Threshold Effects of Import Dependence on Economic Growth in Nigeria

Prahové účinky dovozní závislosti na hospodářském růstu Nigérie

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Abstract

This study uses annual time series data spanning 1981–2018 to investigate the threshold effects of import dependence on economic growth in Nigeria. The ordinary least squares (OLS) and the fully modified OLS (FMOLS) techniques are employed for estimation of a quadratic regression model to determine the nature of the relationship between aggregate import dependence and economic growth. It is found that the relationship is concave, that is, it follows an inverted-U shape. The conditional least squares estimator is thereafter employed to estimate the threshold model specified to determine the threshold level of import dependence. The study finds a threshold level of 26% for aggregate import dependence. Below this threshold, import dependence positively affects economic growth; above the threshold, the growth effect of import dependence is adverse. Furthermore, it is found that the long-run growth effect of Inflation is adverse, and investment is favourable to long-run economic growth. Based on these findings, the paper recommends efforts by Nigeria's government to reduce import dependence below the estimated threshold of 26%, control inflation and encourage investment so as to enhance the growth of the nation's economy.

Keywords

economic growth import dependence, import penetration, Nigeria, threshold regression

Abstrakt

Tato studie využívá roční časové řady dat za období 1981–2018 ke zkoumání prahových účinků závislosti na dovozu na hospodářský růst v Nigérii. K odhadu kvadratického regresního modelu pro určení povahy vztahu mezi agregátní dovozní závislostí a ekonomickým růstem jsou použity techniky obyčejných nejmenších čtverců (OLS) a plně modifikovaného OLS (FMOLS). Zjistilo se, že vztah je konkávní, tj. má tvar obráceného U. K odhadu prahového modelu určeného k určení prahové úrovně dovozní závislosti je poté použit podmíněný odhad nejmenších čtverců. Studie zjistila prahovou úroveň 26 % pro celkovou závislost na dovozu. Pod touto prahovou hodnotou dovozní závislost pozitivně ovlivňuje hospodářský růst; nad touto prahovou hodnotou je vliv dovozní závislosti na růst nepříznivý. Dále bylo zjištěno, že dlouhodobý růstový vliv inflace je

nepříznivý a investice jsou pro dlouhodobý hospodářský růst příznivé. Na základě těchto zjištění článek doporučuje nigerijské vládě, aby se snažila snížit závislost na dovozu pod odhadovanou prahovou hodnotu 26 %, kontrolovala inflaci a podporovala investice, aby se zvýšil růst národního hospodářství.

Klíčová slova

ekonomický růst, závislost na dovozu, penetrace dovozu, Nigérie, prahová regrese

1 Introduction

Nigeria's economy has been largely dependent on imports since the discovery and exploitation of crude oil in commercial quantities in the 1970s. The discovery led to the gradual relegation of the agricultural sector which was hitherto the main stay of the nation's economy, to the background. Also adversely affected by the emergence of the crude oil sector as the driver of the nation's economy was the industrial sector (especially, the manufacturing sector). Edo (2013) aptly noted that crude oil discovery had been the bane of the nation's manufacturing sector. Until recently, agricultural and manufacturing sectors were largely neglected by subsequent governments in the country (Feyisayo, et al., 2015; Egbulonu & Nwokolo, 2016). Consequently, output of agricultural produce and manufactures declined, necessitating increase in imports of those items to meet the growing domestic demand.

Importation enhances a country's access to foreign goods and technology which are not produced or developed locally, thereby contributing to economic growth as foreign technologies are deployed for efficient production locally. The chances of learning by doing are enhanced through knowledge transfers, importation being a key channel of transmission, thereby engendering improvement in innovations, skills and productivity of local workforce. Awokuse (2008) argued that the empirical evidence on the import-led growth is stronger than that of the export-led growth. This position supports Rodrik (1999) who noted that the benefit of trade lies on the import side rather than on the export side. However, it can also be argued that high dependence on imports could adversely affect economic growth. This is the thesis of this paper: that there exists a threshold level of import dependence below which it could be favourable to economic growth and above or beyond which it could adversely impact on economic growth. Import dependence (also known as import penetration) refers to the extent of reliance on imports for satisfaction of domestic demand in the economy.

This study is a single country-study focusing only on Nigeria and to the best of my knowledge no prior study has investigated the growth effect of import dependence, or established whether or not a threshold level exists for import dependence, or estimated such threshold, especially as it relates to Nigeria which to a large extent depends on imports to meet her domestic demand. In view of these, the study sets out to determine the extent to which Nigeria should depend on imports to meet or satisfy domestic demand in order to avoid possible adverse effects on economic growth.

