

# Manufacturing Sector and Import Penetration in Nigeria

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## Abstract

The degree to which domestic demand of a country is being satisfied by imports is known as import penetration. This has proven detrimental to the activities of the manufacturing sector in Nigeria, after examining the relationship between the manufacturing sector and import penetration in Nigeria for the period 1981 to 2017. The classical linear regression model (CLRM) within ordinary least square (OLS) estimation technique was used to estimate the stated objective of this study. The study recommends among other things that to further enhance the activities of the manufacturing sector, the government should adopt a near perfect mix between the import substitution strategy and the export promotion strategy of industrialization. This will place Nigeria at the forefront in Africa and to the world at large.

**Keywords:** manufacturing sector, import penetration, trade openness

## 1. Introduction

In a quest to grow economically for a developing country like Nigeria, conventional economic wisdom supports that developing countries may find solace in importing capital goods from developed countries so as to stimulate local firms. To this end, importation is seen as a necessity for a developing economy to develop. However, it becomes an evil when a country depends on it so much, to the extent of importing what it can produce. This is thus an impediment to development.

Import penetration shows the extent to which domestic demand is satisfied by imports. Import penetration according to Brown, Howard, Jones, and Spencer (2006) is, therefore, the level at which the manufacturing sector of a country is being overheated. The term 'overheated' means that a country's manufacturing sector has reached its climax and is unable to meet up with domestic demand, thereby, complementing the difference through imports. This high demand is further exacerbated as a result of import restriction of some certain goods by the monetary authority in Nigeria. Such a situation tends to make the economy vulnerable to smuggling as the country is incapacitated to meet up with the rise in the demand for the restricted products.

The current trade restriction laws in Nigeria could be blamed on the country's inability to focus on industrialization as a result of the presence of crude oil which accounts for over 70% of the country's revenue. Thus, to revamp the non-oil sector (mainly agriculture) of the economy which hitherto, was the main source of income to the Nigerian nation, trade restriction is considered a second-best policy.

The import substitution strategy – a national development plan, aimed at enhancing the performance of the manufacturing sector has not been much of a success, as a result of the feeble technological base of the economy. Before 1986, crude oil sales was the main source of foreign exchange earnings and this affected local manufacturing which led to the general economic terminology of 'Dutch disease syndrome'. In 1986, the federal government under the leadership of General Ibrahim Babangida adopted a policy known as the Structural Adjustment Programme (SAP) so as to reduce oil dependence and promote non-oil exports which should go beyond raw materials but locally manufactured products (Sola, Obayemi, Adekujo & Ogunleye 2013). This policy has not yielded much success, perhaps, as a result of the lackadaisical attitude towards its implementation.

According to the National Bureau of Statistics (NBS, 2007), the manufacturing sector of Nigeria is comprised of thirteen (13) activities among which are; oil refining; cement; food, beverages and tobacco; textile, apparel and footwear; wood and wood products; pulp paper and paper products; chemical and pharmaceutical products; non-metallic products, plastic and rubber products; electrical and electronic, basic metal and iron and steel; motor vehicles and assembling; and other manufacturing. Despite the aforementioned sectors, most of the goods consumed are sourced from foreign countries in form of imports. The World Bank (2017) showed a downturn in the real manufacturing sector from 2014 to 2016.

After independence in 1960, the need to harness her local resources for consumption and to meet up with her local demands and to stimulate local industries through imports became paramount.

Nigeria trades more with the United States of America, China, India, Belgium, and the Netherlands amongst other minor trading countries. There seems to be a competition between China and the United States. In 2015, China was Nigeria's biggest trading partner. The National Bureau of Statistic reveals that the second quarter of 2015, the value of imports from China is about ₦336.5 billion (22.5%) against ₦143.6 billion (9.6%) by the United States of America; ₦115.4 billion (7.7%) by India; ₦83.4 billion (5.6%) by Belgium; and ₦80.9 billion (5.4%) by Netherlands.

Since Nigeria's highest trading partner is China, her import penetration is likely to be highly affected by the

trading activities with China.

