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Trade Liberalization and Agricultural Sector Performance in Nigeria

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Abstract

The purpose of this study is to determine if trade liberalisation has improved Nigeria's agricultural output. The data were analysed using multiple regression analysis within the framework of the Ordinary Least Square (OLS) estimation technique. The data were sourced from the National Bureau of Statistics 2022 publication and the various issues of the Central Bank of Nigeria Statistical Bulletin, covering the years 1970-2012. It is discovered that trade liberalisation significantly affects Nigeria's agricultural production. Liberalisation promoted agricultural production by raising consumer demand for agricultural goods. The conclusion is that trade liberalisation increases Nigeria's agricultural productivity. Therefore, it is advised that those in charge of the economy focus their efforts on encouraging foreign commerce. However, prudence is advised in order to safeguard nearby enterprises that rely on agricultural products as their primary source of raw materials.

Keywords: *Nigeria, Trade liberalization, Agricultural output*

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Background to the Study

The economic advantages of the agricultural industry are well-established, particularly for economies such as Nigeria's. The agriculture sector has long been a major source of food and the raw materials required for the manufacturing and industrial sectors to run smoothly. These industries are essential to the growth of any economy. Consequently, an increase in agricultural output raises average earnings, allowing consumers to enjoy improved standards of life and a greater selection of products and services (Tejvan 2015).

Szirmai (2015) asserts that a rise in agricultural output results in a surplus and reduced food price, which in turn affect labour costs and a country's ability to compete globally. Strong growth ties exist between the expansion of agricultural output and other economic sectors. Spending locally produced marketable goods and services with revenue from increasing agricultural production increases demand for domestic industries and services, which boosts overall output growth Tejvan (2015). It is a well-known fact that developed economies tend to expand at the highest rate while the poorest nations always grow at the lowest rate in terms of agricultural output.

However, nations that embrace globalisation and become more open to the flow of ideas and technology, as well as products and services, are frequently linked to notable increases in agricultural productivity. The final quarter of 1986 saw the liberalisation of trade in Nigeria (Karimo, 2014). One anticipates increased competition and improved domestic production with expanded production possibility frontiers leading to steady output growth in line with the predictions of conventional trade theories like the Heckscher-Ohlin theory and the Classical Ricardian theory, as a result of trade liberalisation and ongoing government policies to further open trade to the rest of the world. Once more, trade liberalisation was anticipated to have created a larger market for local industrial and agricultural products, which may have raised investment as well as total output and income. In comparison to established economies and even other African countries like South Africa, the nation continues to be classified as a developing nation with sluggish production growth. Agricultural and industrial production are still quite low and make up very little of the GDP. Furthermore, Andersen and Babula (2008) contended that not all countries will see the anticipated favourable correlation between liberalisation and production growth. As a result, governments shouldn't rush to open up to international trade. This makes it necessary to look at the actual link between trade liberalisation and increases in agricultural production.

Theoretical Underpin

Heckscher-Ohlin Theory

The Heckscher-Ohlin trade theory serves as the foundation for this investigation. The Heckscher-Ohlin trade theory aims to explain how the relative factors of production that exist in different nations affect the pattern of international commerce. According to this idea, variations in relative factor endowments across countries are the root cause of trade disparities in comparative costs. This implies that nations should manufacture items for export and import rare goods locally by using plentiful elements at home. This approach implicitly emphasises the need for nations to rely on factor endowment. This establishes a

connection between global labour and capital flows and commerce. The following presumptions form the basis of the theory: (1) there are no transportation costs or trade barriers; (2) perfect competition exists in both the commodity and factor markets; (3) all production functions are homogeneous to the first degree; (4) the production functions demonstrate different factor intensities between the two commodities; and (5) the production functions vary among commodities but remain the same in both countries (Egai, 2004).

