

**THE ECONOMIC IMPLICATIONS OF PROCESSED TOMATO  
IMPORTATION ON LOCAL TOMATO FARMERS PRODUCTION IN  
NIGERIA**

A Thesis

by

**OLALEKAN GBENGA FAROMIKI**

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Chair of Committee, Edwin C. Price, Jr.  
Committee Members, Luis Ribera  
Robert Strong  
Head of Department, David J. Leatham

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## **ABSTRACT**

Most findings suggested that marketing, innovation and competitive pressures emanating from relevant imports are significant catalysts for decreasing total factor productivity (TFP) and economic growth. The Nigerian government believes that importation of processed tomato paste is hurting local farmers' production. Partly to respond to this concern, this study is set to examine the dynamic relationship among local farmer's production, tomato prices and the importation of processed tomatoes. We then identify the effect that inconsistent government policy has on the importation, as it affects final consumers.

The Dickey-Fuller test for stationarity is used to approach correlation relationship and stationarity; OLS regression is used to study the relationship between the exogenous and endogenous variables. The local farmer's production and importation of tomato paste are positively correlated, responding, increasing consumer demand.

The significance of this study lies in the fact that importation of processed tomatoes increases to meet demand whenever local production of tomatoes, also increasing, fails to fill demand. Thus, there is positive correlation between production and imports. This shows that tomato paste is necessity for consumers. Imports help to make food affordable and available to the consumers. This will also be useful by government agency, policy makers, and business owners in identifying farmers plight and consumer preferences to meet the demand. This research work serves as a contribution to the body of knowledge and supports future studies on the effects of imported goods on the national economy.

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## NOMENCLATURE

ETF	Export-Led Growth
ILG	Import-Led Growth
TFP	Total Factor Production
VAR	Vector Auto Regression

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# 1. INTRODUCTION

The terms of trade, exports and imports are important for the national economic development and growth of a country, but not all countries have the required skills and resources to produce certain goods and services. David Ricardo explained this with the theory of comparative advantage. (David Ricardo 1817)

International trade helps the nation meet daily consumption needs of humans and animals with increasing population and limited resources while minimizing costs. For example, country A produces processed tomato above its domestic consumption, using cheaper resources including the availability of tomatoes, compared to country B. The latter has a comparative disadvantage in producing processed tomatoes but has a comparative advantage in another commodity. The two countries mutually benefit by making a bilateral trade agreement between themselves for the exchange of goods for economic growth and expansion.

## **Import-led growth versus Export-led growth**

A vast empirical literature exists that depicts the relationship between processed tomato exports and economic growth versus imports and fast-growing and processing of tomato through new technologies (Ogbonna, 2011). The export-led growth (ELG) implies that an expanding export sector of processed tomato production is a significant factor in the long-run economic growth of a country economy. Exports stimulate the growth of a domestic economy and productivity gains from foreign revenue earnings for the nation (Ogbonna C.B,2011)

Lately, import-led growth (ILG) has been in focus. Fast-growing developing countries have experienced economic gains resulting from importing of processed tomatoes. Import-led growth focuses on industrial modernization and transition to new products through the acquisition of sophisticated equipment and capital (Ogbonna, 2011).

Many studies on the topic provide empirical evidence supporting the export-led growth hypothesis by showing that exports had an overall positive impact on economic growth. The argument suggested the present research look into factors related to the level of imported processed tomatoes in Nigeria. In a critical World Bank report, Lawrence and Weinstein (1999) observed that commercial banks focus mainly on the export-growth relationship, and neglect the contribution of imports in the promotion of productivity. On this note, Lawrence and Weinstein launched studies that incorporated imports and found that protection was harmful to domestic growth compared to exports. Imports were found to enhance productivity in Japan, the United States and Korea. Such findings suggest that marketing, innovation and competitive pressures emanating from relevant imports are significant catalysts for decreasing total factor productivity (TFP) and economic growth.

Nigeria's aggregate imports of processed tomatoes have substantially grown since the nation gained independence in 1960. Imports grew at an average annual growth rate of 2.5% during the 1960s, increasing to 33% between 1970 and 1989, and a record high of 65% in the 90s. Between 1999 and 2008 imports gradually declined to an average of 21% per annum (FAOSTAT, 2008), yet remaining well above the population growth.

Importation of processed tomato products such as concentrate, paste, ketchup, puree, powder, juice etc. provides readily available and affordable tomato products for consumers. Imports generally enhance efficient production through the transfer of modern technologies embodied in both

manufactured and capital goods imports, benefitting the domestic economy. The current demand for fresh tomato fruits is estimated at 2.45million metric tons per annum, while Nigeria produces only about 1.8million metric tons per annum (Premium Times 2018). The remaining gap left will be complemented by the importation as an essential part of international trade policy.

