Open Science

Determinants of Agricultural Export Growth in Nigerian

Udah S. C.[1, 2], Nwachukwu I. N.[3], Nwosu A. C.[4], Mbanasor J. A.[3], Akpan S. B.[5]

[1]Department of Agricultural Economics and Extension, Abia State University, Abia State, Nigeria

[2]Division of Resource Management, West Virginia University, Morgantown, West Virginia, U. S. A.

[3]Department of Agribusiness and Management, Michael Okpara University of Agriculture, Umudike Abia State, Nigeria

[4]Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike Abia State, Nigeria

[5]Dept. of Agricultural Economics and Extension, Akwa Ibom State University, Akwa Ibom, Nigeria

Email address

christdliberator@yahoo.com (Udah S. C.)

To cite this article

Abstract

The performance of agricultural GDP in Nigeria in the last thirty years has been decimal, declining from 64 percent share of gross domestic product (GDP) in 1960 to 44 percent in 2010. In response to this scenario, this study evaluated the determinants of agricultural export growth in Nigeria and proffered recommendations based on research findings. Time series secondary data were used. The study adopted regression analysis on micro and macro-economic variables to find the significant relationship between the different variables chosen. The result shows that 66.4% of the variations in the dependent variable were explained by the explanatory variables. The regression analysis shows that export intensity is positively related to agricultural export. This points toward international trade as a veritable instrument in achieving agricultural growth and wealth to the nation. Adopting or sustaining liberalization policy is advocated while infrastructures that promote massive agricultural production should be vigorously pursued. Such infrastructures should include functional ports, power supply, telecommunication, agro allied industries, sound security outfit and good road network. This is because for an economy to be agricultural export oriented there has to be surplus commodities made possible through economy of scale. It is therefore very important for the aforementioned structures to be in place to realize Nigerian agricultural export goal.

Keywords

Agricultural Export Growth, Regression Analysis, Export Intensity, Liberalization Policy Infrastructural Development, Economy of Scale

1. Background to the Study

Agriculture is the most important sector in the Nigerian economy given its contribution, over the past several decades, to employment, foreign exchange, food supply, poverty reduction and its linkages with other sectors of the economy. It can be said that, indeed, the sector's performance directly mirrors the performance of the overall economy. In 1960 for example, agriculture constituted as much as 64% of Nigeria's GDP [1, 2, 3, 4].

Endowed with huge expanse of arable land, beneficial climate, abundant streams, lakes, forest and grassland, as well as large, active population that can sustain a highly productive agriculture, Nigeria has great potential to become the food basket of the West African Sub-region [5, 6]. The sector is estimated to be the largest contributor to non-oil foreign exchange earnings. This means that agriculture holds abundant potential for enhancing and sustaining the country's foreign exchange. Despite the enormous contribution of agriculture to the Nigeria economy over the years, the sector has, however, slipped into a systemic decline, particularly in the past four decades.

As a direct indicator of agricultural GDP growth, the importance of agricultural export cannot be overemphasized. Available statistics indicate that in 1960, agricultural export commodities contributed well over 75% of total annual merchandise exports [7]. Nigeria was previously the largest exporter of palm oil and palm kernel, ranked second to Ghana in cocoa and occupied a third position in groundnut

[8]. Nigeria has, however, lost its role as one of the world's leading producer and exporters of agricultural commodities. Agricultural export as a share of total export has fallen to 1.63 percent in 2010. This is from a fall of 75 percent in 1960 to 2.77 percent in 1979 and 1.81 percent in 1981 [9, 10, 11].

A major indicator of depressed performance in Nigeria agricultural sector is the food crisis experienced in the country in the contemporary years, forcing the country to resort to increasing food importation at high prices [12]. Thus, by 1975, Nigerian economy had become a net importer of basic food items [2, 6, 9].

Giving the decimal performance of agricultural export in Nigeria over the years as indicated above, it becomes necessary to examine the factors that determine its growth. This would provide appropriate information necessary to design sound macroeconomic policies to address the cause of the problem and pave way for sustained production and higher growth rates.

