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Determinant of import: Effect of sectoral performance

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Abstract
Given the risen import in Nigeria and the need to improve productivity of sectors. This study therefore looks at the determinant of imports using disaggregated Gross Domestic Product. ARDL technique was employed and data from 1981 to 2021. The results reveal the presence of short-run and long-run effects of sectoral performance on import in Nigeria. The findings show that increase in agricultural output, industrial output and service output leads to significant decrease in import while decrease in output of the sectors leads to significant increase in importation. This implies that development of these sectors will lead to reduction in importation. Population has positive and significant effect on import in the short run and long run. The study therefore recommends that government should encourage the development of these sectors in order to increase their productivity. Government should also establish strict policy that will discourage importation of goods produced within the country.

Keywords: ARDL, Import, sector performance, Nigeria

1. Introduction

Import is the aggregate goods and services purchased by a country other than where it was produced. It is also referring to goods or services brought into one country from another. Countries import goods that domestic industries cannot produce as efficiently or cheaply as other countries. They import raw materials or commodities not available within their borders but required in industries for the production of finished goods and services (Quadri 2022).

It is a key part of international trade and vital to economic growth. Developing countries import are subject to periodic fluctuations in the world market, and revenue from this source tends to fluctuate (Inam and Oscar 2014). They provide a regular supply of capital inputs as well as essential intermediate goods. However, increasing imports may have adverse effects on external balance and create debt problems.

Increasing imports specifies robust domestic demand and a developing economy. This might also mean aggregate demand outweighs supply. Nigeria relied on imports to make up for the shortfalls in supply and prevent inflation consequences. This made import as a component of trade have be on steady rise. The rise in import results into deficits in Nigeria's overall Balance of Payments, (Moro, 1995; Egwaikhide, 1999).

The major part of imports in Nigeria as at 2021 are beverages, base metals, animal products, vegetable product, textiles, , machinery and mechanical appliances, mineral and chemical products, electrical and transport equipment, vehicles, aircraft vessels e.t.c (Central bank of Nigeria Statistical Bulletin, 2021). All these goods are produced in the country and should not have been imported.

One of the important statistics that designates whether an economy is expanding or contracting is GDP. It can be traced over long periods of time and used in forecasting a nation's economic growth or decline as well as in determining if an economy is in recession. The industrial sector contributed 11,753billion – 11,148 billion to GDP between 1981-1990 while

agricultural sector and service sector contributed N2,364-N3,464billion and N5,431- N6,849 billion to GDP between the same period. Four decades after, the contribution of industrial sector, agricultural sector and service sector were approximately N14billion, N19billion and N39billion.

Since it measures the monetary value of final goods and services that are bought by the final user or produced by sectors in a country in a given period of time, there is need to look at how these sectors determine Nigeria's import.

The rise is import and sector performance can be viewed in the table 1 below.

Table 1: Growth in Import and Sectors performance

Year	Import (Billion)	Industrial Sector (Billion)	Agric Sector (Billion)	Service Sector (Billion)
1981-1990	12,839-45,717	11,753-11,148	2,364-3,464	5,431 – 6,849
1991-2000	89,488 - 985,022	10,911-10,963	3,590-4,840	7,038-9,365
2001-2010	1,358-8,163	11,576-13826	5,024-13,048	10,059-27,736
2011-2020	10,995-20,519	14,987-14,953	13,429-18,348	29,095-36,712
2021	22,394	14,883	19,738	38,771

Source: CBN Statistical Bulletin 2021

From the table above it can be seen that increase in import outstrips increase in sectoral performance especially in the last decade. This growth in value of imports has been attributed to a number of factors which include rise in foreign exchange earnings as a result of increase in crude oil export, the over-valuation of the naira during the period of controls and liberal trade policies, the desire to provide capital goods and raw materials for import substituting industries. This study therefore intends to diversify from other studies by examining the effect of sectoral performance on import in Nigeria. Sectoral performance is the disaggregated gross domestic product based on sector contribution.

2.Literature Review

Conceptual review

Import: The concept "import" refers to goods and services purchased from other countries. It also refers to goods and services that domestic countries cannot produce efficiently or cheaply as exporting countries. Imports could be in the form of visible goods (machines and equipment) or invisible (services) transactions done between a country and the rest of the world.