Even though Nigeria's average aggregate imports of processed tomato have maintained a substantial upward trend throughout the period under review, the growth of the domestic industry' production of fresh tomatoes in relative terms appears non-responsive. This calls for an investigation.

This study is set to examine the dynamic relationship among local farmer's production, tomato prices and the importation of processed tomatoes. We examine the effect of prices on local farmers' production relative to imports, and the level of local farmers' production relative to imports. Finally, we identify the effect that inconsistent government policy has on the importation, as it affects final consumers.

The remainder of the paper is organized as follows. Section 2 discusses the related literature; Section 3 presents the empirical methodology; Section 4 contains the empirical results, and the summary and conclusions of the study are drawn in Section 5.

## 2. LITERATURE REVIEW

The theoretical relationship between imports of processed tomatoes and domestic productivity tends to be more complicated than that of exports and domestic production of tomatoes in Nigeria. Princewill Ekwujuru tomato paste company which has operations across the country has criticized the \$1 billion (12 billion Naira) spent annually by Nigerians on imported tomato paste and its products (Vanguard Newspaper,2018). A Financial Vanguard investigation found that there is a sufficiently high capacity for local tomato production to fully meet the national demand (Vanguard Newspaper, 2018).

However, despite this capacity for domestic production for the Nigeria market, the importation of processed tomatoes is suspected of suppressing the local production. Due to the apparent inability of local producers' ability to supplant the tomato imports, over three thousand (3,000) jobs are lost on farms and in the industry (Premium Times, 2018). The Dangote group of companies demonstrated the problem after it launched Africa's biggest tomato plant in the commercial city of Kano in Nigeria. One year and five months after the plant became operational; the facility was shut down due to a lack of tomato supply from local farmers (Premium Times, 2018).

The Nigerian government has continued to spend the nation's foreign reserves on the importation of finished consumer products, especially processed tomato products that could be sourced locally. If efforts were made toward increasing farm production and introducing new tomato processing technology, along with the promotion of Nigeria products, foreign reserves could be conserved.

A long-run equilibrium could be established to maintain economic stability for farmers and Nigeria economy (Thisday Newspapers, 2017).

Failure to better inform producers and consumers of the need and opportunity to produce and consume locally, and to accelerate technical improvements, will result in continuous low capacity utilization, in Nigeria-based industries, low farm production, and high unemployment around the country (Thisday Newspapers, 2017).

In general, the implications for domestic production from opening an economy to imports depends on both market structure and institutional factors. Under imperfect competition, an import-led domestic market expands as imports increase, but causes domestic investment to fall and thereby reducing productivity (Tybout,2000).

On the other hand, the potential for future expected profits can lead to a more active research and development (R&D) investment and innovation, with a fully open economy, with no limits on exports or imports, R&D can be higher for exporting firms and for import-substituting firms. Imports of capital goods and intermediate goods, which cannot be produced domestically, will enable local firms to diversify or specialize, further enhancing their productivity (Grossman & Helpman 1991, Sjoeholm 1999 and Tybout, 2000).

Advertising Managing Director of Sonia Foods Industries Limited, Nnamdi Nnodebe, speaking for the Manufacturers Association of Nigeria, MAN Tomato manufacturers, a major operator in the industry, said, “Nigeria is the second-largest producer of tomato in Africa and 13<sup>th</sup> in the world. Still, it spends N12billion (\$1billion) annually, on the importation of tomato paste” (Leadership Nigeria Newspaper, 2018).

Sadly, about 750,000 tons of tomatoes harvested in Nigeria, are wasted, with over 3,000 employers operating under-capacity because of the poor supply chain, deficient storage facilities, and price instability (Thisday Newspapers, 2018).

Under the new foreign exchange policy regime, 41 items, including triple concentrate used in the final production of tomato paste, are barred from access to foreign exchange. These are raw materials needed for local processing and producing finished tomato paste. This is paramount in the mind of tomato producers and processors, as this creates support for them and helps them profitably expand, for the good of the economy. Nnodedede argues that if this is actualized, more jobs will be created and exports would start to grow because Nigeria has the potential to become a leading exporter of concentrates if another prerequisite support is given (Vanguard Newspapers 2018).

Helpman and Krugman (1985) argue that an expanding export sector enhances productivity by offering higher economies of scale. Additionally, expanding exports helps relieve the foreign exchange constraint that affects most of developing countries. The importation of equipment for processing tomatoes can increase income per capita of farmers, as well as open economic opportunity broadly. Imports can provide essential inputs and capital goods encompassing sophisticated technologies that are not produced locally, (Esfahani, 1991 and Serletis, 1992).