This paper has three objectives which mark its contributions to the extant literature. The objectives are: (1) To investigate the growth effect of import dependence on economic

growth in Nigeria; (2) To investigate whether the relationship between the variables is linear or non-monotonic (that is whether an inflexion point or a threshold level exists in the relationship); (3) To estimate the threshold level if it is found to exist. The outcome of the study will serve as a useful policy guide to control dependence on imports, protect and revamp the local industries and the agricultural sector thereby making the country more self-reliant or self-sufficient and less dependence on import, creating employment in the sectors hitherto relegated and enhancing the growth of the nation's economy.

Previous studies including Alam (2006), Ogbonna (2015) and Aigheyisi (2019) assume the effect of imports on economic growth to be linear. The thesis of this study is that the relationship between import dependence and economic growth may be non-monotonic or nonlinear contrary to the assumptions of previous studies. There could be an inflexion point (or a threshold) in the relationship below which increase in import dependence could be favourable to growth, and above which it hurts economic growth. This obvious gap in the literature is what this study sets out to fill. This study contributes to existing literature by demonstrating that the relationship between import dependence and economic growth in Nigeria is non-linear, that an inflexion point or a threshold exists in the relationship. Additionally, it estimates the threshold level of import dependence and highlights its implication for economic growth in the country.

The rest of the study is outlined as follows: Section 2 presents a review of relevant literature. The Data and methodology used in the study, including specifications of model and the estimation technique is discussed in Section 3. The results of empirical analysis are presented and discussed in Section 4. Section 5 concludes the paper with some policy recommendations.

2   Literature Review

2.1   Theoretical Literature

The classical theories (Adam Smith's Absolute Advantage Theory, and the David Ricardo Comparative Advantage Theory) and the neoclassical trade theory (Heckshere-Ohlin Factor Endowment Theory) suggest a strong linkage between trade and output growth, based on some underlying assumptions. The New Growth theory on the other hand, suggests a positive long run growth effect of international trade through knowledge and technology transfer (Roe & Mohtadi, 1999). Barro and Lee (1994) identified trade openness as an important growth determinant as it paves way for acquisition of advanced technologies from highly industrialized countries.

Importation is one of the channels for knowledge and technology transfer. Global transmission of knowledge through this channel has been shown to be a source of total factor productivity (TFP) growth (Navaretti & Tarr, 2000; Belitz & Moulders, 2016). Considering that knowledge is inexhaustible (Arrow, 1991), the non-depletion of knowledge guarantees increasing returns to scale in the trading sectors, and this engenders improvement in factor productivity. The endogenous growth model establishes total

factor productivity growth and knowledge accumulation as principal connectors of trade and economic growth. Participation in global trade, characterized mainly by technology imports will engender rapid economic growth of developing countries (Jayme, 2001).

2.2   Empirical Literature

Empirical evidence on the growth effect of imports and import dependence has been inconclusive, suggesting that the effect is partly dependent on country-specific conditions.

Li et al. (2003) examines the growth impact of services imports in a sample of 83 countries comprising 20 developed and 63 developing countries during the period from 1985 to 1999 for developed countries, and 1990 to 1999 for developing countries. The study found that services imports impacted positively on economic growth in developed countries, but negatively in developing countries. The researchers attributed the different impacts on growth to the varying extent to which services imports engender transmission of knowledge and technical know-how into the services sector of each group of countries. The transmission is greater in developed countries than in developing countries. Another probable reason given is the differences in the nature of the services imported considering that importation of business services may have greater impact on economic growth than tourism imports.

Alam (2006) examines the growth effects of capital goods imports and manufactured exports in Mexico and Brazil during the period from 1959–1990 and 1955–1990 respectively. Various techniques including the Johansen normalized equation, ARDL and FMOLS were used to obtain the long run effects of the capital goods imports and manufactured exports on growth. Evidence from the three methods indicates that capital goods imports positively and significantly affects economic growth in both countries. The result also indicates that manufactured exports do not significantly affect economic growth in both countries while capital and labor were found to be significant growth drivers in both countries. These findings, to an extent, also provide justification for the Rodrik (1999) proposition that the benefit of trade lies on the import side rather than on the exports side.

Kim et al. (2007) examine the effect of imports on economic growth in the Republic of Korea using quarterly data spanning the period from 1980:Q1 to 2003:Q3. Results indicate that imports positively and significantly affect economic growth, but the statistical significance varies across different categories of imports. Specifically, consumption goods imports exert the most significant impact on economic growth in the country followed by capital goods imports and imports from G7 developed countries. Exports exert no significant impact on economic growth. Expenditure in R&D was found to also significantly and positively impact economic growth in the country.

Peltonen et al. (2008) examines the effect of import penetration from emerging market economies on profitability of the manufacturing sector in 10 Euro-area countries during the period from 1995 to 2004. The analysis reveals that the overall impact of import

competition on manufacturing sector profitability in the Euro-area countries is negative. This is more so for imports from China and Russia. Import completion from the United States of America is also found to negatively affect manufacturing firm's productivity. Contrary to these, however, imports from Latin America enhance the profitability of the manufacturing sector in countries.