Sectoral performance: This is the contribution of the three major sectors to gross domestic product. The primary sector includes agriculture, the secondary sector includes manufacturing and the tertiary sector includes services. It is the value of total output produced by each of the sector in the economy. Gross national product is equal to gross national income and gross national expenditure. (CBN bulletin 2021).

Theoretical Review

The Neoclassical theory is associated with the Heckscher Ohlin (H-O) framework, which was developed based on the work of Ricardo (1817). It assumes that countries differ by factors of production, thereby importing outputs with least factor endowment (Englama et al., 2013). The theory further suggests that demand for import is determined by the cost at which the importing country produces a particular commodity relative to its trading partner.

Empirical Review

Previous studies on Import determinants are on demand function and are derived from conventional theory of demand. According to the theory import demand is a function of real income and relative import price defined as the ratio of import price to domestic price (Tang & Nair, 2002; Tang, 2003; Dutta & Ahmed, 2004; Chang et al., 2005; Mugableh, 2017). Others also considered different components of expenditure such as consumption, investment and exports as determinants of aggregate import demand or trade balance (Tang, 2003; Chani, Pervaiz, & Chaudhary, 2011; Sulaiman & Saba, 2016; Chantha, Keo, & Suttiprapa, 2018). Recent studies were also carried out on the causality and cointegration between import and GDP.

Anaman & Osei-Amponsab (2001) studied the determinants of aggregate import demand from from 1964 and 1997 in Brunei. The study modelled the dependent variable as a function of real GDP, real effective exchange rate, and population employing ordinary least squares. The result suggested that all of the specified determinants have a significant impact on import demand. Dutta and Ahmed (2001) studied the performance of imports in India utilizing time series data from 1971-1995. Their research showed that the demand function for import volume is cointegrated with real GDP and the relative import price.

Tang and Nair (2002) investigated the stability of Malaysia's demand for import by employing Autoregressive Distribution Lag (ARDL). Their study observed long run relationship between demand for import, income and relative price.

Narayan and Rusell (2005) examined import demand determinant in Darusallam using ECM and cointegration technique. Exchange rate, real GDP, population and world oil prices were employed as independent variables. Results showed that aggregate imports are inelastic in the short run and long run with respect to income and world petroleum prices, but are price inelastic with respect to population. Huseyin (2006) also investigated the aggregate import demand function behaviour of Turkey using quarterly data from 1994-2003. Error correction techniques was employed to determine the relationship between the variables. The empirical results indicated that there existed a unique long run equilibrium relationship between imports, relative import price and real GNP. Population was found to be most influential determinants of import demand.

Fosu and Magnus (2006), analysed the aggregate import demand and expenditure components in Ghana by using data from the period of 1970-2002. The result shows that an inelastic and positive relationship exists between the three-expenditure component and aggregate import demand. Relative price is also inelastic but negatively impact aggregate demand.

Abdullahi and Suleiman (2008) employed error correction model to investigate the determinants of imports in Nigeria. The outcome shows that real GDP and degree of openness significantly determine import demand while real exchange rate and real foreign reserve were not significant in influencing the pattern of imports in the country.

Dadgar and Nazari (2010) studied analysis of import demand function in Iran using vector auto regression approach for 1974-2007. The findings of their study showed that, the impact of non-oil GDP and oil incomes is positive on import but the impact of relative price is negative on import.

Narayan and Narayan (2010) also estimated the import demand function for Mauritius and South Africa by applying bound test and ARDL model data from 1969 to 2008. The result showed evidence of a long-run relationship between import demand and the estimated determinants in both countries, with income being the most significant factor.

Mohammed (2012) estimated the parameters of import demand determinants

for GCC countries using 1994 – 2008 time series data. Applying panel Seemingly Unrelated Regression (SUR) model. The empirical results confirmed that, in both long run and short run, there are positive and significant relationships between the demand for imports and real income, private consumption, international reserves and gross capital formulation. On the other hand, there are negative and significant relationships between the relative price of import to domestic price and government consumption in the long run, but negative and insignificant relationship in the short run.