The Importation of processed tomatoes makes the product readily available and affordable for consumers. It also serves as a price regulator and provides a choice of goods for the consumer during the peak season and off-season. Thus, without imports in the production estimating equation, the results will be biased (Thisday Newspapers, 2017).

Increasing human population challenges our globalized food supply system to ensure food supply and security. When domestic farmers' production is not enough to meet the needs of the growing population over time. Imports are likely to expand to meet those needs. Open markets allow international suppliers to exercise their market contribution and make more food available, accessible and affordable for the consumers. While this may make it difficult for local tomato processors to compete at the imported tomato paste price, it nevertheless provides an option for consumers to benefit from lower prices (Thisday Newspapers, 2017).

Import duty (tariff) on processed tomato products has recently risen to an all-time high, causing a spike of tomato prices on the Nigerian market and rendering imported brands more expensive than domestically produced tomato paste. This means that the marginal cost of paying above-the standard market prices for tomato paste produced in Nigeria is lower than the marginal cost of importing tomato paste into the country. This makes it possible for domestic tomato processing firms to keep its gross margin at a level required to cover the cost of raw material inputs, operating and overhead costs, and a reasonable profit. It nevertheless runs contrary to the law of comparative advantage (Eric Umeofia, Executive Officer Erico Foods Limited, Economic Confidential, 2015).

To encourage domestic production by local farmers, Dr Frank Jacobs suggests that there needs to be more stringent control on importation. The common implications of importing processing tomatoes are that it tends to meet the rising demand of the consumers, but imperils the downtrodden local producers. Reflecting on the negative impact of importing processing tomatoes, the Manufacturers Association of Nigeria (MAN) President, Dr Frank Jacobs, said, "in order to address this challenge government should through its fiscal/monetary policy maintain the duty of 20 per cent and an additional levy of 30 per cent on finished tomato in retail packs". He further suggested that importation of tomato paste in sachet should be prohibited, to encourage local value



addition and to protect consumers against the health hazards arising from short shelf life sachet products (The Nation Newspaper,2018)

There should be strict measures against imported substandard and smuggled products, as most of the tomato concentrates do not have scientifically justified labels. Imported products need to meet standards of production at all levels certified by Sanitary and Phytosanitary Standard (SPS) and a technical barrier to trade (TBT) respectively (Lopriore, C. and Muehlhoff, E. (2004).

Specific target should be given to appropriate research institutes to develop tomato seedlings and implement projects that will lead to the replacement of imported tomato paste. The government should be ready to give the necessary financial support for this transition (Premium Times, 2018).

The former National Agency for Food and Drug Administration and Control, NAFDAC Director-General, Paul Orhii, complained that 90 per cent of packaged tomato paste from China is substandard and dangerous for consumption (Economic Confidential, 2015). Further emphasizing the danger inherent in the consumption of substandard tomato products in Nigeria, Chief Eric Umeofia, Chairman /CEO of Erisco Foods claimed that most of the imported tomato products are only here to “kill” Nigeria consumers and to satisfy their domestic needs (Economic Confidential,2015). Trade is not about economic benefit alone, but it must protect and ensure the safety of lives of human being, animals and plants.

The economic implication of imports of processed tomatoes can be justified by Adam Smith’s discussion of specialization. Economists examining the determinants of standards of living have also been interested in the trade. Nevertheless, in spite of the great time that has been spent studying the implications, there is little persuasive evidence concerning the effect of trade on income (Frankel and Romer, 1999). In Nigeria, studies of imported processed tomato and the

growth of the industry are relatively inconclusive. This justifies this author's decision to investigate the effect of a processed tomato relative to price. Furthermore, we seek to test whether consumers prefer domestically made tomato paste over imported tomato paste; investigate whether imported tomato paste is of insufficiently high quality that consumers respond by penalizing imports in the marketplace; to determine whether imported tomato paste has a significant effect on Nigerian local industries; and to significantly add to the economic literature of Nigeria.

## **2.1 Analysis of Current Situation**

Many reports (GSSP Working Paper, No.21) had confirmed that the processing offers a way of buying up the glut. Yet tomato gluts occur only a few months of the year, and always as a result of large volumes of rain-fed local varieties unsuitable for processing entering the fresh market at the same time.

For most of the year, the price of tomatoes suitable for processing is above the break-even price for the tomato processors, given the competition from imports. Improved varieties such as Pectomech, Power Rano that are suitable for processing also preferred by consumers and achieve a premium price over the local varieties (Kolavalli, 2010).

