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**ANALYSIS OF IMPORT AND EXPORT ELASTICITY OF AGRICULTURAL PRODUCTS IN NIGERIA: 1975 – 2009**

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**ABSTRACT**

The study sought to analyse the import and export elasticity of agricultural products in Nigeria between 1975 and 2009. Data for analysis were collected conveniently using secondary sources. Data collected were analysed using inferential statistics (multiple regression). The result of the import analysis showed that coefficient of multiple determination,  $R^2$  was very strong at 0.750 and statistically significant at 1% ( $P = 0.01$ ) which indicates a very strong explanatory power of the independent variables in explaining the change in the dependent variable, which was import demand of agricultural products. It explicitly showed that four (4) out of the five (5) coefficients of: gross domestic product (GDP), coefficient of index of commercial openness (ICO), External Reserve (LnEXTR) and Liberalization dummy were positively signed, as well as statistically significant at 1% except liberalization dummy (TLD) that was statistically insignificant. Again, the result of the export analysis showed that the coefficient of multiple determination,  $R^2$  was 0.525 or 52.50% and statistically significant at 1%. The DW value was 2.947 and indicated the absence of auto-correlation. It was further observed that the following variables: gross domestic product (GDP), commercial openness, output of major agricultural export commodities and index of world prices were positively signed and statistically significant at 1%. The study therefore conclude that agricultural export elasticity was most responsive to output and world price, and least responsive to trade liberalization; though not statistically significant. Based on the research findings, the following recommendations were made: stimulation of domestic agricultural production for increase exports; expansion programmes and policies should be made proactive on agricultural export. Agricultural products that are most competitive in terms of quality and price need to be encouraged.

**Key words:** *import, export, elasticity, agricultural product, trade liberalization.*

**INTRODUCTION**

Agricultural commodity trade has assumed prominent status in the world market in that it brings both the industrialized and developing countries together. This affords the participating nations the opportunity to use what they have to obtain what they need. In order to achieve the economic interest of these nations, trade across their borders becomes imperative. While the industrialized countries source substantial amount of their raw materials from developing countries, developing countries on the other hand, depend on developed countries for the supply of capital inputs such as farm machinery and related equipment. Foreign trade has been encouraged by both developing and other developed nations because of some obvious advantages. International trade enables participating countries to reap the benefit of comparative advantage. The classical economists like Adam Smith, David Ricardo, John Stuart Mill, and neo-classical economists like Alfred Marshall, A.C. Pigou, and David Robertson, attached much importance to

international trade in a country's development that they regarded it as an engine of growth. As Kohls and Uhl (1985) observed, the advantages derived from international trade have led to the expansion of trade and integration of nation agriculture with the world agricultural economy. Active export promotion and growth constitute a key element of an outward-oriented development strategy. Until the beginning of trade policy reforms in many African countries, exports were penalized through at least five mechanisms, including high import duties, export licensing, export taxes, below-market producer prices paid by monopoly marketing boards, and overvalued currencies. Policy reforms have eliminated most of these mechanisms in the majority of African countries (Oyejide, 2003; Ojejide and Gunning, 1999). Through a combination of unilateral and regional modalities, import liberalization has progressed quite rapidly in many African countries, particularly in the 1990s. As a result, trade policies in most African countries during this period were characterized by extensive state involvement in the economy, both in production and in marketing. Therefore to shield the domestic market from foreign competition, a number of policy measures which include non-tariff measures such as quantitative import restriction to restrict imports and high tariff structures were instituted. Exports were often restricted by a number of export taxes and strict rules and regulations (World Bank, 2002). It is an established fact that agricultural sector is vital for any economy that must grow and develop. The export trade sub-sector is even more important to generating foreign exchange revenue to make possible the importation of machineries and capital goods required for industrialization and general development (Mesike and Abolagba, 2006).

