

GROWTH RATE AND CAUSALITY AMONG FOREIGN TRADE, FOREIGN DIRECT INVESTMENT AND AGRICULTURAL PRODUCTIVITY IN NIGERIA

^{1*}Fwah, F.H., ¹Abu, O. and ¹Aye, G.C.

¹Department of Agricultural Economics, Federal University of Agriculture, Makurdi, Nigeria.

***Corresponding Author: fwahfrancis5977@gmail.com (08039443554)**

Abstract

This study was carried out to determine the growth rate and causality among foreign trade, foreign direct investment and agricultural productivity in Nigeria, using annual time series data from 1980-2014. Data for the study include non-oil import, non-oil export, foreign direct investment, agricultural productivity, exchange rate, interest rate, budget to agriculture and agricultural loan. Trend analysis and Granger causality test were used for the analysis. The trends show that all the variables fluctuated during the period under review. Furthermore, the instantaneous growth rates of Agricultural Productivity, FDI, non-oil import and non-oil export were 5.33 %, 61.96 %, 34.08 %, and 39.89 % respectively. The corresponding compound growth rates were 5.48 %, 85.81 %, 40.60 % and 49.89 % respectively. The results also revealed that the coefficients of the quadratic terms for the variables of concern were negative and significant at 1 %, 5 %, 1 % and 5 % for agricultural productivity, FDI, Non-oil import and export respectively. The granger causality test revealed that a unidirectional causal relationship was found between Foreign Direct Investment and non-oil export with 16.92 Chi-square tabulated and 21.99 Chi-square calculated. Based on the findings of the study, it was recommended that conditions that will encourage foreign investors to invest in divers sectors of the economy should be put in place, Government should, also, encourage non-oil exportation and discourage importation

Key words: Foreign Trade; Foreign Direct Investment; Agricultural Productivity; Export; Import and Causality.

Introduction

Increase in agricultural productivity brings about economic growth and sustainable development of a nation through provision of employment opportunities for the teaming population, export revenue earnings, raw material for industries and reduction in poverty level. Abayomi (1997), viewed rising agricultural productivity as

the most important tool of successful industrialization while decline or stagnation in agricultural productivity is the principal explanation for poor economic performance.

Foreign trade is the backbone of growth and development of every country of the world. As pointed out by Frankel and Romer (1999) foreign trade has been identified as an instrument and driver of economic growth. Krugman and Helpman (1988) stated that international trade brings welfare and efficiency gains to all countries irrespective of their initial conditions, level of development, technological abilities and natural resources endowments. Oviemuno (2007) added that foreign trade has been and is today an economic force that has spurred agriculture, commerce, promoted technology and growth, spread cultural patterns, stimulate exploration and colonization, and frequently fanned the flames of war.

Foreign direct investment is perceived to have a positive impact on the economy (agriculture inclusive) of a host country through various direct and indirect channels. Alfaro (2006) reported that policy makers believe that foreign direct investment produces positive effects on host economies. Some of these benefits are in form of externalities and the adoption of foreign technology.

In spite of the unstable nature of crude oil price in the world market, discovering of crude oil by other countries which leads to increase in competition, crude oil bunker, substitute for some crude oil product and other benefits of agriculture export, there is no significant shift from oil to non-oil (agricultural) export. Lawanson (2005) reported that shortly after the independence, the non-oil export contributed over 90 percent to the Gross Domestic product (GDP), but continue to decline drastically from the mid 70s' to a single digit (3.1%) in 1980s'. Onyehialam (2009) reported that agricultural sector which has been relatively stagnant at 3% growth performance, moved from 4.1% growth rate in 1998 to 7.4% by end of 2009. This was as a result of a renewed attention of government within the period through various reform programmes that, also, encouraged increasing private sector entrepreneurial activities.

Eze (2011) pointed out that because of the persistent political and institutional instability, unstable macro-economic policies, bad governance and uncertainty, international confidence in Nigeria was badly affected, thereby affecting the flow of foreign investors into the country. Shiro (2014) who worked on the impact of foreign direct investment on the Nigerian economy using economic regression model of ordinary least squares, revealed that a positive relationship existed between FDI and major economic variables such as the GDP and index of industrial production.

The specific objectives of the study are to determine the growth rate, direction of growth and analyze the causal relationship between foreign trade, foreign direct investment and agricultural productivity in Nigeria from 1980-2014.

Methodology

The study was conducted in Nigeria. The country is located in the western part of Africa between Latitude 5° and 15° North and longitude 3° and 15° East of the meridian. Nigeria has a total area of 923, 768 square Kilometer with land occupying 910, 768 square kilometer and water occupying about 13,000 square kilometers. The country is bounded in the north by republic of Niger and Chad, in the south by the Atlantic Ocean, in the west and east by the republic of Benin and Cameroon respectively (World map, 2009).