Processing of highly perishable non-storable tomato crops are typically promoted for two reasons: as a way of absorbing excess supply, particularly during gluts that result from predominantly rain-fed cultivation; and enhance the value chain through a value-added process for export promotion. The approach will improve domestic tomato processing and reduce country dependence on imported tomato products. This invariably improves the foreign exchange reserves as well as the provision of employment and development opportunities in poor rural areas of the country.

### **2.1.1 Problem affecting trade**

As processors cannot obtain all local farmers' tomato produce during a glut based on requirements

to maintain Sanitary and Phytosanitary standards (SPS) measure for scientific justification and Technical Barrier to Trade (TBT) for standard and quality products. Processors must accept quality at competitive prices thus making the farmer a price determiner given the available seed varieties, rather than a price taker. The processors must ensure that the Codex Alimentarius Commission regulation to ensure that the products produced locally meet the international quality and standards. The tomato sector in Nigeria has failed to reach its potential, in attaining yields comparable to other countries. Also, the industry has not been able to sustain processing plants, and improve the livelihoods of those households involved in tomato production nor supply tomatoes to consumers at a cheaper price (Thisday Newspapers, 2017).

Despite public and private interventions, and the third-party certification that include the establishment of many tomato processing factories. Tomatoes of the right quality and quantity for commercial agro-processing are not being grown. Insufficient funding and low education attainment of farmers has prevented them from practicing large scale farming and marketing strategy. Erratic power supply, lack of rural roads network and distance of processing factories from farmers has further impaired the industry. These factors have resulted in wastage of fresh tomatoes across the countries over the years. These challenges increase the importation of processed tomatoes into the country to meet the growing demand of the population (Thisday Newspapers, 2017).

Nigeria continued to suffer post-harvest losses, because of inadequacy in storage, processing facilities and wastage in the tomatoes value chain, costing, Nigeria about \$15 billion post-harvest losses annually (Economic confidential report, 2017).

The past research suggests that Nigeria, despite the higher production of fresh tomatoes, is not the major exporter of either fresh or processed products. Many factors are responsible for the challenge (Economic confidential Newspapers, 2017). They include inadequate supply of good quality seed, inadequate standard storage facilities, poor disease and pest control, poor processing facilities and poor trade relationship in West Africa countries.

Technological advancement and procurement of tomatoes processing plants, storage and export development might improve long-run profits and the value chain productivity for export promotion in Nigeria. If there were an establishment of price guarantee, availability and affordability of both fresh and processed tomato production to meet stable supply. The establishment of necessary technologies and equipment to enhance processing production can help reduce wastage across the six geopolitical zones in Nigeria. This could also increase household income level, firm profitability and foreign revenue. With this development, there will be a cushion effect on the importation of processed tomatoes paste when the needs of the consumers are met locally.

### **3. EMPIRICAL METHODOLOGY/MODEL SPECIFICATION.**

Much previous research uses aggregate import data to study the effect of dis-aggregated imports on economic growth. Therefore, an empirical study of the dynamic relationship between processed tomato imports, local prices, local production, and the implications of imports for the economic growth of Nigeria, is of utmost importance. To this effect, this paper examines the relationship between imports, prices, GDP per capita and growth in local production in Nigeria using a model specification, which relates local production, GDP per capita and prices with historical import variables during the period 1966-2011, based on annual data from FAO and World Bank. This will be employed to determine the implications of processed tomato import on farmers' prices, GDP per capita and production.

This includes a productivity estimation equation for investigating the import-GDP growth relationship in sufficient detail to support better-informed trade policy decisions. We use a conventional multiple regression model and a vector auto-regressive model specification to examine the dynamic relationship of imports as a function of price, GDP per capita and production and production as a function of imports, GDP per capita and farmers prices. We have the Imports tomato (IMP), Prices of tomato (PR), Gross Domestic Product Per capita (GDP) and processed tomato Products (Qty).

To clarify whether tomato production and tomato importation are contemporaneously co-integrated, regression analysis will be performed on the two parameters to see if they are co-integrated or not. The augmented model is given as

$$\Delta \text{IMP} = \beta_0 + \Delta \beta_1 \text{QTY} + \Delta \beta_2 \text{PR} + \Delta \beta_3 \text{GDP} + \mu \dots\dots\dots (1)$$

$$\Delta \text{QTY} = \beta_0 + \Delta \beta_1 \text{IMP} + \Delta \beta_2 \text{PR} + \Delta \beta_3 \text{GDP} + \mu \dots\dots\dots (2)$$

Where: IMP = Aggregate Imports Processed Tomatoes Change in variables;  $\beta_0$  = Constant,  $\beta_{1...3}$  = explanatory power of the respective variable; and  $\mu$  = Stochastic error term. In the equation (2), QTY = Aggregate quantity produce change in variables;  $\beta_0$  = Constant,  $\beta_{1...3}$  = explanatory power of the respective variable; and  $\mu$  = Stochastic error term.