Nigerian's importation ranges in various varieties. The percentage shares of the product category represented in terms of overall imports in Nigeria are expressed in the table below:

Table 1. Importation Ranking in Nigeria

S/n	Product category	Value in US dollars	Percentage of overall imports
1	Mineral fuels including oil	8.2 billion	28.2
2	Machineries including computers	3.9 billion	13.5
3	Electricity machinery, equipment	1.7 billion	6
4	Vehicles	1.5 billion	5.1
5	Cereals	1.4 billion	5
6	Plastic, plastic articles	1.3 billion	4.6
7	Salt, sulphur, stone, cement	720 million	2.5
8	Fish	691.8 million	2.4
9	Articles of iron or steel	679.1 million	2.3
10	Other chemical goods	646 million	2.2

Source: [www.worldstopexports.com/nigerias-top-10-imports/](http://www.worldstopexports.com/nigerias-top-10-imports/)

Form the table above, Nigerian's highest amount of importation both in value and magnitude is mineral fuels including oil. This further shows the dilapidated nature of the refineries and the amount it takes to make oil available so as to meet up with local demand. The under performance of the domestic refineries paved way for the importation of refined oil because the local refineries couldn't provide enough for domestic demand. Ebonyi, Nwanosike, Uzoechina and Ishiwu (2017) noted that heavy reliance of the Nigerian manufacturing firms on imported machinery and equipment is a reflection of the weak manufacturing base of the country.

The general performance of the manufacturing sector raises a specific concern on whether the heat from import penetration is the culprit OR if there is evidence causality. However, this study did not consider the latter objective as a result of the different order of integration of the variables. It is on this backdrop that this study was motivated to study the impact of import penetration on manufacturing sector in Nigeria.

## 2. Literature Review

By way of intuition, there appears to be a link between the manufacturing sector and import penetration for a country that depends highly on imports. This draws from the mercantilist general notion on trade that imports are bad and exports, good.

According to the General Agreement on Tariff and Trade (GATT, 1984), import penetration ratios are often used in ways that imply a positive correlation between the values of the ratios and some notion of "pressure" on the domestic industry. In an aggregate study, the import penetration ratio is calculated thus:

$$\begin{aligned}
 \text{A. } & \frac{\text{Imports}}{\text{GDP} - \text{Exports}} = \frac{\text{Imports}}{\text{Domestic Demand}} \\
 \text{B. } & \frac{\text{Imports}}{\text{GDP}}
 \end{aligned}$$

In formula (A), import penetration is the ratio of imports to domestic demand. This domestic demand according to GATT (1984) is known as "apparent consumption". It excludes goods produced locally and exported. The main idea was to show how imports overheat the economy, thus, an increase in this ratio shows an overheating than a decrease. However, formula (B) measures import penetration as the ratio of imports to output. This measurement is supported by Brown *et al.* (2006) and also quite similar to Edwards and Jenkins (2015), which used sales in place of GDP. The inclusion of exports in formula (B) does not make the denominator a domestic demand in totality because it includes the external demand (exports) which is beyond the scope of this study. Therefore, this study focuses on formula (A) as the surrogate for measuring import penetration which is within the scope of this study.

Manufacturing sector is the sector in an economy that is engaged in the production of merchandise for its demand by utilizing labour, capital and technical knowhow. Manufacturing in a nut shell entails the transformation of raw materials into finished products. It can be seen as bringing of ideas into fruition. Umoh and Effiong (2013) noted that the manufacturing sector in Nigeria has remained heavily dependent on imports. This is because the process involved in the production of most goods is being bridged by importing a part and assembling.

In Nigeria, there have been developments in the manufacturing sector reform from the first National Development Plan (1962-1968) to the second National Development Plan (1968-1975) to the third national development plan (1975-1980) and finally to the fourth National Development Plan (1980-1985). Each of these national development plans has its unique package in terms of the kind of production/industrialization that took place within the period.

