

Import as a Function of Income in Nigeria from 1970-2016

EBERE CHIDINMA E.¹ OKEDINA IYABO M.¹ AFODU OSAGIE J.² Akinboye Olufunso E³

1.Department of Economics, Babcock University, Ilishan Remo, Ogun State, Nigeria

2.Department of Agricultural Economics, Babcock University, Ilishan Remo, Ogun State, Nigeria

3.Department of Agronomy and Landscape, Babcock University, Ilishan Remo, Ogun State, Nigeria

Abstract

This research work aims at investigating import as a function of income in Nigerian economy between 1980 and 2014. The econometric techniques used for this thesis are Unit Root Tests, Cointegration, Vector Error Correction, and Granger Causality Methods. These techniques were consistent with seven of the previous studies in the literature review, and the other seven previous studies used other econometric techniques in their papers. Annual time series data was taken from the World Bank Database. The regression model was in logarithms transformation form purposely to linearize the model, to reduce the impact of outliers and thus to avoid spurious regression result. The theoretical expectation is that there is a positive relationship between the IMPORTS and GNI in Nigeria that is the higher is the GNI, the higher will be the consumption and thus the import. One Other variable was introduced to independent variable and the other variable is Real Exchange Rate (REXRt). LN(IMPORTSt), LN(GNI_t) and LN(REXR_t) have Unit Roots problem at level but were stationary at first difference statistics. Furthermore, Trace and Max. Eigen Value Test indicates one cointegrating equations at 5% significance level. This thesis shows that there is a long-run relationship between the Imports and the Income in Nigeria between 1980 and 2014. The long-run shows positive relationship while the short-run shows no significant relationship.

Keywords: Stationary, Cointegration, VECM, Granger Causality, Import, Income

INTRODUCTION

Nowadays no country is self-independent as to produce everything that they need and as such, countries have to purchase or import goods and services that they cannot produce at a relatively low price. "Import" simply means goods and services brought into a country from across national borders or overseas. This could also mean the inward movement of goods and services from one country to another. Cole (2008) defined it as the action of buying goods and services from one country to another. World Bank stated that import of goods and services from the world at large represent all market goods and services. Examples of services oriented activities are travel, transport, other services may include governmental services, communication, finance and construction services. Developing countries like Nigeria, import secondary materials such as chemicals, food, manufactured goods, machinery equipment etc., for the primary purpose of economic development and growth of the nation, and the importance of this is to help meet short falls in domestic output.

Tokunbo (2014) states that Nigeria's income from importation of goods and services measured up to 9.79% of the GDP in 2013. Tokunbo (2014) also stated that Nigeria importation rose to \$53.3 Billion which made Nigeria the 53rd largest importer in the world. According to the world Trade Organization in 2014, which demonstrated that import products are increasing the market choice and this is because importation helps local market to improve variety of products offered, which may boost the competition level of locally manufactured goods. National Bureau of Statistics (2014) stated that importation of goods and services in Nigeria in 1981 was about ₦ 158,248 and in May 1984, it accounted for ₦ 167,880, and this rose to ₦ 1,554,732.94 in 2014. It was recorded in March 2011 that importation of capital goods accounted for 23% of total import. Importation has been of great benefit to Nigerian economy as it helps speed up industrialization, meet consumer demand, improve standard of living, overcome famine and ensure national defense by importing defense equipment for its constables. In view of the strategic and important role of import, this study seeks to find out the relationship between import volume, Gross National Income (GNI) and real exchange rate. This study further investigates the direction of causality between these variables. Therefore, the study seeks to estimate import as a function of income in Nigeria from 1980 -2014.

PROPOSED RESEARCH QUESTION

Does import, function as a contributory factor to the Gross National Income of Nigeria?

Should the economy of Nigeria rely on import for its economic growth?

In other to answer these questions, the study therefore seeks to determine import as a function of income in Nigeria.

PROPOSED RESEARCH PROBLEM AND THE SIGNIFICANCE OF THE STUDY.