However, the globalization of agricultural trade could have undesirable consequences if the agricultural sector is exposed to the full rigors of international competition (FAO, 1995). It is on the strength of this argument that nations through their policies attempt to protect the sector from factors capable of bringing trade distortions and at the same time generating a flow of revenue for the nations. Policies on trade should be based on the fact that free trade gives rise to efficient allocation of resources and to high standard of living. On the other hand, trade protection involves the prevention of free trade. Therefore, some instruments that could be used to ensure trade protection include taxes on imports, quotas, licenses, restrictions on imports and government subsidies (World Bank, 1981). The effectiveness of each of these tools depends on the situation at any particular period in the economy. Agricultural trade and trade policies are contingent on both internal and external factors. However, in Nigeria, trade policies are normally designed to address matters relating to imports, exports and terms of trade, balance of payments and exchange rate. As FAO (1995) observed, agricultural trade tends to be a source of conflict of interests and international confrontation. This appears so because trade policies are designed to address economic problems of a particular nation. This again is based on the sector playing a leading role in economic development of most developing countries. The role of agricultural trade varies from country to country and the major ones are the foreign exchange earning and international relations among others. The critical issue that threatens Nigeria's source of revenue from the agricultural sector seems to be the decline in agricultural productivity. Looking at the percentage of the population of Nigeria (66%) involved in agriculture, one would be challenged to believe that the sector is contributing immensely to the nation's G.D.P., especially through agricultural export. Before the discovery of crude oil in 1960, Nigeria was into the

production and exportation of most agricultural products such as oil palm, cocoa, cotton, rubber, groundnut and others. This made the nation deeply involved and recognized in agricultural trade internationally. The discovering of oil in the 70's, consequently, leads to a dramatic drop in the agricultural share of the nation's G.D.P. Generally, a lot of trade policies have been adopted for some decades (1975 and 2009) in the history of Nigeria. The major aims of these policies have been to generate revenues and encourage exports while importing to complement the shortfalls in domestic production. Notwithstanding, the responses of tax revenue to such policy as trade liberalization seem not to have been established especially when tax revenues have been observed to serve as the second largest source of the economy's revenue. It is therefore the intention of this study to prove or refute the assumption that if tariff is reduced more import will be encouraged and the net effect may be more tax revenue. It is in the light of this that the study was undertaken to analyze the import demand and export supply elasticity of agricultural products in relation to trade liberalization.

**MATERIALS AND METHODS**

The study area is Nigeria, which is officially referred to as the Federal Republic of Nigeria. It is a country in West Africa which shares land borders with the Republic of Benin in the West, Chad and Cameroon in the East, Niger in the North, and borders the Gulf of Guinea in the South. It has a total area of 923,768km<sup>2</sup> out of which 5,000sq miles is water. According to NPC (2006), Nigeria has a total population of 140,003,542 people. Nigeria lies wholly within the tropics along the Gulf of Guinea on the western coast of Africa. A convenience sampling technique was adopted to collect the data needed for this study. Required data on selected variables were collected from 1975 to 2009 because of their availability, representing a 35-year data for each of the variables selected. The study was carried out by the use of secondary data. The secondary data were collected from relevant agencies and institutions such as the Central Bank of Nigeria (CBN), Nigeria Customs Service (NCS), National Bureau of Statistics (NBS), Nigeria Port Authority (NPA) office, Federal Office of Trade and Commerce, the International Monetary Fund (IMF), Food and Agricultural Organisation (FAO) among others. The tool of multiple regression was the inferential statistics adopted in the study.

**Import Elasticity Model**

The model is specified thus:

$$\begin{aligned}
 \text{VAM}_t &= f(\text{GDP}, \text{EXGR}, \text{ICO}, \text{EXTR}, \text{LIB}, \text{U}_t) \text{ ----- Implicit} \\
 &\text{non-stochastic} \\
 \text{TM}_t &= \alpha_0 + \alpha_1\text{GDP}_t + \alpha_2\text{EXGR}_t + \alpha_3\text{ICO}_t + \alpha_4\text{EXTR}_t + \alpha_5\text{TLD}_t + \text{U}_t \text{ --- Explicit} \\
 &\text{stochastic}
 \end{aligned}$$

Where,

- VAM<sub>t</sub> = Value of major agricultural imports in year t.
- GDP<sub>t</sub> = Gross domestic product in year t.
- EXGR<sub>t</sub> = Official exchange rate vis-à-vis the Dollar in year t.
- ICO<sub>t</sub> = Index of commercial openness in year t.
- EXTR<sub>t</sub> = External reserves in year t
- TLD<sub>t</sub> = Trade liberalization dummy (pre-lib=0, post-lib = 1)
- α<sub>0</sub> - α<sub>5</sub> = Coefficients estimated.