Fukumoto (2012) estimated the disaggregate import demand functions for capital goods, final consumption goods and intermediate goods from 1988 to 2005. ARDL bound test were used in estimating. The findings suggested that import demand for capital goods is influenced by gross domestic product (GDP) and aggregate investment, intermediate goods are determined by exports and import demand for consumption goods are determined by GDP. Englama et. al. (2013) employed an Autoregressive Distribution Lag (ARDL) model to estimate the aggregate import demand function for Nigeria using quarter data from 1970 - 2011. Their findings shows that coefficients of domestic consumer prices, external reserves, level of income and exchange rate were all statistically significant factors in determining the level of imports in Nigeria.

Hussain and Saaed (2014) examined the nexus of Exports, Imports and Economic growth in Saudi Arabia, using annual data for the period 1990- 2011. Granger Causality and Cointegration test were employed in the empirical analysis. Both Trace and Maximum Eigenvalue indicated cointegration at 5% level of significance pointing to the fact that the variables have a long-run relationship. Also, economic growth was found to Granger Cause import. There was a unidirectional causality existing between export and import

Ayodotun and Farayibi (2016) explored the determinant of import demand in sub-Sahara African using consumer demand theory. They adopted fixed effect estimation technique and random effect estimation technique between 1995-2012. They found that income, price of import, foreign reserves and degree of openness and the precious year import are highly significant and positively related to import.

Nteegah and Mansi (2016) also employed similar approach in their study. The findings reveal that income, domestic price change and exchange rate have negative but significant impact on total import demand in Nigeria. The study further showed revealed that the degree of openness, gross capital formation and external debt were positive and impacted significantly on total demand in the country.

Rahmon and Adefunke (2016) empirically investigated the relationships between money supply, government revenue, government expenditure, domestic debt, external debt, inflation rate, exchange rate, and balance of trade in Nigeria, using time series data from 1981 to 2017 and employing the Johansen's methodology. The results indicate that government revenue, government expenditure, exchange rate, and inflation rate have statistically significant positive relationships with a balance of trade while money supply, domestic debt, and external debt exert a statistically significant negative impact on the balance of trade in Nigeria.

Manjunath and Arun (2019) studied the effect of GDP on import of goods and services in India using Vector Error Correction model and data from 1992-2016. The result of their study showed that GDP granger causes import and a negative relationship exist between GDP and Import. Decrease in GDP leads to increase in import and vice versa.

Keho (2022) examined the factors determining the demand for imports of Economic Community of West African States (ECOWAS) countries from 1980 to

2017. He employed the Common Correlated Effect Mean Group (CCEMG) estimator. The results from the panel analysis indicate that income, relative price of imports, foreign direct investment and remittances are significant determinants of import demand in ECOWAS. Income, relative price and remittances have, on average, positive effect on import in the long run. In the short run, all explanatory variables are positively related to imports. The Autoregressive Distribution Lag (ARDL) approach has been used to investigate determinants of demand.

Quadri (2022) investigated the determinant of non-oil import in Nigeria from 1981–2016 using Error correction model. The results revealed that gross domestic product and inflation are statistically significant and affect import negatively while exchange rate and total reserve are statistically insignificant. Alex and Ekiye (2022) examined the determinants of imports in Nigeria using Autoregressive Distributed Lag (ARDL) approach and Error Correction Mechanism (ECM) and data from 1981-2017.Their findings indicated that Real GDP, CPI and Nominal Exchange rate were cointegrated to import demand in the long run. Furthermore, income elasticity exerted the largest influence on imports and when exchange rate depreciates demand for imports increase.

This present study fills the gap and enriches the existing literature by investigating the determinants of import in Nigeria. Import demand function was modifies by disaggregating GDP based on sectors' contribution to GDP and population was also included.