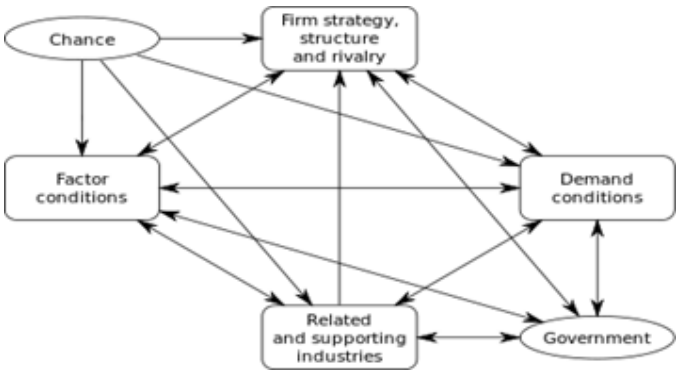
For many economists, the Heckscher-Ohlin model provides a more useful framework for understanding comparative advantage than the Ricardian theory. Comparative advantage theory, which began with comparative advantage and continued by linking the economic characteristics of trade partners to the pattern of international commerce, is included into the Heckscher-Ohlin model. Leontief used an analysis of the US to evaluate the Heckscher-Ohlin model. According to his theory, a nation with abundant capital would buy labor-intensive items and export capital-intensive goods. Using an input-output table for the United States in 1947, he evaluated his hypothesis and came to the conclusion that labour was used significantly more in export sectors than in import industries. As a consequence, the US exports a greater proportion of labor-intensive items than capital-intensive goods. A number of writers responded to his findings. They said that the test was conducted during a period of intense trade protection in the US and saw it as an anomaly. The veracity of his statistics has under criticism from Egai (2004).

Porter's Theory

Traditional trade theories characterise factor conditions as land, labour, and capital, which includes human capital. However, Porter (1990a) makes a distinction between physical resources, knowledge resources, capital resources, infrastructure, and human resources.

Porter's theory of competitive advantage, commonly known as Porter's diamond model, postulates that four characteristics impact trade patterns.

Figure 1: The Porter's Diamond



Source: Adopted from Egai (2004)

1. Infrastructure, capital resources, human resources, physical resources, and knowledge resources are examples of factor conditions. Industry-specific specialised resources are critical to an industry's competitiveness. It is possible to generate customised resources to offset the drawbacks of a factor.
2. When intelligent home market purchasers put pressure on businesses to develop more quickly and provide more cutting-edge items than their rivals, this may help companies gain a competitive advantage.
3. Associated and auxiliary sectors have the capacity to generate vital inputs for internationalisation and innovation. These sectors not only supply inexpensive inputs but also take part in the upgrading process, which encourages innovation among other businesses along the chain.
4. Rivalry, firm strategy, and structure make up the fourth factor that determines competitiveness. Success in business is largely dependent on how organisations are founded, prioritised, and run. However, fierce competition inside the home base is also significant since it puts pressure on innovation to improve competitiveness.
5. All four of the aforementioned factors that determine competitiveness are subject to political influence. It is clear that the government has the power to affect the domestic market's demand, the competitiveness among businesses, and the availability of important manufacturing inputs. Interventions by the government might take place locally, regionally, or nationally.
6. Events known as "chance events" are uncontrollable by a company. They are significant because they bring about disruptions whereby some people gain, and some people lose competitive positions. Porter (1990) posits that the interplay of these elements fosters an environment conducive to innovation and enhanced competitiveness. Porter's diamond is the name given to the four qualities. He referred to them as a country's characteristics that make up its "national advantage diamond." There are two types of competitive advantages for firms:
    i. Efficiency: this relates to relative cost of production.
    ii. Differentiation: this relates to the uniqueness of the product.

The sources of competitive advantage include the following:
(a) production, (b) purchasing, (c) financing (d) distribution, (e) advertising and sale.
According to Porter, a country's competitive advantage will be strengthened if it invests in advanced factors like sophisticated labour and technology, has sophisticated and demanding domestic customers, suppliers or related industries that are globally competitive and appropriate for the firm's strategy, and has intense domestic rivalry (a competitive market structure).

Empirical Literature

Liberalisation has been shown in several studies to have a favourable impact on GDP growth. However, other research indicates that liberalisation and growth have a negative association. Among these studies is one by Rodriguez (2006), which makes the compelling case that while trade shares can be connected with growth rates and income levels, trade is generally uncorrelated with growth. However, it is challenging to identify a significant impact

of openness on economic growth due to the intricacy of the causal and endogeneity relationships between trade shares, growth, and other drivers of growth.