$U_t$  = Random term at t period

*A priori*, it is expected that the coefficients of GDP, ICO, and EXGR would be positively signed while that of EXGR should be negatively signed. The coefficient of liberalization dummy was expected to assume any value between greater than or less than zero.

### Export Elasticity Model

This model is presented as:

$$VAX_t = f(GDP_t, EXGR_t, ICO_t, OUT_t, IWP_t, TLD_t, U_t) \text{ -----}$$

Implicit stochastic

$$VAX_t = \beta_0 + \beta_1GDP_t + \beta_2EXGR_t + \beta_3ICO_t + \beta_4OMAC_t + \beta_5IWP_t + \beta_6TLD_t + U_t \text{ -----}$$

Explicitly stochastic

Where,

$VAX_t$  = Value of major agricultural exports in year, t (₦)

$GDP_t$  = Gross domestic product in year t. (₦)

$EXGR_t$  = Official exchange rate vis-à-vis the Dollar in year t.

$ICO_t$  = Index of commercial openness in year t.

$OMAC_t$  = Aggregate of outputs of major agricultural commodities in tones per year t.

$IWP_t$  = Index of average world prices of agricultural produce

$TLD_t$  = Trade liberalization dummy (pre lib = 0, post lib = 1).

$\beta_0 - \beta_6$  = Coefficients estimated

$U_t$  = Random term at t period

*A priori*,  $GDP_t$ ,  $ICO_t$ ,  $OMAC_t$  and  $IWP_t$  were expected to be positively signed while EXGR will be negatively signed.

## RESULTS AND DISCUSSION

### Import Demand

The coefficient of multiple determination,  $R^2$  was very strong at 0.750 and statistically significant at 1% (SigF=0.00). This showed a very strong explanatory power of the independent variables in explaining the change in the dependent variable, which was import demand of agricultural products. Thus, the included independent variables explained 75% of the total variation in the dependent variable. The results showed that four (4) out of the five (5) coefficients: gross domestic product (GDP), coefficient of index of commercial openness (ICO), External Reserve (LnEXTR) and Liberalization dummy were positively signed, as well as statistically significant at 1% level but for liberalization dummy (TLD) that was statistically insignificant. This implies that any increase in these variables would favour agricultural import demand, which agrees with the *a priori* expectations. Exchange rate had its coefficient negatively signed, and thus indicate that an increase in any of the variable would lead to a decrease in agricultural import demand. These findings were consistent with the views of Abdullahi and Suleiman (2004) and Egwaikhide (1999). While the former observed that the elasticity of import demand with respect to real GDP, exchange rate and real foreign reserve was inelastic, the later noted that the index of trade openness in Nigeria has been consistently above the 15 – 20% mark often suggested in literature for an open economy. The positive response of agricultural import demand to index of commercial openness may be attributed to the

several trade policies embarked upon by the Nigerian government, which have encouraged agricultural imports. The need to pursue economic development over the years has led Nigerian government to embrace liberal trade policies.