1.1. Statement of the Problem

Nigeria launched Structural adjustment programme (SAP) in 1986 to redefine the state of the economy with the main aim of reversing the downward trend of the agricultural sector. The sector was deregulated by abolishing marketing board, eliminating price control, privatization of public enterprise and devaluation of naira in other to aid the competitiveness of the export sector [13].

Before SAP was introduced, Nigeria economy was characterized by a weak economic structure arising from frequent changes in economic and financial policies, bad implementation of gigantic agricultural projects, rise in food importation, fall in oil price, increase in foreign debt, and others [14]. Agricultural exports had declined from 75% share of total export in 1960 to 1.81 percent in 1981[7, 10].

The period described above was also characterized by currency overvaluation partly due to oil boom. This led to Nigerian agricultural exports being uncompetitive in the world market. Factors of production such as land and labour migrated out of the rural agricultural sector to the urban industrial sector. This was because construction, manufacturing and service sectors, booming at the period, were paying higher returns on those factors. The increased migration of able-bodied youths from the rural to urban areas later dealt a blow to agricultural sector [8, 15]. Despite the adoption of development plans and various agricultural policies, Nigerian economy behaved sluggishly and population grew by leaps and bounds unchecked having one of the highest growth rates in the world (3-5.5%) [14].

The reason for deregulation as the policy trust of SAP and other aforementioned programmes was to put the agricultural sector and the economy on a sustainable growth path. This has not been achieved as intended since food supply could not meet up with demand. When SAP policies were executed as intended by the IMF, the Nigerian economy actually did grow as was expected. The growth manifested between 1986 and 1988, with the export sector performing especially well. However, the falling real wages in the public sector amongst the urban classes, along with a drastic reduction in expenditure on public services, set off waves of rioting and other manifestations of discontent that made sustained commitment to the SAP difficult to maintain [14].

Post SAP projects, programs, and policies by Nigerian government also included the National Economic Empowerment and Development Strategies (NEEDS I and NEEDS II), the implementation of the Comprehensive African Agriculture Development Program (CAADP) and the National Food Security Program (NFSP) [16]. Despite all these efforts by various policy regimes, the agricultural sector has not been able to achieve the expected results as food supply is unable to keep pace with demand [16, 17, 18]. Given aforementioned reasons, there is definitely a need to determine the factors that affect agricultural export in Nigeria in other to design appropriate policy for a sustained agricultural growth.

1.2. Justification of the Study

Agriculture is the most important sector in the Nigerian economy. Since the sector's performance directly mirrors that of the overall economy, the results of the study are expected to assist researchers, policy makers, and relevant government agencies in their planning, research, development, and the use of agricultural product towards attaining food security [2, 3, 15].

For a proper design of growth enhancing policies, policy makers should know what accounts for variation in growth rates across periods and the roles of the various factors in agricultural export growth. They should know the production structures and factors underlying them. With the necessary information, policy makers can evaluate the possible effects on productivity.

Analyzing the determinant of agricultural export growth is an appropriate way of finding where policies can rightly respond to these issues. This work decomposed the agricultural sector and growth rates into different components and examine the role of the different factors in the sector in order to understand better the agricultural export growth process. The outcome could therefore assist in gaining better understanding about the determinants of agricultural export growth and provide useful information for more beneficial and appropriate public.

2. Research Methodology

2.1. Study Area

The study was conducted in Nigeria which is one of the largest countries in Africa and lies wholly within the tropics along the Gulf of Guinea on the western coast in Sub-Saharan Africa. Nigeria lies between 4^0 and 14^0 North of the equator and between longitudes 3^0 and 15^0 east of the Greenwich. Nigeria has a total land area of 923,768.622 km or about 98.3 million hectares, and population of 151.874 million people [19, 20]. Nigeria has a highly diversified agro-ecological condition, which makes possible the production of

a wide range of agricultural products. Smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land [21].