The question of whether trade liberalisation has improved agricultural output in Nigeria was investigated by Apere and Akarara (2018). The data were analysed in the study using multiple regression analysis within the framework of the Ordinary Least Square (OLS) estimation approach. The data were sourced from the National Bureau of Statistics 2017 publication and the Central Bank of Nigeria Statistical Bulletin, covering the years 1970–2017.It is discovered that trade liberalisation significantly affects Nigeria's agricultural production. Liberalisation promoted agricultural production by raising consumer demand for agricultural goods. The conclusion is that trade liberalisation increases Nigeria's agricultural productivity.

Agada, Udogu and Ochoche (2023) evaluated the impact of trade liberalisation on Nigeria's output of a few chosen agricultural products (1986–2020): rice, wheat, cocoa, and cassava. The World Bank database, the National Bureau of Statistics (NBS), the Food and Agriculture Organisation (FAO), and the Central Bank of Nigeria (CBN) all provided information on the study's variables. The Vector Error Correction Model (VECM) was used to analyse the data. Using the Vector Error Correction Model (VECM) to analyse the long- and short-term effects of trade liberalisation on agricultural output, the results indicated that, ceteris paribus, a unit increase in trade openness will, over time, increase cassava output by 0.603 units, decrease cocoa output by 0.53 units, increase wheat output by 6.03 units, and increase rice output by 3.30 units. The study concludes that trade liberalization is healthy for the agricultural sector in Nigeria.

Udoh and Adelaja (2021) examined the impact of agricultural trade policies and the export values of agricultural commodities on Nigeria's GDP. This study made use of time series data. The data were assessed using regression analysis and the Augmented Dickey Fuller (ADF) test, often known as the unit root test. According to the data, cashew and cocoa had the highest export values in 2012 (₦95,383,071,481.00 and ₦119,365,225,390.00), while ginger had the highest export value in 2013 (₦14,885,150,186.88). Among the fourteen (14) agricultural policies that were put into effect between 2010 and 2018 were the Bank of Agriculture, the Commercial Agriculture Credit Scheme (CACS), duty-free imports of agricultural equipment, the Growth Enhancement Support Scheme, the Nigeria Incentive Based Risk Sharing System for Agricultural Lending (NIRSAL), and other agricultural policies. Findings revealed that a significant relationship ($p<0.1$) existed between trade policy and agriculture contribution to GDP.

The multilateral system has had a limited impact on trade liberalisation, according to Jean-Christophe Bureauu, Hussain, and Sebastein (2017), who used a decomposition of changes in several forms of tariffs to assess advancements related import protection in the agriculture sector. In a similar vein, Anowor et al. (2013) investigated how trade liberalisation affected Nigeria's agricultural output. Using the Error Correction Model, they discovered that the real exchange rate, agricultural capital creation, and foreign direct investment in Nigerian agriculture are crucial for boosting output and exports of agricultural goods.

Also, Usman et al. (2010) noted that despite a number of policy initiatives to increase food production, the demand for food has continuously outpaced supply, with an increasing number of people becoming more vulnerable, in their study on agricultural trade liberalisation and food security in Nigeria for the years 1981 to 2003. Therefore, it is advised to take steps to lessen the negative consequences of trade liberalisation on the security of domestic food supplies. Reducing domestic assistance that distorts trade is a crucial component of agricultural trade liberation, according to SCBD's (2005) study on the effects of trade liberalisation on agricultural biological diversity.

The link between trade openness and economic development in Nigeria from 1970 to 1996 was also studied by Ekpo and Egwaikhide (1994). They discovered a negative correlation between economic growth and trade openness. Olomola (1998) investigated the long-term connection between openness and economic growth using the endogenous growth model. He used the Dickey-Fuller and Augmented Dickey-Fuller tests to look at the variables' stationarity. Using export/GPD and total trade/GDP as proxies for openness across the sample period of 1960 to 1998, he discovered that there is no meaningful correlation between total trade and GDP and Nigeria's long-term growth.