The longitudinal survey design was adopted for this study. Time series data were collected on annual basis. Inferential statistics were used to analyze the data collected. Trend analysis and Granger causality test was used to analyze the objectives.

$$Y_t = Y_0 + (I + r)^t \quad (1)$$

Where,

Y_t = amount of foreign trade or FDI or agricultural productivity in year t,

Y_0 = amount of Foreign trade or FDI or agricultural productivity in the base year,

r = compound rate of growth of Y and

t = time trend in chronological years.

The growth rate model is expressed linearly using the natural logarithm (\ln), i.e

$$\ln Y_t = \ln Y_0 + t \ln(I + r) \quad (2)$$

Substitute $\ln Y_0$ with α_1 and $\ln(I + r)$ with α_2 in the equation above, we have

$$\ln Y_t = \alpha_1 + \alpha_2 t \quad (3)$$

Adding the disturbance term, we have

$$\ln Y_t = \alpha_1 + \alpha_2 t + \mu \quad (4)$$

The slope coefficient a_2 , determines the type of growth rate which could be expressed in terms of instantaneous growth rate (IGR) at a particular time or compound growth rate (CGR) over a period of time.

$$\text{Thus: IGR} = a_2 \times 100 \quad (5)$$

$$\text{CGR} = [\text{antilog } a_2 - 1] \times 100 \quad (6)$$

To determine the rate of change of growth, the quadratic form of the model is given as:

Granger causality test

In order to analyze the causal link between foreign trade, foreign direct investment and agricultural productivity in Nigeria, the Granger causality test was modeled and expressed as follows:

$$AGP_t = \beta_o + \sum_{i=1}^p \beta_i AP_{t-i} + \sum_{i=1}^p \theta_i FT_{t-i} + \varepsilon_{1t}$$

$$FT_t = \beta_o + \sum_{i=1}^p \beta_i FT_{t-i} + \sum_{i=1}^p \theta_i AGP_{t-i} + \varepsilon_{2t}$$

$$AP_t = \lambda_o + \sum_{i=1}^p \lambda_i AGP_{t-i} + \sum_{i=1}^p \gamma_i FDI_{t-i} + \mu_{1t}$$

$$FDI_t = \lambda_o + \sum_{i=1}^p \lambda_i FDI_{t-i} + \sum_{i=1}^p \gamma_i AGP_{t-i} + \mu_{2t}$$

$$FDI_t = \psi_o + \sum_{i=1}^p \psi_i FDI_{t-i} + \sum_{i=1}^p \phi_i FT_{t-i} + v_{1t}$$

$$FT_t = \psi_o + \sum_{i=1}^p \psi_i FT_{t-i} + \sum_{i=1}^p \phi_i FDI_{t-i} + v_{2t}$$

where:

p = optimal lag length

β_o, λ_o and ψ_o = constant

$\beta_i, \theta_i, \lambda_i, \gamma_i, \psi_i$ and ϕ_i = parameter coefficients to be estimated

$\varepsilon_{1t}, \varepsilon_{2t}, \mu_{1t}, \mu_{2t}, v_{1t}$ and v_{2t} = Gaussian white noise

AGP_t = current value of agricultural productivity,

FT_t = current value of foreign trade,

FDI_t = current value of foreign direct investment,

AGP_{t-i} = immediate past values of agricultural productivity,

FT_{t-i} = immediate past values of foreign trade,

FDI_{t-i} = immediate past values of foreign direct investment.

Results and Discussion

Growth trend in foreign trade, foreign direct investment and agricultural productivity

The result of growth and trend in foreign trade, foreign direct investment and agricultural productivity are presented for both linear and quadratic model in Table 1. The quadratic model was chosen based on Akaike information criterion (AIC) which indicates the goodness of the model. The analysis of trend of agricultural productivity for quadratic model shows a coefficient of determination (R-square) of 0.9366 implying that about 93.66 % of the variations in the value agricultural productivity is explain by the trend model. The instantaneous growth rate (IGR) and compound growth rate (CGR) of agricultural productivity are 5.33 % and 5.48 % respectively. The coefficient for the quadratic model was negative (-0.001) and significant at 1 %. This implies that there was deceleration in the growth rate of agricultural productivity for the period of thirty five years.

The R-square for Foreign Direct Investment is 0.3642 which implies that time explain about 36.42% of variation in Foreign Direct Investment. The coefficient of the trend model for the Foreign Direct Investment has a value of 0.6196 and when translated into instantaneous growth rate (IGR) and compound growth rate (CGR) are 61.96 % and 85.81 % respectively. The coefficient for the quadratic model was negative (-0.012) and statistically significant at 5 %. This implies that there was deceleration in the growth rate of Foreign Direct Investment for the period under consideration.