2.2. Sources of Data

This study relied on the use of aggregate secondary data. Time series annual data was used. Macroeconomic variable such as on trading partner's income, trade openness, infrastructural development, real exchange rate, government expenditure in agriculture were positively related to agricultural export growth while interest rate was negatively related to agricultural export growth. Microeconomic variable such as real world market price of agriculture export was positively related to agricultural export growth. Data on these variables and other relevant information were obtained from Central Bank of Nigeria (CBN) several issues, National Bureau of Statistics (NBS) formally Federal Office of Statistics (FOS) several editions, World Bank Report; Food and Agricultural Organization Statistics, U.S bureau of labour statistics, journals, bulletins, proceedings etc.

2.3. Method of Data Analysis

In order to investigate the relationship that exist between the independent variable and explanatory variables, this research adopted the following procedures:

2.3.1. Unit Root Test

The paper conducted the unit root test on the variables by employing the Augmented Dickey Fuller (ADF) to test the characteristics of the variables with a view to determining the order of integration.

2.3.2. Regression Analysis

After determining the stationary levels of equation, ordinary least square method of analysis was used to determine the effect of the independent variables on agricultural export growth. Their regression results were presented in Table 1.

2.4. Model Specification

$AE_t = f(WP_{t-1}, TP_t, EX_t, INR_t, TO_t, IF_t, GE_t, AE_{t-1}, e_t)$ - Implicit function

Where

AE_t = growth in Agricultural export (Quantity tonnes)

WP_{t-1} = growth in Lagged real world market price of agriculture export (N\tonne)

TP_t = growth in Trading partner's income (proxied by U.S. GDP)

EX_t = growth in Official exchange rate (₦/$)

INR_t = growth in Interest rate (%)

TO_t = growth in agricultural export intensity (measured as agricultural export as a percentage of real GDP)

IF_t = growth in Infrastructural development (proxied by land and irrigation area) [1000ha]

GE_t = government expenditure in agriculture (Billion)

AE_{t-1} = Lagged growth in agricultural export (Metric tonnes)

e_t = error term

t = time in years.

δ_0, δ_1-δ_8 = parameters to be estimated

Ln= Natural logarithm

The following production functions were explicitly fitted to the model:

i Linear Function

$$AE_t = \delta_0 + \delta_1 WP_{t-1} + \delta_2 TP_t + \delta_3 EX_t + \delta_4 INR_t + \delta_5 TO_t + \delta_6 IF_t + \delta_7 GE_t + \delta_8 AE_{t-1} + e_t$$

ii Exponential Function

$$L_n AE_t = \delta_0 + \delta_1 WP_{t-1} + \delta_2 TP_t + \delta_3 EX_t + \delta_4 INR_t + \delta_5 TO_t + \delta_6 IF_t + \delta_7 GE_t + \delta_8 AE_{t-1} + e_t$$

iii Cobb Douglas /Power/ Double-log Function

$$L_n AE_t = \delta_0 + \delta_1 L_n WP_{t1} + \delta_2 L_n TP_t + \delta_3 L_n EX_t + \delta_4 L_n INR_t + \delta_5 L_n TO_t + \delta_6 L_n IF_t + \delta_7 GE_t + \delta_8 L_n AE_{t-1} + e_t$$

iv Semi–log function

$$AE_t = \delta_0 + \delta_1 L_n WP_t + \delta_2 L_n TP_t + \delta_3 L_n EX_t + \delta_4 L_n INR_t + \delta_5 L_n TO_t + \delta_6 L_n IF_t + \delta_7 GE_t + \Delta_8 L_n AE_{t-1} + e_t$$

2.5. Apriori Expectations

The expected signs for the coefficients of the structural parameters are summarized as follows:

$\delta_0 > 0; \delta_1 > 0; \delta_2 > 0; \delta_3 > 0; \delta_4 > 0; \delta_5 > 0; \beta_6 < 0; \delta_7 > 0; \delta_8 > 0;$

δ_0 is the intercept of the regression equation.