We are aware that imports generally contribute to the development of exports and economic expansion. Exports are considered as one of the very important contributors to economic growth. Therefore, as many of the studies empirically supported the export-led growth hypothesis, there is notable consensus on the role of imports. As the population increases, more tomato production is needed for consumption thereby increasing demand for both the domestic production and import.

### 3.1 Data section

Available data covered only the years 1966 to 2011; more recent data is not yet available. Imports for the period under review are affected by government tariffs, rising consumer demands, exchange rates and quality of the paste. The price used in this paper was the nominal price of the farmer's production from 1966-2011 in US dollars. The choice was made not to deflate the farmer prices because of other commodities that contributed to the growth of inflation will not be considered in the adjusted factors for real prices due to data limitation of the consumer price index. The original price was in local currency (Naira). The Naira price was converted to US dollars using the exchange rate for each respective year of data.

### 3.2 Estimation procedure

(i) To clear the problem of spurious regression, it is important that the OLS time-series properties of the data set employed in the estimation of the equations to be ascertained. A series  $X_t$  is said to be integrated of order  $d$  denoted by  $X_t-I(d)$  – (if it takes one first difference to induce stationarity). If it becomes stationary after differencing  $d$  times, and thus  $X_t$  contains  $d$  unit roots in a series.  $I(0)$  is said to be stationary (if it takes 0 first differences to induce stationarity (Answer and Sampath, 1997). To determine whether a series is stationary or non-stationary, the unit root test developed by Fuller (1976) and Dickey and Fuller (1981) is used.

The Augmented Dickey-Fuller test (ADF) shows the presence of a trend in a time series regression.

$$\Delta X_t = a_0 + a_1 t + a_2 X_{t-1} + \sum_{k=1}^k \Delta \alpha_k X_{t-k} + e_t \dots\dots\dots (3)$$

Where  $\Delta$  is the first difference operator,  $t$  is the linear time trend and  $e_t$  is the error term. In (3) the null hypothesis  $H_0: \alpha = 0$  against the alternative hypothesis  $H_1: \alpha_2 \neq 0$  is tested by comparing the calculated t-ratio in absolute terms with the critical value from the table. If the calculated t-value is less than the critical t value, then we reject the null hypothesis of a unit root (non-stationary) where the case level of the time series  $X_t$  is characterized as integrated of order zero i.e.  $I(0)$ . Nevertheless, if it is observed that the individual time series in equation (3) are integrated of order one,  $I(1)$ , then the series is said to be non-stationary. The Augmented Dickey-Fuller (ADF) unit root tests is employed to test the integration level and the possible co-integration among the variables (Dickey and Fuller, 1981)

#### 3.2.1 Hypothesis

**Null hypothesis** – Processed tomatoes Importation has no significant differences in local farmers’ production

**Alternate hypothesis** – Processed tomatoes importation has significant differences in local farmers' production.

### 3.3 General VAR Models

(ii) A VAR (vector autoregression) is the regression of the current value of each series on lags of itself and the other lagged  $k$  times. Here we have 3 series  $X_1$ ,  $X_2$ , and  $X_3$  and we consider three lags of each. Testing for Granger non-causality in general,  $n$  variable VAR ( $P$ ) models follows the same logic used for bivariate models. For example, consider a VAR ( $P$ ) model with  $n = 3$  and  $Y_t = (y_{1t}, y_{2t}, y_{3t})$ . In this model,  $y_2$  does not Granger-cause  $y_1$  if all of the coefficients on lagged values of  $y_2$  are zero in the equation for  $y_1$ . Similarly,  $y_3$  does not Granger-cause  $y_1$  if all of the coefficients on lagged values of  $y_3$  are zero in the equation for  $y_1$ . These simple linear restrictions may be tested using the concept of causality due to Granger (1969). This is appropriate and used by most of the studies for testing the relationship between the economic growth of imported processed tomato and farmers' production. According to the Granger causality approach, a variable  $Y$  is caused by  $X$ , if  $Y$  can be predicted better from past values of  $Y$  and  $X$  than from past values of  $Y$  alone (Answer and Sampath, 1997).