Nigeria being an importer of variety of goods and also a large importer of capital and consumption goods and as such, it is necessary to investigate its import as a function of income for the Nigerian economy between the period specified, (1970 – 2016). Base on this, this study will be significant for policy makers, government of Nigeria, consumers, students, producers, importers, and stake holders in the country.

The study is intended to study import as a function of income in Nigeria from 1970 – 2016. This is to be able to have more accurate information and to deduce facts about import dependence since post-independence era.

REVIEW OF RELATED LITERATURE

Mohammed (2001) examined income functions in aggregate import demand as a function of income in Pakistan from 1960-1999 by using both equation approach and Ordinary Least Square Method. His empirical finding shows that import demand are positively related to the GDP of Pakistan country during the specified years.

Dutta and Ahmed (2006) looked into the behaviour of the comprehensive imports of India with the use of a time series data of 1971-1995. Dutta and Ahmed found that India's demand function for import volume is co-integrated with Real GDP and the Relative import price. Their econometric estimates states that India's demand for import is basically described by the general economic activity of the country, captured by Real GDP.

Demand function for India suggests that import demand is largely explained by Real GDP which relates to the general level of economic activity in the country. The amount of import is positively inclined by the real GDP changes than the relative import prices of import.

N'guessan and Yaoxing (2010) examined Cote d'ivoire's demand model for import, making use of series data starting from 1970 to 2007, they came out with the conclusion that a long-run co-integration relationship exist among consumption, relative prices, investment expenditure and import, it also show that import demand were inelastic for all component of spending and comparative prices, meaning that demand for import were not sensitive to price change. Also Chimobi and Ogbonna (2008) further explained that it is ineffective to use exchange rate policy in influencing import demand for Nigeria. Furthermore, Sa'ada and Hassan (2008) both identified the factors that determine import and they found that GDP and trade openness significantly determined import also that real exchange rate and foreign reserves were insignificant in determining import in Nigeria's Economy.

Chang (2005) re-studied the demand function for South Korea's aggregate import, his scope was specified from 1980-2009. His estimation method was robust, as he referred to it as the unrestricted error correction model. Chang (2005) result shows that cointegration exist among import volume, relative spending, and inflows (income) and that a long-run relationship exist among the demand for imports and its determinants income and relative prices are all co-integrated and there is a long-run relationship between the demand for imports and its determinant in South Korea. Also, the projected long-run and short-run elasticity's of the demand for import with respect to income and related prices. This simply means that a short and long-run positive relationship exist between relative prices and South Korea's import as well.

Mohammad (2012) investigated the determinants and econometric estimation of imports demand function. He made use of the following independent variables GDP, CPI and Exchange Rate (EX). And regressed them over 1997-2010 by using Multicollinearity, Auto-correlation, Durbin-Watson, Correlation and Heteroscedasticity. Mohammad (2012) result shows that one million dollars increase in GDP leads to increased demand for Palestine imports by 1.219 million dollars. This is to say that he found a positive relationship between t import demand and the GDP but no relationship exist amongst the demand for import and exchange rate in Palestine. This is caused by high dependent on trade with Israel which is represented by more than 59.9% in 2011 and the use of only one currency which made exchange rate not to affect the foreign trade in Palestine. Also, Douglason (2010) identified the factors responsible for import demand using error corrections mechanism, and he found out that import and income cointegrate also that import is determined by real income. His result points out that exchange rate policy and devaluation of local currency are ineffective in influencing import in Nigeria.

Munir, Naeem-Ur-Rehman, Yahya, Badshah, Tariq and Akhtar (2009) investigated the relationship between the remittances (GNP and REER) and imports in Pakistan for the period 1982-2007 by using simple Ordinary Least Square Method. Their estimated result signifies that, import in the economy is a large extent determined by the role remittances play in the economy. Also, it shows that the marginal tendency to import and remittances coefficient are related positively with imports, with the exception that real exchange rate were negatively related with imports as well.