3. Results and Discussion

3.1. Regression Analysis

Table 1 shows the results of the ordinary least square (OLS). The semi-logarithm form of the regression analysis was chosen as the lead equation based on the econometric criteria with particular reference to the R^2 value, estimated parameters and the significance of the parameters estimated. This variable shows the relationship between the dependent and independent variables. The R^2 in the lead equation explained 66.36% of total variations in the growth of agricultural sector. The F-statistic of 7.40 is significant at 1% level, indicating that R^2 in the lead equation is significant and this implied that the selected equation has goodness of fit. The result showed that the agricultural export growth in Nigeria had a significant (at 1% level) positive relationship with export intensity (TO_t). This implied that as trade openness increases agricultural export increases too. The finding suggested that as the Nigeria government, through the liberalization policy increased access to foreign agricultural goods on domestic agricultural goods, Nigerian agricultural export increased. The result is in line with that of Anwar *et. al.* [22], who found out that increase in trade openness led to higher export of cotton.

3.2. Augmented Dickey Fuller

The results of unit root test using Augmented Dickey-Fuller Root is presented in Table 2 and 3. The variables under consideration include: agricultural export growth, trading partner's income, trade openness, infrastructural development, real exchange rate, government expenditure in agriculture, interest rate, and real world market price of agriculture export

The Augmented Dickey- Fuller (ADF) was used to determine the time series characteristics of the variables used in the regression. The results of both logged and nonlogged variable showed that all the variables were significant (stationary) at level.

Table 1. Determinants of agricultural export growth-1970-2010.

Variable	Linear	Exponential	Double-Log.	Semi-Log^L
Constant	3.49(0.51)	0.27(0.50)	0.58(1.10)	8.52.(1.26)
WP_{t-1}	0.07(7.46)	0.00(0.13)	-0.03(-0.75)	0.16(0.32)
TP_t	0.07(0.08)	-0.01(-0.13)	-0.26(-0.41)	-3.54(-0.43)
EX_t	0.02(0.53)	0.00(0.64)	-0.00(-0.65)	-0.02(-0.91)
INR_t	-0.04(-0.37)	-0.00(-0.46)	0.00(0.06)	0.06(0.23)
TO_t	0.58(6.22)***	0.05(6.30)***	0.08(5.90)***	1.07(5.80)***
IF_t	-0.58(-0.87)	-0.07(-1.31)	-0.47(-0.73)	-3.82(-0.47)
GE_t	0.00(0.27)	2.22(0.25)	-0.00(-0.09)	0.04 (0.19)
AE_{t-1}	-0.11(-0.97)	-0.11(-9.90)	-0.12(-0.89)	-0.15(-1.08)
R^2	0.6910	0.6617	0.6380	0.6636
Adj. R-sq.	0.6086	0.5715	0.5415	0.5740
F-Statistic	8.39***	7.33***	6.61***	7.40***
	D-W -1.08	D-W -0.61	D-W -2.07	D-W -2.08

Note: Asterisk *, **and *** represent 10%, 5% and 1% significance level respectively. Figure in brackets are t-values and variables are as defined in equation (3.6). L stands for lead equation.
Source: Regression results from various data.

Table 2. Results of the ADF Unit Root test for non-logged Variables used in the Analysis.

Non-Logged Variables	Level	First difference	Order of integration
Agricultural export (AE)	-8.413***	-	1(0)
Infrastructural develop.(IF)	-6.365***	-	1(0)
World Price(WP)	-5.745**	-	1(0)
Trading partners' income(TP)	-5.452**	-	1(0)
Exchange rate(EX)	-5.703**	-	1(0)
Interest rate (INR)	-7.078**	-	1(0)
Trade openness (TO)	-6.632***	-	1(0)
Government expenditure (GE)	-6.263**	-	1(0)

Note: At level, critical value at 5% = -3.53, and at 1% = - 4.21; at first difference, critical value at 5% = -3.53 and at 1% = -4.21. Asterisks ** and *** represent 5% and 1% significance levels respectively. Variables are as defined in the model specification. These tests were performed by including drift and a deterministic trend in the regressions. Variables are in growth rates.