According to Granger (1988), causality within the framework of the VEC model can occur in two different ways. The first way is through the impact of the lagged differences of a right-hand-side variable. The second way is through the error correction term, which is a function of the one-period lagged values of the variables. Granger suggested that the impact of the lagged differences of a right-hand-side variable on the left-hand-side variable captures the short-run dynamics of the system (Granger, 1969). This can be interpreted as short-run causality. The impact of the one-period lagged error correction term on the left-hand-side variable captures the extent that the variables are out of equilibrium; thus, it can be interpreted as long-run causality. There are four



possible scenarios of causality as (a) unidirectional causality running from X to Y; (b) unidirectional causality running from Y to X; (c) feedback or bi-directional causality running in both directions, and (d) no causality.

Visual observations of the time series data examined in this study suggest the hypothesis that in Nigeria, imports and local farmers' production are statistically significantly promoting the economic growth of the country (GDP) and that no long-run relationship exists between the farmers' price, importation and production variables.

### **3.4 Possible outcomes**

One possible finding is that continuous tomato paste importation will worsen the poverty status of small-scale holders in tomato farming. Excessive importation of tomatoes, especially low-quality tomato products, into the country will make life difficult for small-scale tomato farmers because of the high cost of production they have to bear as compared to their foreign counterparts who enjoy many subsidies from their respective governments.

This will meet the increasing demand of the farmers' production income by introducing the concepts of importation production into their processing products given tastes and preferences among consumers.

Another possible outcome is that imports do not affect farmers' production, GDP per capita and prices. Import will make food available and affordable for the consumers at lower prices. The only condition under which imports of processed tomatoes will not have effect on production and supply is when the technological growth rate is increasing in the local production of tomatoes in Nigeria.

## 4. RESULT AND DISCUSSIONS

### 4.1 Stationarity

It is customary in time series analysis to ascertain the order of integration for each series to avoid the problem of spurious regression (see Granger and Newbold 1974; Philips 1986). The findings regarding the stationarity property of each variable were conducted using Dickey-Fuller (1979). From the regression analysis, the D-F test statistics have a value of 3.84, which falls within the critical value range, and fails to reject with the p-value 0.0004 at 5% significance. We, therefore, concluded that the time series analysis is non-stationary but statistically significant at 5% level.

To make a clear clarification of the relationship of correlation between import and production, we perform another regression using production as the dependent variables while imports, price and GDP per capita are used as the explanatory variables. The model depicts that D-F test statistics has 3.84 which is greater than the critical value of -2.89, and fails to reject the stationarity with the p-value of 0.0004 at 5% level of significance. This shows that tomatoes importation coefficient is statistically significant at 5% level of significance while the price and GDP per capital proxy to consumption is statistically insignificant from the regression model.

Test for non-stationarity for each series, we use dickey fuller test

$$\text{For production, } \Delta QTY_t = \beta_0 + \Delta\beta_1 IMP_{t-1} + \Delta\beta_2 PR_{t-2} + \Delta\beta_3 GDP_{t-3} + \mu \text{ ----- (8)}$$

$$\Delta QTY_t = 280.96 + 3.81 IMP_{t-1} + 0.42 PR_{t-2} - 0.04 GDP_{t-3}$$

(132.33)    (0.99)            (0.34)            (0.25)

$t = \beta_1 / \text{Se } \beta_1$  - Non-standard t-distribution. The t-sat of non – stationary is found from the ratio

$$t = 3.81 / 0.99 = \mathbf{3.84}$$

Therefore,  $\Delta QTY = \text{non-stationary I [1]}$ , we fail to reject the null hypothesis.

An analytical model of the data presented shows that the importation of processed tomatoes is statistically significant (Table 1). We, therefore, reject the null hypothesis and accept the alternative hypothesis that there is a significant relationship between import and farmer's production.

**Table 1:** OLS regression statistics for production and other variables

SUMMARY OUTPUT									
<i>Regression Statistics</i>									
Multiple R	0.751796214								
R Square	0.565197547								
Adjusted R Square	0.534140229								
Standard Error	411.1664121								
Observations	46								
ANOVA									
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>				
Regression	3	9229811.561	3076603.85	18.1985304	1.02056E-07				
Residual	42	7100428.374	169057.818						
Total	45	16330239.93							
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>	
Intercept	280.9636093	132.3347426	2.12312809	0.03967875	13.90128672	548.025932	13.9012867	548.025932	
Import/Tonne	3.816465191	0.992802122	3.84413481	0.00040356	1.812909394	5.82002099	1.81290939	5.82002099	
Price/USD	0.421193648	0.34356166	1.22596232	0.22704257	-0.272141852	1.11452915	-0.2721419	1.11452915	
GDP/Capital/US	-0.04264308	0.256545052	-0.1662206	0.86878094	-0.560371955	0.4750858	-0.560372	0.4750858	

