultural output in Nigeria?
- ii. Does government expenditure have significant impact on agricultural output in Nigeria?
- iii. Does labour participation in agriculture have significant impact on agricultural output in Nigeria?

Objectives of the Study

The major objective of this study is to investigate the impact of Trade openness on Agricultural Output in Nigeria while the specific objectives are to:

- i. investigate the impact of degree of openness on agricultural productivity in Nigeria;
- ii. examine the impact of government expenditure on agricultural output in Nigeria; and
- iii. examine the impact of labour participation in agriculture on agricultural output in Nigeria

Value of Agricultural Output in Nigeria for the period of 2008-2019

YEAR	VAO in billion \$
2008	25.2797
2009	26.74885
2010	23.8937
2011	22.4171
2012	21.85996
2013	20.75862
2014	19.5248
2015	20.4382
2016	20.98311
2017	20.78121
2018	21.20375
2019	21.9063

Source: World Bank Development Indicators (March 2021)

Methodology

This section will focus on the methodology that will be adopted in examining the impact of balance of trade on agricultural output in Nigeria. The section will discuss the framework behind model specification, the sources of data, as well as the estimation techniques.

Theoretical Framework

The theoretical framework adapted for this study is the Cobb-Douglas production function, given by American economists, Charles W. Cobb and Paul. H Douglas, who studied the relation between the input and the output. This same theoretical frame has been used for related study by Anigbogu, Abosi and Okoli, (2015). The cobb douglas production function is that type of production function wherein an input can be substituted by others to a limited extent. For example, capital and labour can be used as a substitute of each other, however to a limited extent only. Cobb Douglas production function can be expressed as follows: $Q = AK^aL^b$

Model Specification

The functional form of the model is specified as

$$VAO = f(DOP, ACRE, EXR, LARG, GEA)$$

Where:

VAO= Value of Agricultural Output

DOP= Degree of Openness

EXR= Exchange rate

LARG= Labour Participation in Agriculture

GEA= Government Expenditure on Agriculture

ACRE= Acres of land for agricultural purpose.

The econometric form of the model is specified as

$$VAO_t = \alpha_0 + \alpha_1 DOP_t + \alpha_2 ACRE_t + \alpha_3 EXR_t + \alpha_4 LARG_t + \alpha_5 GEA_t + \varepsilon_t$$

Where α_0 is constant representing the intercept of the model, t represents time, and

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ and α_7 are the coefficients of the independent variables.

A priori: We expect $\alpha_1 > 0, \alpha_2 > 0, \alpha_3 < 0, \alpha_4 > 0, \alpha_5 > 0$

Data Requirement and Source

The data used for this study consist of data on value of agricultural output in Nigeria, degree of openness, agricultural export, agricultural imports, foreign direct investment, exchange rate, labour force participation in agricultural productivity, government expenditure on agriculture for the period covering 1981 to 2019. This research work will make use of secondary data collected from World Bank Development Indicator, (<https://databank.worldbank.org/source/world-development-indicators>), Central bank of Nigeria (CBN) Statistical Bulletin (<https://www.cbn.gov.ng/documents/statbulletin.asp>), and National Bureau of Statistics (NBS) data base, (<https://www.nigerianstat.gov.ng/>). The choice of this period is based on data availability.

Estimation Techniques

In order to achieve the specific objectives of this study, Autoregressive Distributed Lag (ARDL) model was adopted.

Unit Root Test

Time series data are prone to a spurious regression. To avoid this, we subject our data to a unit root test. We tested for stationarity of the series using Phillips Perron (PP) tests.