### **Export Supply**

The results showed that the coefficient of multiple determination,  $R^2$  was 0.525 or 52.50% and statistically significant at 1%. Thus, the variables included in the model significantly explained about 53% of the total variations in the export supply of agricultural products between 1975 and 2009 (Table 2). The DW value was 2.947 and indicated the absence of auto-correlation. It was further observed that the following variables: gross domestic product (GDP), commercial openness, output of major agricultural export commodities and index of world prices were positively signed and statistically significant. Indicating that any increase in these variables would trigger off agricultural export and this agreed with the *a priori* expectations. The result also indicated that the export supply of agricultural products was price elastic, and the index of world price exerted positive effects on performance of export of agricultural commodities. Thus, a rise in producer's price would cause exporters to increase supply. This finding is in tandem with Mesike, *et al* (2008), who deduced that agricultural export commodities contributed well over 75% to total annual merchandise exports in Nigeria. While the coefficient of the exchange rate and trade liberalization was negatively signed but statistically, exchange rate significant. Thus, a rise in exchange rate led to a fall in the export of agricultural commodities. Also trade liberalization has no significant influence on agricultural export in Nigeria. The negative and significant effect of exchange rate on agricultural export agreed with the findings of Abolagba *et al* (2010), Eyo (2008), Yusuf and Yusuf (2007), and Adubi and Okummadewa (1999). They noted among others that a decrease in exchange rate (ie depreciation of the local currency) brings about an increase in export earnings. However, it deviated from the result obtained by Odularu (2010) which opined that as exchange rate rises, agricultural exports rise. The observed inverse relationship implied that as the local currency depreciates relative to the world market currency, the production and export of agricultural products become stimulated.

### **CONCLUSION**

In conclusion, agricultural import demand to its determinants, except for trade openness was inelastic. Its response to trade openness indicated relative elasticity suggesting that Nigerian economy is highly open. Export elasticities indicated that agricultural export was most responsive to output and world price, and least responsive to trade liberalization; which was not statistically significant.

There has been a gradual increase in the contributions of the agricultural sector, championed by the crop sub-sector, to Nigeria's GDP. The increase however, has not translated into increased agricultural export trade. Over the periods under study, agricultural imports remained sizeable and overshadowed exports causing non-oil trade openness to exert negative influence on GDP. The devaluation of the naira rather than limit agricultural imports favoured it. These are indications that the increase in agricultural sector contributions to GDP are associated with production for domestic consumption, which have not been satisfied hence, the increasing imports. Thus, increase in the output of agricultural export commodities favours increased agricultural export supply.

## **RECOMMENDATIONS**

Based on the research findings, the following recommendations were made:

Based on the fact that its effect on trade tax revenue was low, there is need to stimulate domestic agricultural production for increase exports. It is therefore, pertinent that the different agricultural export expansion programmes and policies be made proactive. Agricultural products that are most competitive in terms of quality and price need to be encouraged. Also, policies that can attract more investment into the sector over time should be encouraged.

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**Table 1: Multiple Regression Results of Import Demand of Agricultural Products by Natural Logarithm Function**

Variable	Coefficient	Standard Error	t-value	Sig.
Gross Domestic Product (LnGDP)	0.975*	0.179	5.459	0.000
Exchange rate (LnEXGR)	-0.138*	0.027	-5.111	0.001
Index of Commercial Openness (LnICO)	0.010*	0.119	8.499	0.000
External Reserve (LnEXTR)	0.262*	0.66	-3.988	0.000
Liberalization Dummy (TLD)	0.031	0.094	0.332	0.743
Constant	0.041	0.075	0.542	0.592
R =	0.866	*Significant at 1%		
R <sup>2</sup> =	0.750			
$\bar{R}^2$ =	0.706			
Standard Error =	0.232			
F-statistic =	16.812			
Sig F =	0.000			
DW =	2.139			

**Table 2: Multiple Regression Results of Export Supply of Agricultural Products**

Variable	Coefficient	Standard Error	t-value	Sig.
Gross Domestic Product (LnGDP)	0.598*	0.054	11.074	0.002
Exchange rate (LnEXGR)	-0.111*	0.021	-5.261	0.012
Index of Commercial Openness (LnICO)	0.209*	0.017	12.292	0.000
Liberalization Dummy (TLD)	-0.051	0.476	-0.108	0.915
Output of Major Agricultural Export Commodities (LnOMAC)	1.174*	0.371	3.164	0.003
Index of World Price (LnIWP)	1.021**	0.658	1.552	0.132
Constant	0.006	0.393	0.015	0.998
R =	0.585	*Significant at 1%		
R <sup>2</sup> =	0.525	**Significant at 10%		
$\bar{R}^2$ =	0.492			

Standard Error        =        1.191  
F-statistic         =        24.404  
Sig F         =        0.000  
DW         =        2.947