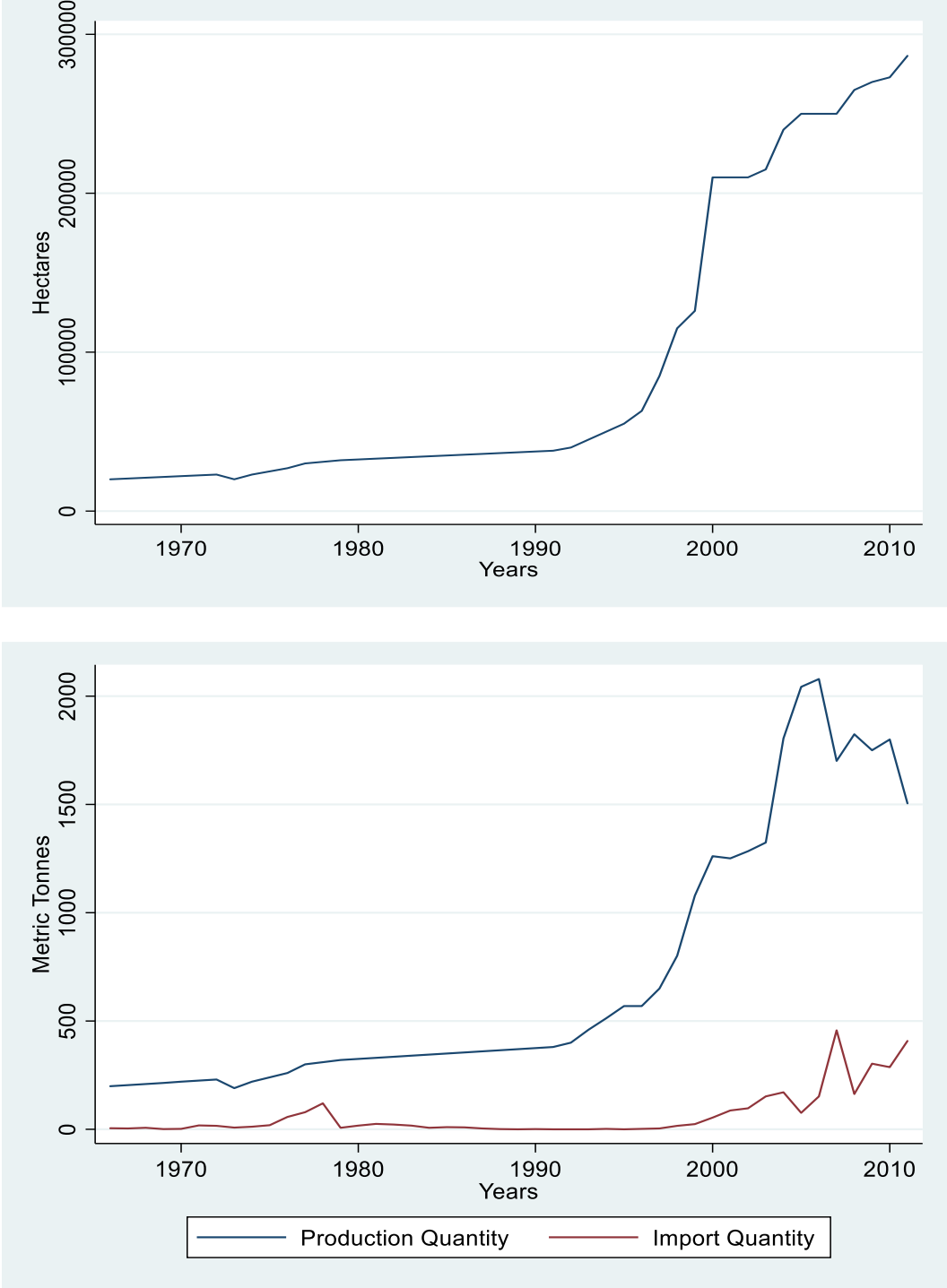
**Source:** FASOSTAT (1996-2011) and World Bank for GDP/Capital (1966-2011)

From Table 1, we have the regression results showing production as a dependent variable with import, price and GDP per capita as independent variables as shown above. The result of the regression analysis implies that import is statistically significant having a spurious relationship with production without harming the price and GDP per capita.

From Table 2, the positive sign of import tomatoes is statistically significant as it goes against the economic theory which says that it should be negative.

The graphical representation below depicts that import has a positive relationship with the production, but not increasing with the rate of production. The harvested per hectare helps in large volume of production over the time. Yet large volume of tomato produced do not meet the standard and quality of the processors. Since tomato paste do not have close substitute, it is difficult to lay a ban on importation of tomato paste so as to meet the deficit gap of demand and supply.