Olanrewaju (2013) examined the effect of trade liberalization on manufacturing sector performance in

Nigeria. The study found that trade openness granger causes performance in the manufacturing sector in Nigeria. Ebenyi *et al.* (2017) examined the impact of trade liberalization on manufacturing value-added in Nigeria. The study found that ever since Nigeria embraced open trade policy, there hasn't been much performance in the manufacturing sector of the economy.

Trade openness measures the rate at which a country is prone to external shock. This is because an economy becomes very open to international trade as the ratio increases. It is also a vehicle for driving productivity in an economy. Onakoya, Fasanya and Babalola (2012) studied the relationship between trade openness and manufacturing sector performance in Nigeria. The analysis shows that trade openness is positively related to the growth in the manufacturing sector. Likewise, Umoh and Effiong (2013) established the relationship between trade openness and manufacturing sector performance in Nigeria. The study found that trade openness has a positive and significance relationship on manufacturing productivity in Nigeria. A more current research by Agu (2017) found that trade openness positively impacts on the growth of manufacturing sector in Nigeria. This establishes a fact that as the economy of Nigeria is open to trade, there is an improvement in the manufacturing sector.

Growth in the manufacturing sector of an economy propels economic growth. That being the case, it becomes pertinent to know the effect of international trade – strictly imports, on economic growth. Ehinomen and Da'silva (2014) investigated the impact of trade openness on the output growth in the Nigerian economy. The study showed that there is trade openness has a positive impact on output growth in Nigeria. Lawal and Ezeuchenne (2017) examined the relationship between international trade and economic growth in Nigeria. Using the vector error correction model, the study found that imports have a long run relationship with economic growth. The short run effect was rather insignificant. Within the same period, Afolabi, Danladi and Azeez (2017) also examined the relationship between international trade and economic growth in Nigeria. The study found that imports have a rather negative significant impact on economic growth in Nigeria. Thus, the findings on the relationship between imports and exports from both studies are rather inconclusive.

However, Adeleye, Adeteye and Adewuyi (2015) investigated the impact of international trade on economic growth in Nigeria within the period 1988 to 2012, using the net export (total export less total imports) as a surrogate for international trade. From the study, it was discovered that net export is not significant in affecting economic growth in Nigeria.

From the literature reviewed, there is scarcely a study that examined the relationship between the manufacturing sector and import penetration. The importance of such relationship cannot be overemphasised. This is because Nigeria is a nation that has a huge history on importation. Therefore, it becomes imperative to estimate the impact of import penetration on manufacturing sector in Nigeria.

### 3. Methodology

Having noted in the literature that manufacturing sector drives economic growth, this study will be framed within the Heckscher-Ohlin (H-O) theory of trade. The H-O model is a general equilibrium model of international trade which is mathematically based. The theory is based on the endowments of factor resources of a trading region. The model states that a country will dwell on the exportation of products in which she is more endowed (abundance of cheap factors of production), while she imports those products whose resource factors are scarce.

This study seek to establish the impact of import penetration on manufacturing sector in Nigeria using time series data ranging from 1981 to 2017. The ratio of imports to domestic demand (imports divided by GDP minus exports) is a proxy for import penetration. The core variables include; import penetration, manufacturing sector (Manufacturing value added) and trade openness (imports plus exports divided by GDP), while inflation and government expenditure are the control variables. These variables were collected and computed from the World Bank (2017) data and *E-views 9* respectively.

$$MSC = f(IMP, TO, INF, GOX) \quad (1)$$

where:

- MSC = Manufacturing sector
- IMP = Import penetration
- TO = Trade openness
- INF = Inflation
- GOX = Government expenditure

Transforming equation (1) econometrically we have;

$$MSC_t = \beta_0 + \beta_1 IMP_t + \beta_2 TO_t + \beta_3 INF_t + \beta_4 GOX_t + u_t \quad (2)$$

To make the model in equation (2) on an equal footing, we transform it to a double log model for the ease of interpretation.

$$\ln MSC_t = \beta_0 + \beta_1 \ln IMP_t + \beta_2 \ln TO_t + \beta_3 \ln INF_t + \beta_4 \ln GOX_t + u_t \quad (3)$$