3. Methodology

Following the works of Narayan and Narayan (2010) which expressed the import demand function in linear form below:

IMT = F (RGDP, CPI EXG) ---------- (1)

The modified functional equation is given as IMPT=f(IND, AGR,SER, EXG, POP)-----(2)

Where IMPT =import, IND is the total output produced by industrial sector, AGR is the total output produced by the agricultural sector, SER is the total output produced by the service sector EXG represents exchange rate, POP is population. Taking natural logarithm of equation (2) yields the baseline econometric model of the study as presented in equation (3).

$$lnIMPRT_t = \alpha_0 + \alpha_1 lnIND_t + \alpha_2 lnAGR_t + \alpha_3 lnSER_t + \alpha_4 lnPOP_t + \alpha_5 EXG + \varepsilon_t \quad (3)$$

Model Estimation Procedures

The methodological approaches employed are in three steps. The first step involves the conducting unit root tests to establish the stationarity property of the data. In this regard, two units root tests were employed, namely, the Augmented Dickey-Fuller (ADF), and the Phillips-Perron (PP) unit root tests.

The second step is testing the existence of cointegration (long run) relationship among the variables using Autoregressive Distributed Lag (ARDL) bound test approach by Pesaran et al. (2001). This method is preferred over other methods of cointegration. This is because it does not impose restriction on the integration order of the variables being I(0) or I(1) and has flexibility to change lag lengths (Pesaran et al., 2001). It also addresses the problems of autocorrelation, endogeneity and omitted variables as well as providing efficient and unbiased estimates and valid t-statistics even with small sample size (Abubakar & Kassim, 2016).

$$\Delta LIMPRT_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, \Delta LIMPRT_{t-i} + \sum_{i=0}^{n} \beta_{2i}\, \Delta IND_{t-i} + \sum_{i=0}^{n} \beta_{3i}\, \Delta LAGR_{t-i} + \sum_{i=0}^{n} \beta_{4i}\, \Delta LSER_{t-i} + \sum_{i=0}^{n} \beta_{5i}\, \Delta EXG_{t-i} + \sum_{i=0}^{n} \beta_{6i}\, \Delta LPOP_{t-i} + \phi_1 LIMPRT_{t-1} + \phi_2 LIND_{t-1} + \phi_3 LAGR_{t-1} + \phi_4 LSER_{t-1} + \phi_5 EXG_{t-1} + \phi_6 LPOP_{t-1} + \varepsilon_{1t} \quad (4)$$

The third step is the estimation of the short-run coefficients of the model. In order to obtain the short-run coefficients, an error correction model (ECM) is estimated and the ARDL specification of the ECM is presented in Equation (6):

$$\Delta \ln MPRT_t = \alpha_0 + \sum_{i=1}^{p} \beta_1\, \Delta lnIMPRT_{t-i} + \sum_{i=0}^{q} \beta_2\, \Delta lnIND_{t-i} \sum_{i=0}^{r} \beta_3\, \Delta lnAGR + \sum_{i=0}^{s} \beta_4\, \Delta lnSER_{t-i} + \sum_{i=0}^{t} \beta_5\, \Delta lnEXG_{t-i} + \sum_{i=0}^{t} \beta_6\, \Delta POP_{t-i} + \pi_1 ECT_{t-1} + \varepsilon_t \quad (5)$$

4. Results and Discussion

Results of Unit Root Tests

Table 2 shows the results of ADF and PP unit root tests. The results reveal that only lnIND is stationary at level, while the remaining variables have unit roots at their level, hence they are not stationary. However, after taking the first difference the variables become stationary. Thus, the null hypothesis that the variables are not stationary, were rejected.

Table 2: Results of ADF and PP Unit Root Tests

	Level		First Difference	
Variables	**ADF**	**PP**	**ADF**	**PP**
LnIMPRT	-0.974	-1.464	-7.179***	-7.143***
LnIND	-4.321***	-4.338***	-5.439	-5.442
LnAGR	-1.822	-1.962	-6.012***	-6.011***
LnSER	-2.429	-2.001	-2.002	-3.171**
LnPOP	-0.389	-2.696	-3.194**	-2.952**
EXG	-0.482	-0.572	-5.049***	-5.052***

Note: (AIC) was used to select optimal lag length in the ADF test; ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively. The lag length is (1,0,3,3,0,3)

4.2 Results of ARDL bounds tests

The result of the ARDL bounds test for cointegration reported in table 2 indicate that the computed F-statistics (7.259) is higher than the upper bound at 1% significant level. This implies that there is a cointegration among the variables. This follows the decision rule by comparing the computed F-statistic with the critical values provided by Pesaran et al. (2001). The optimal lag-length of (1,0,3,3,0,3) suggested by Akaike Information Criterion (AIC)was used.