**Figure 1:** Plots of Nigerian tomato harvested per hectare, production and import quantity in metric tonnes 1966-2011, annual data



Source: FASOSTAT (1996-2011)

**Table 2:** OLS regression statistics for production and import in metric tonnage

<i>Regression Statistics</i>								
Multiple R	0.73810416							
R Square	0.544797751							
Adjusted R Squ	0.534452245							
Standard Error	411.0286971							
Observations	46							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	8896677.983	8896677.98	52.6603308	4.81451E-09			
Residual	44	7433561.952	168944.59					
Total	45	16330239.93						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	437.8649304	70.61183393	6.20101343	1.7085E-07	295.5561299	580.173731	295.5561299	580.173731
Import/Tonne	4.138629217	0.570314913	7.25674381	4.8145E-09	2.989235034	5.2880234	2.989235034	5.2880234

**Source:** FASOSTAT (1996-2011) and World Bank for GDP/Capital (1966-2011)

The statistically significant implies that as the import tomatoes increase, demand also is apparently increasing.

From table 2, showing the OLS regression of production on import; we find that import is statistically significant with a p-value of 0.000.

#### **4.2 Significance of the study**

The significance of this study lies in the fact that importation of processed tomatoes is use to checkmate demand whenever there are shortages of local production of tomatoes, given the positive relationship between production and imports. This shows that tomato paste is necessity commodities for the consumers. There should be a relaxation of the anti-import policy that hurts the importation of processed tomatoes in Nigeria. The informative results of this research suggest that farmers and government should avoid a trade war, and support policies to meet the needs of the demand. Government, corporate, public and privates' organization can create an economic investment through the implementation and establishment of technological advancement, procurement of tomatoes processing plants, storage facilities as these will improve long-run profits and more productivity for export promotion in Nigeria. Tomato paste accounts for more than half of the food ingredient for total consumption expenditures of poor households (Ivanic and Martin 2008). Whenever price increases as sudden and large adjustment of the poor are difficult. High population growth with growing income will lead the purchasing power to a greater demand for tomato products. It will also be useful to the business owners and managers in identifying farmers and consumers' preferences and availability of tomatoes to meet the growing population. This research work will also serve as a contribution to the body of knowledge and as a reference for future studies on the effects of imported goods on the national economy.

#### **4.2.1 Impact of the proposed solution.**

##### **(i) Innovate and Share Knowledge**

The tomato factories could create a demonstration farm where they collaborate with local farmers to innovate new farming processes to achieve the best quality and highest yields to feed the processing plant. They could test the soil composition, fertilizer, seeds, pest control techniques, irrigation methods and harvesting techniques. The partner farmers who work on the demonstration farm can then convince other farmers to change their farming methods based on proven results.

##### **(ii) Production**

Economic impacts of improved processing, storage, and other post-harvest handling, can generate more domestic income through the change of form to improve convenience, availability and affordability for the buyers at all times.

Containers, sorting area, sorting and packaging to reduce the spoilage, could improve handling of tomatoes during harvest.



## **5. SUMMARY AND CONCLUSIONS**

### **5.1 Summary**

Statistical data from FAOSTAT and World Bank GDP per capita data from 1966-2011 showed that Nigeria's imports of processed tomatoes have been increasing over time, in spite of the efforts of the government to prohibit imports of processed tomato products. Most outlets and markets are still well-stocked with these goods. Nigerians' government perception and attitudes are negatively disposed towards imported processed tomatoes, but the growing population demands more of the processed tomatoes to meet the gap of the consumers needed. Hence, they are ready to buy them given their increasing purchasing power.

### **5.2 Conclusions**

The results of the analysis indicated that importation of the processed tomato pastes move alongside with domestic production to checkmate the demand by shortages of local production. The statistical model's representation of the data results shows that importation is statistically significant to meet the gap needs of the people. The farmers production of fresh tomatoes helps us to understand that the gap that is not met by the farmers production in Nigeria is filled by the importation of processed tomatoes paste to make tomatoes paste accessible and affordable to the consumer demands. This invariably makes food affordable and available to the consumers at a lower and affordable price. Importation has a positive relationship with the production growth of the nation and makes consumers consumption accessible and affordable.

In forecasting analysis, the future outcome depends on past values or historical data. The data used in this research papers is eight years ago until date because of data limitation. Some factors might occur due to an error term that might cause a dynamic behavioral pattern in the market. The result

of the analysis is within the window frame of FAOAST and World Bank GDP per capita data from 1966-2011.

With commitment to developmental advancement through technological innovation and a freer trade policy, as suggested by this research, the demands of the consumers in Nigeria, as well as the income needs of farmers and processors, can be met.

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