Kira, Ranjini and Mark (2012) investigated the demand function for import with the U.S and U.K from 1996-2010 by using Co-integration analysis and Vector Error Correction Techniques to examine the Real Gross Domestic Product, Relative Price Imports, Real Foreign reserves and Exchange Rate. Their paper suggests that a unique cointegration relationship is found between imports and its independent variables (RGDP, RP, RFR, and RER) in both the U.S and U.K model. They also investigated the short and long run elasticity's in the two models and their result shows the followings such as, in Jamaica and U.S trade, they found also that in the short and long run, income has a low elasticity but that income is negative in the long run. Also, the long-run experiences more changes faster than in the short-run and this is much noted in Jamaica and U.S trade, U.K and Jamaica trade experience less elastic GDP in the short-run than in the long-run and, both imports and GDP are negative in the short-run. Finally, their papers also reveal that tight monetary policy has impacted significantly in Jamaica's import, only in the short-run as noted with the U.K especially, but not with the U.S.

Qazi and Mashood (2010) examined Bangladesh aggregate demand function for import by making use of

Autoregressive distributed lag (ADRL) method for cointegration and Rolling Window regression method for the data of 1980-2008. Their estimated result shows the positive long-run import relationship with national income but a negative long-run relative price elasticity. The method above (Rolling Window Method) demonstrates a long-run elasticity of National Income variables varies between a positive the range of 0.81 to 0.96.

Bernard and Bayo (2008) investigated the determinant of import in Nigeria through the use of variables such as Real Gross Domestic Product, External Reserve, Real Exchange Rate and index of Openness from the period 1970-2008 by using Unit Root Test, Cointegration and Vector Error Correction Method. Their result shows that the Vector Error Correction Model (ECM (-1)) is significant, which simply means that a long-run relationship exist among the import quantity demanded and its determinants. In their study, a negative long-run relationship was found between imports and the Real GDP in Nigeria between 1970 and 2008. Also, in the short-run, the major determinants of import demand is Real GDP in Nigeria. Their lagged ECM (-1) shows, the aggregate import demand adjusted to correct a long-run disequilibrium between itself and its functions.

Uche, Anne, and Chekwube (2015) focused on income elasticity of import demand and price in Nigeria for the period of 1970-2013, they estimated the function by using Autoregressive Distribution Lag (ARDL) to test for a long-run relationship that exist among variables. Their result shows that there is a long-run negative relationship between import demand and the national income (NI) in Nigeria between 1970 and 2013.

Sanjay (2010) states that the behaviour of India collective imports during 1991- 92 and from 2007 to 2008 and His result based on the two important objectives that Marginal tendency to Import (MTI), that is to know the imports sensitivity for Personal Disposable Income (PDI) through the use of Ordinary Least Square Method. His findings indicate that India's import were found to be profound for PDI in India throughout the period of post reform wherefore, Marginal Propensity to Import (MPI) was noted to be -0.2955 meaning that during the period, Indians spent 29.55percent of the differences in their change of PDI on imports. Sanjay (2010) finds negative relationship between the MPI and PDI in India between the periods of 1991-92 to 2007-08.

Halil and Oguzhan (2014) examined the dynamic of import and National income functions in Turkey. They examined this, with the use of Unit Root Test, Co-integration Test and Multivariate Granger Causality Analysis between the period 1987 and 2011. Their empirical result shows that Turkey's Real GDP granger causes Foreign Direct Investment and the Real Exchange Rate, causing a link towards import in the long-run. Moreover, they indicates that Import Granger causes GDP in the long-run but they failed to identify if there exist a positive or negative relationship amongst the imports and the GDP in Turkey between 1987 to 2011.