4. Summary of Findings

The study examined the determinants of growth in Nigerian export sector. The results of the regression analysis (Table 1) shows that 66.36% of the variations in dependent variable (Agricultural GDP) were explained by the explanatory variables. The result thus, shows the result showed that the agricultural export growth in Nigeria had a significant (at 1% level) positive relationship with export intensity or trade openness (TO_t). This implied that as trade openness increases agricultural export increases too. The finding suggested that as the Nigeria government, through the liberalization policy increased access to foreign agricultural goods on domestic agricultural goods, Nigerian agricultural export increased.

Table 3. Results of the ADF Unit Root test for logged Variables used in the Analysis.

Logged Variables	Level	First difference	Order of integration
Agricultural Export (AE)	-8.345***	-	1(0)
Infrastructural development (IF)	-6.378***	-	1(0)
World Price(WP)	-5.801**	-	1(0)
Trading partner's income (TP)	-5.250**	-	1(0)
Exchange rate(EX)	-6.415**	-	1(0)
Interest rate (INR)	-5.255**	-	1(0)
Trade openness (TO)	-7.146***	-	1(0)
Government expenditure in agriculture (GE)	-6.205**	-	1(0)

Note: At level, critical value at 5% = -3.53, and at 1% = - 4.21; at first difference, critical value at 5% = -3.53 and at 1% = -4.22. Asterisks ** and *** represent 5% and 1% significance levels respectively. Variables are as defined in the model specification. These tests were performed by including drift and a deterministic trend in the equation. Variables are in growth rates.

4.1. Conclusion

The purpose of this study is to examine the factors that determine Nigerian agricultural export growth. The study concluded that improvement in agricultural export is necessary to adequately develop Nigerian agricultural potential and be in the path of sustainable growth. Thus, as Nigeria government, through the liberalization policy increased access to foreign agricultural goods on domestic agricultural goods, Nigerian agricultural export increased.

4.2. Recommendations

Based on the findings from the analysis, the following recommendations are made:

Adopting or sustaining liberalization policy advocated

The positive relationship between export intensity and agricultural export growth points toward international trade as a veritable instrument in achieving agricultural growth, achieved through liberalization policy.

Vigorous Pursuit of Infrastructures that Promote Massive Agricultural Production.

For an economy to be agricultural export oriented, there has to be surplus commodities made possible through

economy of scale. It is therefore very important for basic infrastructures such as good road network, power, functional ports, telecommunication, agro allied industries and sound security outfit to be in place to support scale economy.

References

[1] Central Bank of Nigeria (CBN) (1998). The Challenging Structure of Nigeria Economy and Implications for Development. Annual Statistical Bulletin, the Research Department, Abuja, Nigeria.

[2] Ekpo, A. H. and Umoh, O. J. (2010). An Overview of the Nigerian Economics Growth and Development. OnlineNigeria.Com.

[3] Odhiambo, W, Nyangito H.O. and Nzuma J. (2004). Sources and Determinants of Agricultural Growth and Productivity in Kenya. Kenya Institute for Policy Research and Analysis. Bishops Garden Tower Bishops Road, Nairobi Kenya.

[4] Emeka, O.M. (2007). Improving the Agricultural Sector towards Economic Development and Poverty Reduction in Nigeria. CBN bulletin 4:23-56.

[5] Food and Agricultural Organization (FAO), (2003). World Agriculture: Towards 2015/2030. An FAO Perspective, Rome.

[6] Imoudu, P. B. (2005). Government Policies towards the Sustainability Rebirth in Nigeria: Challenges and Opportunities. Proceedings of the 39th conference of the Agricultural Society of Nigeria held in Benin, Edo State, Nigeria. Pp 31 – 35.