Data Analysis and Interpretation of Results

Table 4.1: UNIT ROOT TEST RESULT

Variable	Level	PP	
		1st Diff	Order of Int.
VAO	-2.0131**	-4.0261**	I(1)
DOP	-1.6809**	-7.5891**	I(1)
LARG	1.0656**	-2.9624**	I(1)
EXR	-2.2359**	-5.2363**	I(1)
GEA	-1.6733**	-7.5752**	I(1)
ACRE	-16.1669**	-	I(0)

Source: Authors (2021)

*Significant at 1%; **Significant at 5%; ***Significant at 10%

Critical test statistic @ 1% = -3.47397, @ 5% = -2.88059, and @ 10% = -2.88059

Table 4.1 shows the output of Phillips Perron (PP) unit root test. From the table, only ACRE is stationary at level I(0), while other variables became stationary at first difference I(1). Hence the null hypothesis of unit root could no longer be accepted for the variables at this level. This means that the series are integrated in order of order 1. In order to proceed to the estimation of the ARDL, we first find the optimal lag length of the series as presented in table 4.2 below:

Table 4.2 OPTIMAL LAG LENGTH FOR ARDL MODEL

Lag Length Criteria

VAR Lag Order Selection Criteria

Endogenous variables: VAO DOP LARG EXR GEA ACRE

Exogenous variables: C

Date: 06/18/21 Time: 12:16

Sample: 1981 2019

Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	195.6166	NA	1.07e-12	-10.53426	-10.27034	-10.44214
1	422.5627	365.6353*	2.73e-17*	-21.14237	-19.29493*	-20.49757*
2	449.6588	34.62280	5.33e-17	-20.64771	-17.21675	-19.45022
3	494.7347	42.57168	5.34e-17	-21.15193*	-16.13745	-19.40174

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author (2021)

Four out of the five selection criterion suggest an optimal lag length of 1.

Table 4.3 THE ARDL COINTEGRATION ESTIMATES

Dependent Variable: VAO
 Method: ARDL
 Date: 06/16/21 Time: 13:27
 Sample (adjusted): 1982 2019
 Included observations: 38 after adjustments
 Maximum dependent lags: 1 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (1 lag, automatic): DOP EXR LARG GEA ACRE
 Fixed regressors: C
 Number of models evaluated: 32
 Selected Model: ARDL(1, 1, 0, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
VAO(-1)	0.746906	0.084439	8.845544	0.0000
DOP	10.39434	5.272743	1.971334	0.0586
DOP(-1)	9.815397	4.880412	2.011182	0.0540
EXR	0.020526	0.068533	0.299501	0.7668
LARG	1.481346	0.788669	1.878286	0.0708
GEA	-10.46197	5.283693	-1.980049	0.0576
GEA(-1)	-9.631471	4.873175	-1.976426	0.0580
ACRE	-1.355643	1.639324	-0.826952	0.4153
ACRE(-1)	3.086015	1.708042	1.806756	0.0816
C	374.0557	151.3809	2.470956	0.0198

R-squared	0.997899	Mean dependent var	27.96842
Adjusted R-squared	0.997223	S.D. dependent var	2.413794
S.E. of regression	0.127191	Akaike info criterion	-1.065320
Sum squared resid	0.452971	Schwarz criterion	-0.634376
Log likelihood	30.24107	Hannan-Quinn criter.	-0.911993
F-statistic	1477.520	Durbin-Watson stat	2.047218
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Author (2021)

R-SQUARED = 0.997899; this shows that the independent variables jointly explain about 99.8% variation in the dependent variable. The Adjusted R-Squared = 0.997223 and it takes into cognizance the degree of freedom. The Adjusted R-Squared is usually less than the R-Squared and it shows that after removing the unwanted variables, the independent variables explain about 99.7% of the dependent variable.

Discussion of Findings

The above result is a product of time series analysis concerning the Value of Agricultural Output (VAO), Degree of Openness (DOP), Exchange Rate (EXR), Government Expenditure on Agriculture (GEA), Arch of Land use for Agricultural purpose (ACRE) and total number of Labour Participating in Agriculture (LARG). The research seeks to investigate the impact of balance of trade on agricultural output, and the relationship between the dependent variable which is VAO and the independent variables of DOP, EXR, GEA, ACRE and LARG. With the *a priori* expectation that there is a positive relationship between the dependent variable VAO and independent variables of DOP, LARG, GEA and ACRE. The independent variable of EXR is expected to have a negative relationship with the dependent variable. It is observed that the sign that came with result shows that most of the variables are in conformity with the *apriori* expectation. However, the study further reveals that the value of agricultural output (VAO) was positively affected by the country degree of openness (DOP) ($t = 0.72$, $p > 0.05$). From the result the outcomes shows that a 1 percent increase in degree of openness (DOP) will result in a 7.5 percent increase in the level of the value of agricultural output (VAO), although the outcome is not significant. This suggests that the degree of openness will only assist in improving the output of agricultural product in Nigeria and not a real factor that determine agricultural output.