Hector and Ivor (2012) showed empirical, an investigation of small country demand function for imports and they channel the variables by using annual time series data for Guyana over the years 1971-2010 through the single equation, Cointegration, and the Vector Auto Regression (VAR) frameworks. The channel variables are Foreign Exchange Reserves (FER), Official Foreign Aid (OFA), and Exchange Rate (XR) et-al. The coefficients show that a short and long-run relationship exists between import demand and Gross National Income. In their paper, they demonstrated that there is a positive long-run relationship between import demand and the National Income in Guyana for the period specified.

Abdul and Tayyaba (2010) examines the import demand function as GNI in Pakistan from 1960-2014 by using two different method of analysis namely, Autoregressive Distributed Lag (ARDL) and Dynamic Ordinary Least Square (DOLS). Abdul and Tayyaba (2010) states that ARDL result shows a strong indication of the presence of a long-run unstable relationship among the variables included in the model for import demand but they also concluded finally that there exist a negative relationship amid the imports and the GNI in Pakistan between 1960 and 2014.

Abdusalam (2015) estimated the overall import function in the Libya economy by testing double log transformation method and using Johansen Multivariate Co-integration method for the period 1975-2014. His result shows that the behaviour of Libyan imports seems to be highly affected by the variation in its GDP and relative price. It establishes that skyrocketing in oil prices has completely upset the import-income relationship in Libya during the period of decline in oil revenue. The short-run elasticity of Libya imports with respect to its income is approximate -1.2 which shows a negative relationship between the imports and the income in Libya between 1975 and 2014.

Ichoku et al (2013) used OLS regression technique, co-integration and Error Correction Method (ECM) to investigate the causes of Nigeria's Non-oil demand for import, they resulted in a deviation of findings, imputing that real exchange rate, and real income were insignificant cause of relationship in the model, that is, real exchange rate and income were not significant in determining non-oil import demand.

The econometric modelling strategy is not consistent with all the previous studies in the literature reviewed but it is consistent with the other seven previous papers reviewed the other papers used other econometric techniques in their studies. The seven previous studies that is not consistent with econometric strategies are, such as Munir, Munir, Naeem-Ur-Rehman, Yahya, Badshah, Tariq, and Akhtar in (2009) in Pakistan; Qazi and Mashood (2010) in Bangladesh; Sanjay in (2010) in India; Mohammed (2001) in Pakistan; Mohammad (2012) in Palestine; Uche, Anne, and Chekwube (2015) in Nigeria; and Abdul and Tayyaba (2010) in Pakistan. The non-

consistent of the previous studies with this thesis used different econometric techniques and they have mixed empirical findings (that is results). In fact, Uche, Anne, and Chekwube (2015) in Nigeria used Autoregressive Distribution Lag (ARDL) to test for the price and income elasticity of import demand in Nigeria between 1970 and 2013. Uche, Anne, and Chekwube (2015) found that there exist a negative long-run relationship amongst import demand and the national income and there is also evidence of imperfect substitution between foreign trade goods and domestically produced goods. In Uche, Anne, and Chekwube (2015) implies that the use of currency devaluation as an import substitution tool is not validated by their results. Munir, Munir et al (2009) shows in his findings that income plays a significant role in the determination of imports, and that Marginal Propensity of imports and coefficient of income are positively related with imports in Pakistan.

The technique used in this thesis was consistent with ten of the previous studies in the literature review as mentioned earlier. Those papers that shows consistency with this thesis are, namely, Bernard and Bayo (2008) in his research conducted in Nigeria; Halil and Oguzhan (2014), carried out his research in Turkey; Dutta and Ahmed (2006) in his research carried out in India; Hector and Ivor (2012) in whose research was conducted in Guyana; Chang (2005) in South Korea; Abdusalam (2015); Ranjini and Mark (2012) in Jamaica. Those papers that used the same econometric modelling strategies in their studies still have mixed or different empirical results. All these papers can be found in the literature review chapter of th is thesis. Therefore, I was motivated to investigate the import function for Nigeria from 1980-2014 due to the mixed empirical findings in the literatures read and the recent financial crises across the country.