[7] Ekpo A, Egwaikhide F. Exports and economic growth in Nigeria: A reconsideration of the evidence. Journal of Economic Management. 1994; 1(1):100-115.

[8] Abolagba, E.O., Onyekwere, N.C., Agbonkpolor, B.N. and Umar, H.Y (2010). Determinants of Agricultural Exports, J. Hum. Ecol., 29(3): 181 – 184.

[9] Central Bank of Nigeria (CBN). (2000). Nigerian Economy and Implications for Development. Annual Statistical Bulletin, the Research Department, Abuja, Nigeria.

[10] Idachaba FS. Repositioning Nigerian Agriculture to Realize Millennium Development Goals (MDGs): Whither Nigerian Agriculture in the Obasanjo Reform Agenda? Invited Keynote Paper presented at the 40th Annual Conference of Agriculture. Society of Nigeria held at NRCRI, Umudike, Nigeria; 2006.

[11] World Bank, 'Agricultural Raw Material Exports (% of Merchandize Exports) in Nigeria'. World Bank Indicators-Nigeria-Export: 2010.

[12] Ogundari, K. and Ojo, S. O. (2007). Economic Efficiency of Small Scale Food Crop Production in Nigeria: A Stochastic Frontier Approach. *Journal of Social Science,* 14(2):123-130.

[13] Binuomote, S. O. and Ajetomobi J. O. (2012). The Effects of Structural Breaks on Cocoa Yield Response in Nigeria (1961–2007) International Journal of Applied Agricultural and Apicultural Research 8 (1): 46-58,

[14] Umebali EE, Akubuilo. Nigerian economy and structural adjustment: Effect on the agricultural sector. In: Aham Anyanwu the Nigerian Structural Adjustment Programme a Multi Sectorial Analysis. Abic Books and Equipment Limited Enugu, Nigeria in Conjunction with Avan Global Research Consult Abia State University; 1992

[15] Ojiako, I. A. (2008). Analysis of acceleration, deceleration and stagnation in output, Land area, and yield of sweet potato (Ipomoea batatas L. Lam.) in Nigeria, 1961-2007. (pp. 94-101). In: Sweet potato in Nigeria (M. O. Akoroda, & I. Egeonu-eds). Proceedings of First National Sweet potato Conference, Sweet potato Promotion Group held 16-18 September, 2008. Faculty of Agriculture and Forestry, University of Ibadan, Nigeria.

[16] Diao X, Nwafor M, Alpuerto V. Strategic issues on growth in the agricultural sector and reducing poverty in Nigeria. Brief No.10. International Food Policy Research Institute, USA; 2010.

[17] Tanko, L., Onyenweaku, C. E. and Nwosu, A. C. (2006). Optimum Crop Combination under Limited Resource Condition: A Micro Level Study in Yauri, Kebbi Staten Nigeria. *The Nigerian Agricultural Journal* 37(5): 1-10.

[18] Food and Agricultural Organization (FAO), (2004). Production Year Book, 40.Food and Agriculture Organization of the United Nations. FAO, Rome, Italy.

[19] International Monetary Fund (IMF) (2011) World Economic Outlook.

[20] Lafiagi, M. S. (1984). Towards Self-Sufficiency in Sugar Production in Nigeria. Memo Submitted to Federal Ministry of Commerce and Industry pp. 1 – 46.

[21] Manyong, V.M, Ikpi, A. Olayemi, J.K, Yusuf, S.A. Omonona, R, Idachaba, F.S. (2003). Agriculture in Nigeria: Identifying Opportunities for Increased Commercialization and Investment in Nigeria, IITA, Ibadan, Nigeria, pp.159.

[22] Anwar, S., F. Shaukat and Z. Hussain. (2010). Impact of Trade Liberalization on Export of Cotton from Pakistan: a Time Series Analysis. *Sarhad J. Agric*. 26(2): 297-304.