The coefficient  $\beta_0$  is the constant coefficient (intercept).  $\beta_1$  to  $\beta_4$  shows the parameters to be estimated. For

a priori expectation,  $\beta_1$  is expected to be negative ( $\beta_1 < 0$ ), which depicts that as the economy's local demand is being financed by imports, it affects the manufacturing sector.  $\beta_2$  is expected to be positive ( $\beta_2 > 0$ ), which means that as the economy embraces international trade, the manufacturing sector will improve so as to encourage more exports.  $\beta_3$  is expected to be negative ( $\beta_3 < 0$ ), this signifies that if inflation continues to increase, it will increase the cost of production and as such, less will be produced by the manufacturing sector. Finally,  $\beta_4$  is expected to be positive ( $\beta_4 > 0$ ), this means that as the government continues to increase its expenditure, particularly on capital goods, it will stimulate the activities of the manufacturing sector of the country. For the error term  $u_t$ , we assume that it is independently and identically distributed with zero mean and constant variance [ $u_t \sim N(0,1)$ ].

To achieve the objective of the study, equation (3) was estimated using the classical linear regression model within the ordinary least square estimation technique.

#### 4. Results and Discussion

Running a spurious regression underrates the empirical standing of any study. Thus, to avoid such a trap, the stationarity test for all variables used in this study was conducted. This is to ensure that the mean value as well as variance of the variables doesn't vary over time and it was achieved through the Augmented Dickey-Fuller (ADF) test. The decision rule is to reject the null hypothesis (that the variable is non stationary) if the ADF test statistic is negative and less than the MacKinnon critical value.

Table 2. Stationarity test result for variables in the model

Variables	ADF Statistic (level)	MacKinnon Critical Values at 5%	ADF Statistic (1 <sup>st</sup> Difference)	MacKinnon Critical Values at 5%	Order of Integration
LOGMSC	-2.2680	-3.5443	-4.8753	-1.9507	I(1)
LOGIMP	-3.3188	-2.9458	-	-	I(0)
LOGTO	-4.9606	-2.9458	-	-	I(0)
LOGINF	-3.2987	-2.9458	-	-	I(0)
LOGGOX	-3.6176	-3.5403	-	-	I(0)

Source: Author's computation from E-views 9

Table 2 above shows that only the dependent variable in the model (manufacturing sector) is integrated of order one I(1), while all other variables are integrated of order zero I(0) at 5% level of significance. Therefore, since the order of integration of the manufacturing sector and import penetration is of a different order, it does not pass the criteria for Granger causality to be estimated and thus, it doesn't make sense to estimate if there is an evidence of causality.

Sequel to the above, conventional economic wisdom posits that when the dependent variable is of same order of integration (integrated of order one) with any of the independent variables, then the cointegration test becomes a necessary condition (Gujarati & Porter, 2009). However, since the dependent variable is integrated of order one and that most of the independent variables such as import penetration, inflation and government expenditure were stationary at only 5% and non-stationary at 1%, we conducted the Johansen Co-integration test. This test is to establish that there is a long-run relationship amongst the variables. The decision rule is to reject the null hypothesis when the P-value is less than 5%, otherwise, we do not reject.

Table 3. The Johansen cointegration test result for the model.

Number of cointegrating equations	Trace statistic	Critical value at 5%	P-value
None*	74.894	69.819	0.0186
At most 1	40.107	47.856	0.2187
At most 2	19.824	29.797	0.4349
At most 3	4.3325	15.495	0.8750
At most 4	0.0514	3.8415	0.8207

Source: Author's computation from E-views 9

The above is the cointegration table. At "None", the null hypothesis of no cointegrating equation is rejected since the probability value (P-value) is less than 5%, while those of at most 1, 2, 3, and 4 that "there is at least one to four cointegrating equations" cannot be rejected since the P-value is greater than 5%. Thus, we conclude that there is cointegration and the non stationarity of the dependent variable at level is not a mere coincident. The establishment of cointegration shows that a long-run relationship exists between the manufacturing sector (LOGMSC) and other explanatory variables (import penetration, trade openness, inflation and government expenditure). The error correction mechanism (ECM) is a short-run model that shows how the long-run error of a model is corrected in the short-run. The ECM result reveals that about 39% of the short-run disequilibrium between the explained and explanatory variables will be adjusted within a period of one year.