ACRE from the result shows that it has a positive relationship on the value of agricultural output, by implication it means that a 1% increase of ACRE will increase the value of agriculture product by 3.09%. The outcome is statistically significant. The illustration is that ACRE is of a significant factor to consider when it comes to improving the level of agricultural output in Nigeria. It is noted R^2 , which is a measure of overall goodness of fit in the analysis is very high. At a high level of 0.99 or what can be regarded as 99%, it means that the proportion explained by the independent variable is 99% while the remaining 1% is explained by the error term. We equally see that the adjusted R^2 which allows for degree of freedom is equally high. This R^2 allows to compare equations with different explanatory variable and equally to determine that one-to-one relation between R^2 and the residual variance. The R^2 is most useful in a simultaneous equation with the best predictive ability.

Conclusion

Balance of trade components and some of the factors were examined, the terms of trade and cause of balance of trade were also elucidated at the very beginning of this research work. However, it is important for a nation that is naturally endowed with agricultural product and raw materials to see if there is a means by which the degree of trade openness could help in the growth of agricultural product in such nation as this is a point that necessitate this study. From some literature reviewed, it was seen that agricultural sector has its impact on the growth of the economy with the production of foods for the teeming masses, provision of employment for the largest percentage of the nation's population, avenue for foreign exchange earnings and also a major component of the nation's gross domestic product. However, it is important reason for carrying out a research about its relationship with balance of trade.

The study therefore concludes after the regression analysis carried out which reveals that not all the variables employed in this study are significant or have a positive impact on the independent variable. This study concludes as follows; Firstly, degree of openness (DOP)

has positive relationship to the value of agricultural output (VAO) as it will assist in improving the outcome of the agricultural output but is not a significant factor to consider when comes to level of agricultural output in Nigeria. Secondly, we realized that the amount of which the government is spending on agriculture sector is not significant, although this was not in-line with the *a priori* expectations. Thirdly, it is also concluded that there exist a long term connection with the value of agricultural output (VAO) and exchange rate this is because their exist a positive relationship among them but the probability is not significant. Furthermore, the population of farmers that are actively involved in the production of agricultural products are highly significant factor that will determine the amount of agricultural products produced. Finally, the ACRE which is the denoted as the amount of land been used for agricultural purpose is also a significant factor that determine the value of agricultural output (VAO) as its co-efficient is positive and probability is also significant.

Recommendations

Based on the findings of this research work, it is inevitable to provide a set of policy recommendations that would be applicable to the Nigeria economy:

- i. The Nigerian government should consider promoting the agricultural sector of the economy so as to boost agricultural productivities and as well improve the growth of the economy.
- ii. The government should increase access to credit facilities to intending farmers at a lesser interest rate or zero interest to boost agricultural production.
- iii. The government should encourage optimal control of trade through the borders of the economy as this will help the economy to fully account for all the transaction or trade concerning agricultural products which is sold to the neighboring countries.
- iv. There is a need to revive and rebuild the agricultural sector of the economy to raise output for exporting purpose. This can be achieved by improving the sector with appropriate incentives, like provision of infrastructural facilities and modern farm tools.
- v. The government should make the agricultural sector an independent body, which could be checked directly by the judicial arms of government in case of any misappropriation or embezzlement of fund allocated to the sector, as this could minimize corruption that has become a bane to the sector and hindering the growth in the output.
- vi. The monetary authority should adopt a mechanism that will lead to the stability of the exchange rate. Erratic exchange rate will have a long term negative effect on the production of agricultural output.
- vii. In general it is important that developing countries and indeed Nigeria should seek greater concessions in the next trade round in the use of support measures and effective implementation of agreements on agriculture.
- viii. Although in terms of acres of land dedicated for farming, the result from the regression is impressive, this is a wake-up call for all the state governments that have so many land unused to embark on agricultural production as this will be a source of revenue for the state government.

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