Similarly, Ogujiuba, Oji, and Adenuga (2004) used a co-integration technique to assess the relationship between trade openness and Nigeria's long-term growth. For several reasons, they favoured the VAR technique, and their econometric findings indicate that there is no meaningful correlation between production growth and openness, and that unchecked openness may have detrimental effects on the expansion of regional industries, the real sector, and government income.

Sarkar (2007) looks at research that specifically focus on Nigeria and Africa to investigate the connection between growth and openness (trade-to-GDP ratio). A cross-country panel data analysis of 51 South American nations from 1981 to 2002 reveals that only 11 wealthy, heavily dependent on trade countries had a positive correlation between real growth and trade share. A time series analysis of the experiences of individual nations reveals that, between 1961 and 2002, there was no positive long-term association between openness and growth in the majority of the sampled countries, including those in East Asia. He discovers that only the middle-class group demonstrated a favourable long-term relationship based on the experiences of different locations and groups.

Methodology and Data

The data were analysed using multiple regression analysis within the context of the Ordinary Least Square (OLS) estimation approach. The data were sourced from the National Bureau of Statistics 2022 publication and the Central Bank of Nigeria Statistical Bulletin. The yearly time series data included information from 1970 to 2022. Analysing the data was the first step in estimation. The unit root test is then conducted using the Augmented Dickey Fuller (ADF) unit root test protocol in order to prevent inaccurate results. In section 3.2, a co-integration test was also performed to see whether the variables in our model had a long-term equilibrating relationship. Finally, the models will be checked for autocorrelation using the Durbin-Watson test.

Model Specification

The functional form of the model specified to capture the objective of the paper is as follows:

$$AOG = f(TL, GCF, FDI, ER) \quad \ldots (1)$$

Where:

AOG stands for Index of Agricultural Output, which is a stand-in for the agricultural sector's performance. TL = Total trade to GDP ratio as a measure of trade liberalisation Gross capital formation in the agriculture sector is known as GCF. ER is for real exchange rate, while FDI stands for foreign direct investment into the agriculture sector.

Mathematically, the above functional relationship expressed in equation 1 can be expressed as;

$$AOG_t = \varphi_0 + \varphi_1 TL_t + \varphi_2 GCF_t + \varphi_3 FDI_t + \varphi_4 ER_t \ldots \quad (2)$$

The econometric model for estimating equation 2 is:

$$AOG_t = \varphi_0 + \varphi_1 TL_t + \varphi_2 GCF_t + \varphi_3 FDI_t + \varphi_4 ER_t + u_{1t} \quad \ldots (3)$$

Where u_{1t} is the error term, φ_1, φ_2, $\varphi_3 and$ φ_4 are parameters to be estimated.

Unit Root Test

The ADF unit root test equation for equation 1 is presented below;

$$\Delta AOG_t = \partial + \delta_t + \beta AOG_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta TL_{t-1} + \sum_{i=1}^{n} \mu_i \Delta GCF_{t-1} + \sum_{i=1}^{o} \rho_i \Delta FDI_{t-1} + \sum_{i=1}^{p} \sigma_i \Delta ER_{t-1} + \varepsilon_{2t} \ldots\ldots 4$$

$$\Delta\Delta AOG_t = \partial + \delta_t + \beta AOG_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta\Delta TL_{t-1} + \sum_{i=1}^{n} \mu_i \Delta\Delta GCF_{t-1} + \sum_{i=1}^{o} \rho_i \Delta\Delta FDI_{t-1} + \sum_{i=1}^{p} \sigma_i \Delta\Delta ER_{t-1} + \varepsilon_{3t} \ldots\ldots 5$$

Equation 5 is necessary if the variables are non-stationary at level form.

Note that TL, FDI, FDI, ER, and AOG are specified as previously. Additionally, lag order selection criteria like the Hannan Quinn information criterion (HQIC), the Akaike information criterion (AIC), and the Swartz Bayesian information criterion (SBIC) experimentally establish q, which is the maximum lag duration.