Having corrected the deviations of the explained and explanatory variables, the regression result will not be

considered spurious (Gujarati & Porter, 2009). Therefore, the regression result of our model in equation (3) is presented below.

Table 4. Summary of regression result for the study

Dependent Variable: Manufacturing sector – LOGMSC

Variable	Coefficient	Std. Error	t-statistics	Prob.
Constant – C	-3.839	1.328	-2.891	0.007
Import penetration – LOGIMP	-0.777	0.097	-7.983	0.000
Trade openness – LOGTO	1.121	0.243	4.619	0.000
Inflation – LOGINF	0.032	0.033	0.955	0.347
Government expenditure – LOGGOX	0.978	0.042	23.56	0.000
R-squared	0.95			
Adjusted R-squared	0.94			
Durbin-Watson Stat.	1.95			
F- stat	148			
Prob. (F-statistics)	0.00			

Source: Authors computation using E-views 9

The above result shows a sound goodness of fit (R-squared) of about 95%. This means that 95% of variability in the dependent variable is explained by the independent variables. The F-statistic is the probability value that informs us on the overall significance of the model. From the regression result above, the F-statistic and probability value is 148 and 0.00 respectively. This means that the model is statistically significant.

The intercept term shows the value of the dependent variable (manufacturing sector) when the value of all the explanatory variables is zero. The coefficient of this intercept (-3.839) is negative and statistically significant. This means that holding all explanatory variables constant, the manufacturing sector has a downward movement of about 4% on an annual basis. Although this does not draw much economic meaning, but its negative trend is not far from expected. This is because it was pointed out by World Bank (2017) that real manufacturing sector has a downward trend recently.

The coefficient of import penetration (-0.777) is negative and statistically significantly different from zero. This conforms to the a priori expectation. It implies that holding all other variables constant, a percent increase in import penetration will reduce activities of the manufacturing sector by about 0.8%. Put differently, as the economy becomes heated as a result of the influx of huge import bills into the country, the activities of the manufacturing sector will be on a downward spiral.

The coefficient of trade openness (1.121) is positive and statistically significantly different from zero. The sign conforms to the a priori expectation. Therefore, one percent increase in trade openness will increase the activities of the manufacturing sector by about 1.12%, holding all other variables constant. This means that as the economy is more open to international trade, the activities of the manufacturing sector will speed up more than the exposure of the economy to the world. This conforms to the findings of Onakoya *et al.* (2012); Umoh and Effiong (2013); and Agu (2017).

The effect inflation has on the manufacturing sector is positive but not statistically different from zero, as the t statistic is less than 2 in absolute terms using the 2 t rule of thumb. Therefore, since inflation is not significant, it has no impact in this study and thus no economic interpretation.

The coefficient of government expenditure is positive (0.978) and statistically significantly different from zero. This conforms to the a priori expectation. This means that a percent increase in government expenditure will almost increase the activities of manufacturing sector by 1% (almost the same magnitude). This shows that if government activities in ensuring that infrastructures are in place, salaries are adequately paid and a well functioning system increases, the activities of the manufacturing sector will increase in near equal proportion.

## 5. Conclusions and Policy Recommendations

This study examined the relationship between manufacturing sector and import penetration in Nigeria from 1981 to 2017. Specifically, the impact of import penetration on manufacturing sector was achieved. It was observed that import penetration, trade openness and government expenditure are significant in influencing the activities of the manufacturing sector in Nigeria. Import penetration had a negative impact while trade openness and government expenditure showed positive impacts. However, inflation was not statistically significant. The core variable of interest – import penetration, which shows the degree to which domestic demand is satisfied by imports, has made the manufacturing sector to lose confidence on their capacity to expand so as to satisfy the domestic demand themselves. Put differently, the influx of imported commodities has affected the manufacturing sector adversely. This is because it seems the manufacturing sector has given up the mindset to cater for the demands of the domestic economy into the hands of importers. However, trade openness showed that if Nigeria is open to trade with the rest of the world, her manufacturing sector will improve drastically. This then suffice

one to say, that import penetration has indeed overheated the manufacturing sector, while trade openness gives the manufacturing sector in Nigeria the opportunity to produce and influence the world by not only providing for her local demand but also that of other countries (external demand). Expenditure's which are undertaken by the government is also a driving force in enhancing the activities of the manufacturing sector in Nigeria.