Table 3: Results of ARDL bounds tests

Dependent Variable	**Function**	**F-Statistic**
LIMPRT	f(LIND ,LAGR, LSER,,EXG, LPOP)	7.259***

Critical Values Bounds							
10%		5%		2.5%		1%	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
2.08	3.00	2.39	3.38	2.70	3.73	3.06	4.15

Source Authors' computation (2023). *** denotes statistical significance at 1% level.

The next step is estimating the relationship between the variables after confirmation of cointegration.

4.3 Results of the Parsimonious Long-run and Short-run Estimates

The results of the long-run and short-run of the study are presented in panel A and panel B respectively in Table 4

The result in the table revealed that industrial and agricultural performance affect import though not significantly in the long run. This implies that in the long run, rise in the two sectors performances lead to reduction in import by 0.06% and 0.13% and vice versa. This is supported by the work of Manjunath and Arun (2019) and Quadri (2022) who also found a negative relationship between import and GDP. Their non-significant effect may be as a result of poor development of the sectors or due to negligent investment in the sectors. Once they are developed and budget directed to the sector are judiciously invested, their longrun effect will be obvious. Service sector also exert negative but significant effect on import. Population has positive and significant effect on import. An increase in population by 1% leads to increase in import by 15.94% and vice versa. This is supported by the work of Huseyin (2006).

In the short run, industrial and service sector still exert negative and significant effect on import. This implies that increase in their performances by 1% leads to decrease in import by 1.91% and 1 .96%. While a decrease in their performance leads to increase in import. Increase in population still exerts a positive and significant effect on import. An increase in population by 1% leads to increase in import by 66.2%

Table 4: Result of short run and long run estimates

Panel A: Long-run Coefficients - Dependent variable is LIMPRT				
Independent Variable	Coefficient	Standard Error	t-Statistic	Prob.
C	-219.467***	49.312	-4.451	0.002
IND	-0.060	0.912	-0.148	0.883
LAGR	-0.135	1.155	-0.052	0.959
LSER	-1.911***	0.554	-3.453	0.000
LPOP	15.94***	1.689	9.439	0.000
EXG	-0.01**	0.001	-5.506	0.019
Panel B: Short-run Coefficients - Dependent variable is ΔLIMPRT				
Δ (LIND)	0.488**	0.655	0.746	0.463
Δ (LIND(-1))	-0.163	0.612	-0.267	0.792
	-1.907***	0.6121	-3.113	0.005

Δ (LIND(-2))				
Δ (LSER)	-1.964*	1.049	-1.872	0.075
Δ (LSER(-1))	3.579***	1.072	3.340	0.003
Δ (LSER(-2))	3.270***	1.145	-2.856	0.000
Δ (LPOP)	66.215***	25.841	2.562	0.009
Δ (LPOP(-1))	-57.709	34.794	-1.659	0.114
Δ (LPOP(-2))	100.712***	27.719	3.63	0.002
CointEq(-1)	-0.857***	0.107	-8.042	0.000
Adj R^2	0.640			
Fstat	284.87			
0.000				
DW	2.19			

Source: Author's computation using Eviews 10

The result above shows that increase in productivity of sectors in the country leads to reduction in importation. Therefore, government should invest more in these sectors and reduce importation. This will meet the need of increasing population which will further lead to reduction in imported goods. The error correction coefficient is correctly signed and significant. The coefficient of 0.86 indicates that a deviation from the long run is corrected within the year.

Results of Residual Diagnostic Tests

The results of residual diagnostic tests reported in Table 5 show that the model passes all tests including serial correlation, heteroscedasticity and functional form. Hence, the estimated relationship is free from the problems of serial correlation and heteroscedasticity.