Estimation Output and Analysis

The study's average AOG was 124.0943, while the study's average TL, GCF, FDI, and ER were 526.6148, 574985.2, 851892.5, and 73.8925, respectively. The data set's ER value is quite

near to the mean, as indicated by its standard deviation. The values in the data set are farther from the mean, according to the standard deviation values of AOG, TL, GCF, and FDI. The positive skewness coefficients show that all of the variables are favourably skewed. Furthermore, each and every variable is significant at the 5 percent level. As a result, we disprove the normalcy hypothesis for every variable. As a result, we draw the conclusion that the variables lack normal distribution.

Table 1a: Mean, Standard Deviation Maximum Values and Minimum Values of the Variable

Variables	Mean	Standard Deviation	Minimum value	Maximum value
AOG	124.0943	70.19795	55.16	302.11
TL	526.6148	728.8293	7.24	2455.66
GCF	574985.2	1240074	130.7	5991400
FDI	851892.5	2411317	-404.1	1.10e+07
ER	73.8925	40.1491	0.74	113.2

Source: Author's Computation

Table 1b: Skewness and Kurtosis

Variables	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	p-value
AOG	0.0094	0.6452	6.40	0.0408
TL	0.0009	0.3309	9.96	0.0069
GCF	0.0000	0.0000	35.16	0.0000
FDI	0.0000	0.0000	37.54	0.0000
ER	0.0171	0.0451	8.36	0.0153

Source: Author's Computation

Tests for Stationary

The results regarding the stationarity properties of the data and the order of integration of the series have been determined by Augmented Dickey Fuller (ADF) test which is presented below.

Table 2: Augmented Dickey – Fuller Unit Root Test Results

Variable	ADF – Statistic		Model	Lag order at level	Lag order at 1st diff.	~I(d)
	Level	1st Difference				
AOG	-0.217	-4.153*	Drift	3	3	I(1)
TL	-0.976	-2.976*	No constant	3	3	I(1)
GCF	-1.190	-2.167*	Drift	3	3	I(1)
FDI	- 0.296	-4.490*	Drift	3	3	I(1)
ER	-1.962	-4.585*	Drift	3	3	I(1)

Where * denotes significance at 5% and the rejection of the null hypothesis of presence of unit root. The optimal lag lengths were chosen according to Akaike's final Prediction Error (FPE) criterion (presented in Appendix B1). The critical value at level is -1.679 while the critical value at 1st difference is -1.674

Source: Author's Computation.

There might be a long-term association between the variables because they are all incorporated in the same sequence. But we won't know for sure until it's experimentally verified. Because of this, a cointegration test is performed on the variables, and the results are shown in the Section that follows.

Cointegration Test

To determine if there is a long-term link between the dependent variable in equations 3 and the explanatory factors, a cointegration test is performed. The test's outcome is shown in Tables 2 below. The findings showed that there are three cointegrating equations for the following variables: exchange rate (ER), gross capital formation (GCF), trade liberalisation (TL), foreign direct investment (FDI), and agricultural output growth (AOG). This suggests that the explanatory variable and the dependent variable in equation (3) have an along-run connection.

Table 3: Results of Johansen test for cointegration between AOG, TL, GCF, FDI, and ER

Maximum Rank	Eigenvalue	Trace Statistics	5% critical value
0	.	130.0600	59.46
1	0.84290	52.3233	39.89
2	0.43858	28.0770	24.31
3	0.33277	11.0833*	12.53
4	0.18996	2.2348	3.84
5	0.05182	-	-

Source: Author's computation

The outcome shown in table 3 above indicates that the variables may be corrected for errors and short-term disturbances that cause them to stray from long-term equilibrium paths. Additionally, there is a chance that the variables will converge and adjust back to the long-term equilibrium, but the rate at which this adjustment occurs will only be known by the coefficient of adjustment in the error correction model. Thus, estimating an error correction model is required.