In the light of above, the study recommends the following:

- i. The inverse impacts of import penetration and trade openness shows that for the manufacturing sector to improve appreciably, the government should adopt a perfect mix of both the import substitution strategy and export promotion strategy of industrialization. By adopting the import substitution strategy, Nigeria should only import those items which they cannot produce in the meantime and by the export promotion strategy, they should try to ensure that products produced in Nigeria meets up with international standard.
- ii. Importation of commodities whose factor of production is more labour intensive should be strictly frowned at. This is because Nigeria has the requisite manpower to produce those items whose factor is labour intensive in nature.
- iii. Government expenditure is to be encouraged. More initiatives outside providing infrastructures and paying salaries should be welcomed. Furthermore, the government should ensure that funds directed for a particular purpose be strictly followed. This is to ensure that researchers are not only bamboozled by figures but in actuality, the effect of such expenditure should be felt by the general masses.

## Reference

- Adeleye, J. O., Adeteye, O. S., & Adewuyi, M. O. (2015). Impact of international trade on economic growth in Nigeria. *International Journal of Financial Research*, 6(3), 163-172.
- Afolabi, B., Danladi, J. D., & Azeez, M. I. (2017). International trade and economic growth in Nigeria. *Global Journal of Human-Social Science*, 17(5), 29-39.
- Agu, G. C. (2017). Trade openness and manufacturing sector growth: An empirical analysis for Nigeria. *Unpublished MSc Thesis*. Federal University of Technology, Owerri.
- Brown, S., Howard, C., Jones, S., & Spencer, U. (2006). *The Economist. Guide to economic indicators: Making sense of economics*. London: Profile Book Ltd.
- Ebenyi, G. O., Nwanosike, D. U., Uzoechina, B., & Ishiwu, V. (2017). The impact of trade liberalization on manufacturing value-added in Nigeria. *Saudi Journal of Business and Management Studies*, 2(5A), 475-481.
- Edwards, L., & Jenkins, R. (2015). The impact of Chinese import penetration on the South African manufacturing sector. *The Journal of Development Studies*, 51(4), 447-463.
- Ehinomen, C., & Da'silva, D. (2014). Impact of trade openness on the output growth in the Nigerian economy. *British Journal of Economics, Management and Trade*, 4(5), 755-768.
- General Agreement on Tariffs and Trade (GATT) (1984). Textiles and clothing in the world economy: Relating trade to domestic production and consumption.
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5<sup>th</sup> ed.). New York: McGraw hill/Irwin.
- Lawal, E. O., & Ezeuchenne, K. (2017). International trade and economic growth in Nigeria. *Journal of Humanities and Social Science*, 22(6), 35-43.
- Olanrewaju, A. L. (2013). Effect of trade liberalization on manufacturing sector performance in Nigeria. *Unpublished MSc Thesis*. Universiti Utara Malaysia.
- Onokoya, A. B. O., Fasanya, I. O., & Babalola, M. T. (2012). Trade openness and manufacturing sector growth: An empirical analysis for Nigeria. *Mediterranean Journal of Social Sciences*, 3(11), 637-646.
- Sola, O., Obamuyi, T. M., Adekunjo, F. O., & Ognleye, E. O. (2013). Manufacturing performance in Nigeria: Implication for sustainable development. *Asian Economic and Financial Review*, 3(9), 1195-1213.
- Umoh, O. J., & Effiong, E. L. (2013). Trade openness and manufacturing sector performance in Nigeria. *Margin: The Journal of Applied Economic Research*, 7(2), 147-169.
- World Bank (2017). *World Development Indicators*. Washington DC: World Bank.