ESTIMATION RESULT

Augmented Dickey Fuller, and Phillip Peron Unit root test was conducted at level and first difference. The result was reported for three cases.

- i. Without trend and drift
- ii. With trend and drift
- iii. The presence of trend and without drift and the null hypothesis states that there is the existence of unit root while the alternative states otherwise.

RESULT OF ADF AND PP UNIT ROOT TEST

Table 1.

LEVEL (STATISTICS)	LN(IMPORTt)	LAG	LN(GNI _t)	LAG	LN(REXR _t)	LAG
Tt(ADF)	-1.341	(0)	-1.902	(0)	-1.033	(0)
Tu(ADF)	-0.972	(1)	-1.741	(0)	-3.410***	(0)
T(ADF)	4.449*	(0)	-1.636	(0)	-0.094	(0)
Tt(PP)	-2.158**	(4)	-2.057	(1)	-1.033	(0)
Tu(PP)	-1.659	(0)	-1.741	(0)	-4.373*	(10)
T(PP)	4.449*	(0)	-0.614	(2)	-0.087	(3)
FIRST DIFFERENCE (STATISTICS)	LN(IMPORT _{St})	LAG	LN(GNI _t)	LAG	LN(REXR _t)	LAG
Tt(ADF)	-2.257	(1)	-4.326**	(0)	-5.046**	(0)
Tu(ADF)	-4.939**	(0)	-4.342**	(0)	-5.264**	(0)
T(ADF)	-0.857	(1)	-4.374**	(0)	-5.118**	(0)
Tt(PP)	-4.590**	(1)	4.235**	(4)	-5.024**	(6)
Tu(PP)	-6.135**	(4)	-4.170**	(6)	-5.285**	(9)
T(PP)	-2.176**	(2)	-4.295**	(4)	-5.104**	(6)

Source: Author's computation

Tt implies a drift and trend; Tu represents a drift and without a trend; T indicates without a drift and trend. *, **, *** indicates H₀ is rejected at 1%, 5%, and 10% significance levels indicatively.

The result reviewed that all the results were stationary at first difference. Sten and the Schwarz - info – criteria (sic) was used to determine the optimum lag length, with variables stationarity at first difference. It becomes necessary to run the cointegration test of all variables used.

The cointegration test is reported in table (2) below

Table 2: Trace test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Probability Value
None*	0.893406	25.07812	15.49471	0.0013**
At most 1	0.040264	0.452072	3.841466	0.5014**

** implies rejection of the hypothesis at the 0.05 level.

*, **, *** signifies 1%, 5% and 10% significance.

The trace test noted that there exist one cointegrating equation at 0.05 level. The cointegrating assumption implies that there exist a linear determinist trend.

Table 3: Maximum Eigenvalue for Cointegration Rank Test.

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**
None*	0.893406	24.62605	14.26460	0.0008
At Most 1	0.040264	0.452072	3.841466	0.5014

The above table signifies one cointegrating equation at 0.05 level. This means, there exist one cointegrating factor between the variables used. Therefore, there is need to determine the long and short run relationship among variables used and this is done by employing VECM, which will examine if there exist long or short run or both relationships between the variables used.

The ECT indicates that the results of the short term coefficient are statistically significant. The value in table 5 in the appendix is 5.21516% and positive. The value indicates that the value of import in short run converge by 5.21516% speed of adjustment to its long run equilibrium level. It indicates that VECM, ECM (-1) is statistically significant and signifies short and long run relationships among variables. But, $REXR_t$ is not statistically significant in both the short and long run. Hence, the speed of adjustment is 52% which contributes to GNI of the country in the long run.

CAUSALITY TEST.

The granger causality test shows that GNI causes REXR, REXR causes IMPORT, REVR causes GNI and GNI causes REXR, indicating a bi-directional causality among variables. As GNI causes IMPORT, and IMPORT causes GNI which also signifies a bi-directional causality but a unidirectional causality between REXR to IMPORT.