Discussion of Results

The estimation of the error correction model is shown in Appendix, Table A. As anticipated, the model's coefficient of adjustment (ECM) turned out to be negative. The findings showed that AOG, TL, GCF, FDI, and ER converge to their long-run equilibrium route at a rate of 26.1 percent annually, even in the presence of short-term variations. The Ordinary Least Square method was utilised to estimate equation (3), which was defined in accordance with the study's purpose. Table 3 presents the findings. With the exception of exchange rate, all coefficients are positive. The findings showed that trade liberalisation benefits Nigeria's rising agricultural output. Trade liberalisation has resulted in a notable 5 percent increase in agricultural output, as evidenced by the low probability value (0.000) and high t-statistics (3.75). The theory that trade liberalisation has no discernible effect on Nigeria's agricultural production is clearly rejected in light of this data. Nigeria's agricultural output is therefore significantly impacted by trade liberalisation. It has a major impact on Nigeria's agricultural production. Increased demand for agricultural products is made possible by trade liberalisation, which raises agricultural output and productivity.

Table 4: Estimation results for Agricultural Output; Dependent Variable AOG

AOG	coefficients	Standard Errors	t-Statistic	P-value
TL	0.0055	0.0014666	3.75	0.000
GCF	4.22	1.43537	2.94	0.007
FDI	1.11	0.41729	2.66	0.009
ER	-0.099	0.03498	-2.83	0.006
Constant	5.150	1.69967	3.03	0.004
R-Squared		0.7469		
Adj. R-Squared		0.6534		
F(4, 38)		55.647 (0.000)		
Durbin-Watson d-statistic (5, 43)		1.520581		
Breusch-Godfrey LM chi2		1.281 (0.1122)		
Ramsey RESET F (3, 35)		2.27 (0.0980)		
Breusch-Pagan / Cook-Weisberg chi2(1)		0.02 (0.8770)		

Source: Authors' computation

In the same way, foreign direct investment and gross capital creation boost agricultural output. Agricultural output rises by 4.22 and 1.11 units, respectively, in response to increases in foreign direct investment and gross capital formation. They also have a big impact on

Nigeria's agricultural productivity. The corresponding high t-statistics and low probability values demonstrate this. Exchange rates, on the other hand, lower agricultural production. Agricultural production decreases by about 0.1 when the rate of exchange rises by 1 naira. This outcome is consistent with Seetanah, Matadeen, and Matadeen's (2012) findings, which looked at the relationship between trade openness and economic performance in a few African nations and found that there is a positive and statistically significant relationship between trade openness and economic growth in developing nations.

With a coefficient of determination of 0.7469, the model's variables were able to explain a change in agricultural production of around 74.69 percent. Put differently, the factors that influence the growth rate of agricultural production in Nigeria by 74.69 percent include currency rate, foreign direct investment, gross fixed capital formation, and trade liberalisation. The explanatory factors jointly and significantly affect agricultural production, according to the significant F-statistics. There is no autocorrelation, according to the Durbin-Watson d-statistic. The lack of serial correlation is further supported by the negligible Breusch-Godfrey LM chi2 value of 1.281 (0.1122). Furthermore, the results of the missing variable test show that our model has no omitted variables. The Ramsey RESET F (3,35) value of 2.27 (0.0980) supports this. As a result, the model is appropriately described and includes the appropriate set of variables. The results of the Cook-Weisberg and Breusch-Pagan tests for heteroskedasticity indicate constant variance, as seen in Table 4.4. As a result, applying the OLS approach is suitable.

Summary, Conclusion and Recommendations

In conclusion, this study discovered that trade liberalisation significantly affects Nigeria's agricultural production. It promoted agricultural productivity by raising consumer demand for agricultural goods. This supports the conclusions made by Anowor et al (2013) and Apere and Akarara (2018). It was also found that customers started to desire local items instead of imports in general as the exchange rate increased. The demand for items manufactured in Nigeria is rising, which in turn causes output to rise. This contradicts the findings of Anowor et al. (2013), who found a positive correlation between trade liberalisation and real exchange rates. In a similar vein, output was often raised by foreign direct investment.

We infer that trade liberalisation increases agricultural output in Nigeria based on the results of our study. Trade with other nations has enhanced agricultural output and raised demand for Nigerian agricultural goods. Nigeria's agricultural output generally benefits greatly from trade liberalisation. Therefore, it is advised that policy makers focus on encouraging foreign commerce in order to increase Nigeria's agricultural production. However, prudence is advised in order to safeguard nearby enterprises that rely on agricultural products as their primary source of raw materials.

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