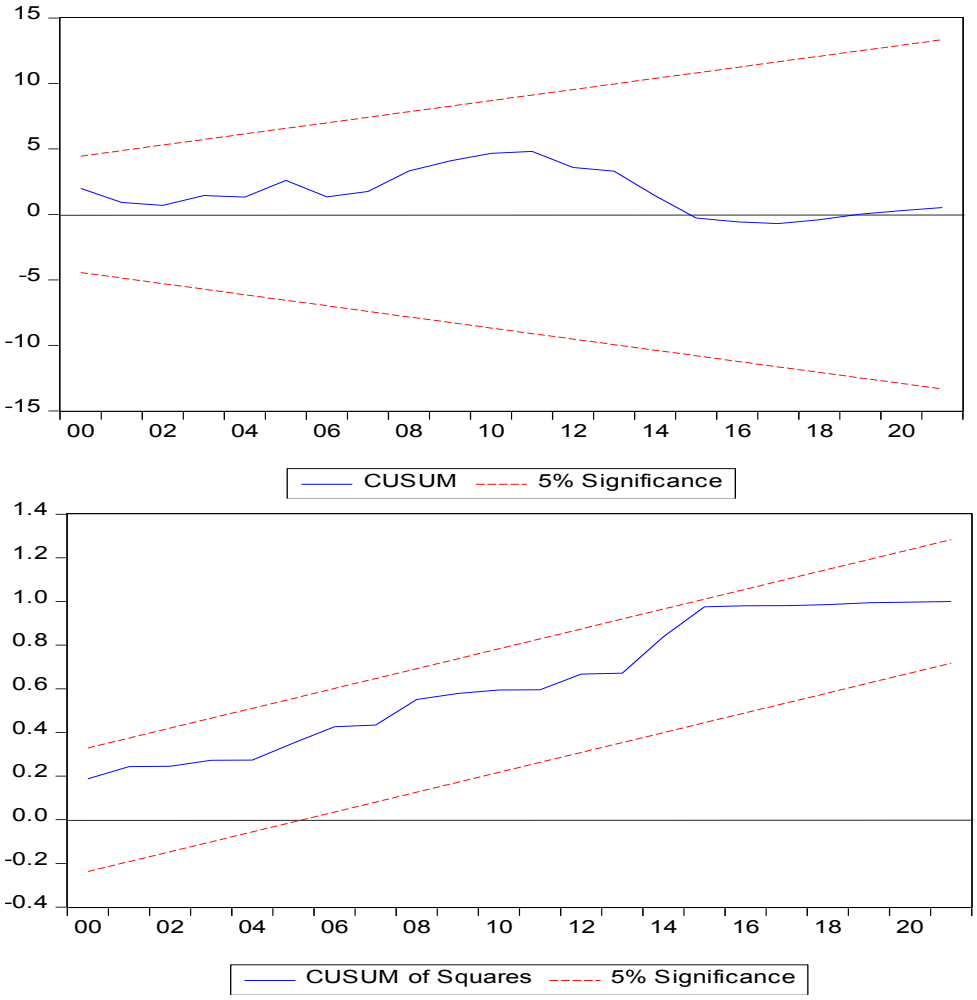
Table 5: ARDL-ECM model diagnostic tests

Test Statistic	Results
Serial Correlation: Prob. F(2, 20)	0.25[0.78]
Heteroscedasticity: Prob. F(15,22)	1.59[0.16]
Functional Form: Reset F-stat(1, 21)	2.82[0.11]

Source: Author's Computation (2023)

Results of Model Stability Tests

From the figure below it can be clearly seen that the plot of CUSSUM and CUSSUMQ statistics lies between the critical bound at 5% levels of significance. This means that the estimated coefficients in the model are stable. The straight lines in the figure represent critical bounds at 5% significance level. A drift from this region of stability will mean an error in model specification but the result has stated otherwise, hence this report could be relied on up for further reference.



5. Conclusion and Recommendation

This paper employed ARDL cointegration approach to examine the determinant of import in Nigeria during the period of 1981 to 2021 using effect of sectoral performance. The result found a cointegration relationship between the variables used in the study. Based on the results and discussion, it is concluded that industrial sector, agricultural sector and service sector performance significantly and negatively affect import in Nigeria in the short-run and long run. Population positively and significantly affect import in the longrun and shortrun. The paper recommends that, consumers should be encouraged to patronize goods produced within the country. This will reduce importation of such goods. Each sector should be developed through investment to improve their productivity and meet the needs of increasing population

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