Non-oil import shows R-square of 0.9651 which implies that time explain 96.51% of the variation in non-oil import. The instantaneous growth rate (IGR) and compound growth rate (CGR) are 34.08 % and 40.60 % respectively. The coefficient for the quadratic model was negative (-0.003) and statistically significant at 1 %. This implies that there was deceleration in the growth rate of non-oil import for the period of the study.

On the other hand trend analysis for non-oil export R-square of 0.8163 which implies that time explains 81.63% of the variation in non-oil export. The instantaneous growth rate (IGR) and compound growth rate (CGR) are 39.89 % and 49.89 % respectively. The coefficient for the quadratic model was negative (-0.005) and statistically significant at 5 %. This implies that there was deceleration in the growth rate of non-oil export for the period of thirty five years.

Table 1: Estimated Trend, Growth Rate and Direction of Growth

Variable	Model	Determinant	Coefficient	AIC	Durbin Watson	R-square	IGR (%)	CGR (%)	STATUS
GP	Linear	Constant	0.349829	-1.447249	0.206587	0.693995			
		Trend	0.016527						
	Quadratic	Constant	0.147261	-2.965599	0.967355	0.936686	5.33	5.48	Decelerating
		Trend	0.053358						
		Trend ²	-0.0010***						
DI	Linear	Constant	17.17082	5.297654	1.192371	0.275205			
		Trend	0.197123						
	Quadratic	Constant	14.84687	5.223724	1.31804	0.364243	61.96	85.81	Decelerating
		Trend	0.619659						
		Trend ²	-0.0124**						
IP	Linear	Constant	1.815449	1.705366	0.500319	0.952589			
		Trend	0.237944						
	Quadratic	Constant	1.249491	1.455170	0.695550	0.965134	34.08	40.60	Decelerating
		Trend	0.340846						
		Trend ²	-0.0030***						
XP	Linear	Constant	-1.078187	3.349705	1.923786	0.788254			
		Trend	0.233050						
	Quadratic	Constant	-1.990720	3.264298	2.221822	0.816386	39.89	49.89	Decelerating
		Trend	0.398965						
		Trend ²	-0.0048**						

Note *** (**) (*) denote significance level at 1%, 5% and 10% level respectively.

AGP=Agricultural Productivity; FDI=Foreign Direct Investment; IMP=Non-oil Import;

EXP=Non-oil Export; IGR= Instantaneous Growth Rates CGR= Compound Growth Rates

Source: Source: Output from data analysis, (2018)

Short-run granger causality test

The result of the short-run granger causality test among variable is presented in Table 2. The result shows that there is a unidirectional causal relationship between Foreign Direct Investment and non-oil export. That is non-oil export granger cause foreign direct

Table 2: Short-run Granger Causality

Null Hypothesis	F(1, 10)	F(1, 10)	Decision
AGP does not granger cause AGP	3.72	16.92	Accept
AGP does not granger cause FDI	1.27	16.92	Accept
AGP does not granger cause IMP	5.08	16.92	Accept
AGP does not granger cause EXP	7.16	16.92	Accept
FDI does not granger cause AGP	1.21	16.92	Accept
FDI does not granger cause FDI	5.96	16.92	Accept
FDI does not granger cause IMP	8.78	16.92	Accept
FDI does not granger cause EXP	21.99	16.92	Reject
IMP does not granger cause AGP	2.23	16.92	Accept
IMP does not granger cause FDI	2.29	16.92	Accept
IMP does not granger cause IMP	2.84	16.92	Accept
IMP does not granger cause EXP	4.50	16.92	Accept
EXP does not granger cause AGP	2.50	16.92	Accept
EXP does not granger cause FDI	4.21	16.92	Accept
EXP does not granger cause IMP	2.78	16.92	Accept
EXP does not granger cause EXP	1.43	16.92	Accept

Source: Output from data analysis, (2018)

investment, but foreign direct investment does not granger cause non-oil export. This implies that the past values of export can be used to predict the current value of foreign direct investment while the past value of FDI cannot be use to predict the current value of oil export. Hence the null hypothesis is rejected. On the other hand, the null hypothesis of no granger causality is accepted for other variables that has no causal relationship.

Conclusion and Recommendations

From the analysis of the findings, it was concluded that there was deceleration in the direction of growth of agricultural productivity, FDI, Non-oil import and export. It was, also, concluded that there was a unidirectional causal relationship between Foreign Direct Investment and non-oil export. Based on the findings of this study, the following recommendations are made:

1. Due to deceleration in the growth rate of Foreign Direct Investment, conditions that will encourage both foreign investors to invest in diverse sector of the economy should be put in place by the government.
2. Results also indicated that non-oil exports growth rate decelerate. Non-oil goods exportation should therefore be encouraged by boosting the production of local industries, improve the quality of Nigerian goods so as to compete favorably in the world market and policies that will also encourage non-oil exportation should be put in place.
3. With decrease in Agricultural productivity, Government should therefore, discourage importation, especially goods that the nation can produce or goods that the nation has comparative advantage in the production.

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