SUMMARY, CONCLUSION, AND RECOMMENDATION.

EMPIRICAL SPECIFICATION AND DATA SOURCES

The econometric techniques used for this research work include ADF, PP Unit Root Tests, Johansen Cointegration, Vector Error Correction, and Granger Causality Methods. Annual time series data was collected from the World Bank Database. The multiple regression technique was in logarithms transformation for the purpose of removing spurious regression and generate good output.

MODEL OF ANALYSIS

The study adapted the model used by Quazi and Mashood (2010), which examined Bangladesh aggregate demand function for import by making use of Autoregressive Distributed Lag (ADRL). Uche Anne and Chekwube (2015), they examined income elasticity of import demand and price in Nigeria.

The model for the study is specified as: $IMPORT = f(INCOME)$. The other variable introduced is the Real Exchange Rate (REXR). This is because there are other factors which affect import as it serves as a functions of income.

This makes the model as $IMPORT = f(INCOME, REXR)$. This variable added to the model have been based on information derived from some studies in the literature review. Like, Ranjini and Mark (2012) in Jamaica; Bernard and Bayo (2008) in Nigeria; Hector and Ivor (2012) in Guyana; Munir, Naeem-Ur-Rehman, and some others.

$IMPORT_t = \beta_0 + \beta_1 GNI_t + \beta_2 REXR_t + U_t$ Equation (1) Transformation of the model to natural log, we have:

$LN(IMPORT)_t = \beta_0 + \beta_1 LN(GNI)_t + \beta_2 LN(REXR)_t + U_t$ Equation (2)

The Apriori expectation for this study is $\beta_1 > 0$. That is, import has a positive function with income and real exchange rate added to this work shows a negative relationship with import.

The research work is intended to use Nigeria as a case study as a result of its recent financial crisis in the country and also the mixed empirical findings read from different related research works. To determine the equilibrium relationship between import and income in Nigeria.

The method of data collection shall be secondary method and the data shall be collected from World Bank database and it will be an annual time series data. The econometric techniques that is intended to be used is unit

root test with Augmented Dickey fuller test, Philip perron test, to detect the stationarity of the variables. Also, the Johansen cointegration test shall be implemented, Vector Error Model and lastly, the Granger Causality test shall also be carried out.

REFERENCE:

- Bernard O.A., and Bayo F. (2008). The Determinants of Import in Nigeria from 1970-2008. Vol.14(1), 52-72.
- Chang T.Y., and Huang C.J (2005). A Re-examination of South Korea's aggregate Import Demand Function. The Bound Test Analysis. *Journal of Economic Development vol.30 (1)*
- Cole E.A. (2008). The Essential Economics for Senior Secondary Schools. *Second Edition, August 2008.*
- Hector C.B. and Ivor S.M. (2012). An Empirical Analysis of Small Country Import Demand Function for Guyana Over the Period of 40 years. Problems and Perspective in management. *Vol.10, Issue 1,*
- Kira H., Ranjini T., and Mark H. (2012). The Econometric Analysis of Jamaica's Import Demand Function with the U.S. and U.K. from 1996-2010. *The International Journal of Business and Finance Research. Vol. 6(1)*
- Mohammed A. (2001). The Aggregate Import Demand as a Function of Income in Pakistan from 1960-1999. *The Labor of Economics. Vol. 6(2)*
- Munir K., Naeem-Ur Rehman K., Yahya B. et al (2009). The Remittances and Import Function as a Determinant of Gross Domestic Product in Pakistan for the period of 1982-2007. *Sarhad j. Agric. Vol. 23(4)*
- Qazi M.A. and Mashood M.H. (2010). The Aggregate Import Demand Function for Bangladesh Economy for the Period of 1980-2008. *African Journal of Bussiness Management. Vol.4(10)*
- Uche C.N, Anne C.M. and Chekwube V.M. (2005). The Price and Income Elasticity of Import Demand in Nigeria from 1970-2013. *Vol 3(4), 91-103.*