Goldar and Renganathan (2008) estimated a dynamic panel model in a study to examine the effect of import penetration on capacity utilization in India using dataset covering the period from 1996/97–2003/04 on 62 industrial firms which encountered significant import competition during the period. The study found that import penetration adversely affects capacity utilization in the short run. However, over the long run, the firms are able to adjust to contain, as well as neutralize the negative effects.

Ogbonna (2015) investigates the growth effects of various categories of imports (namely food and live animals, manufactured goods and machinery and transport equipment) in Nigeria during the 1961–2008 period by adopting Johansen cointegration and Granger causality tests. No significant causation was found to run from the categories of imports to economic growth, suggesting that growth in the country is not import-led.

Ali and Li (2016) investigate the effects of various categories of imports on economic growth in Pakistan using ARDL Bounds Testing to cointegration approach and error correction modeling (ECM). The study found that imports positively and significantly affected economic growth in the country. Specifically, imports of food, heavy machinery, petroleum products, textile and metals, agricultural products and chemicals, and other goods, all positively and significantly affected economic growth in Pakistan.

In a study to investigate the determinants of economic growth in the Kingdom of Saudi Arabia during the period from 1980 to 2014, Altaee, et al. (2016) employs the ARDL approach to cointegration and ECM to investigate the effects of imports and other variables on economic growth in the country. The study finds that imports negatively and significantly affected economic growth in the short- and long-run. Growth in the country is found to be driven by investment (gross fixed capital formation), exports and financial development.

Hamdan (2016) examines the possible effects of exports and imports on economic growth in 17 Arab countries during the period from 1995–2013 using a fixed effect model. The study found that exports and imports positively affect economic growth in the countries. Gross capital formation and labor force were also found to have affected economic growth positively and significantly. This suggests that trade was a key ingredient of economic growth in the Arab countries studied.

Yamed and Dougherty (2016) estimate fixed effect models to examine the impact of import penetration on firms' productivity growth in OECD countries during the period from late 1990s to late 2000s. The study finds the effect to be non-linear and dependent on firms' proximity to the technology frontier as well as extent of deregulation of the product market. Import penetration positively affects productivity growth of firms that are close to the technology frontier, and where there is less stringent regulation of the product

market. However for firms that are far from the technology frontier, import penetration has no significant effect on firms' productivity growth irrespective of the level of deregulation of the product market.

Aigheyisi (2019) employs the panel FMOLS estimator to examine the effect of import penetration on economic growth in ECOWAS sub-region during the period from 1995 to 2015. The study finds an adverse long run growth effect of import penetration (or import dependence) in the sub-region, suggesting that the sub-region's high dependence on imports stalls its long run economic growth. However, the researcher notes high import penetration rate in advanced or highly industrialized economies may be due to intensification of intra-industry trade occurring particularly between developed countries, and accounting for significant share of global trade (Sawyer & Sprinkle, 2012). Studies by Owolabi-Merus (2015) and Omoke et al. (2021) involving OLS and ARDL cointegration analysis respectively, also found adverse long-run effect of imports on economic growth in Nigeria. These tend to suggest that high dependence on import in the country adversely affects the growth of the economy.

Rijesh (2019) estimates random effect models in a study to examine the effect of import penetration and other factors on productivity of manufacturing firms in India during the period from 1980 to 2013. The study finds that import competition induces negative economies of scale in the short run. However, overall (and in the long run), imports provide the channel of transmission of trade-linked productivity gains.

Syzdykova et al. (2019) explore the short and long run effects of imports and exports on economic growth in Kazakhstan during the period from 2000 to 2017. The ARDL Bounds Testing approach to cointegration and ECM were employed for the analysis. The empirical evidence indicates that both imports and exports positively and significantly affects economic growth, but the growth effect of import was more significant than that of export in the long run. In the short run, the growth effect of export was positive, but less significant than its long run growth effect. Import adversely affects growth in the short run.

It could be inferred from the mixed conclusions of the literature on imports and economic growth that though imports promote growth to some extent in both developed and developing economies, yet high level of import dependence could adversely affect economic growth. This implies existent of threshold level of import dependence. However, to my knowledge based on a wide search of the literature, the growth effect of import penetration, and the extent to which imports should be relied on in Nigeria have not been empirically investigated. Apart from the study by Aigheyisi which investigated the effect of import penetration on economic growth in the ECOWAS sub-region, other previous studies on Nigeria focused on the effect of imports (not import dependence or import penetration) on economic growth. Most of the existing studies on the effect of imports on economic growth assumed linear relationship between the variables. The current study fills the gaps in the literature by investigating the nature of the relationship to ascertain whether an inflexion point (or threshold) exists, and then proceeds to estimate the threshold, while examining what happens to economic growth at import dependence rate below and above the threshold rate.

2.3   Stylised Facts

Nigeria's non-oil trade is dominated by imports of virtually all categories of goods (primary goods and raw materials, intermediate goods and capital goods), and services. Generally, the country's import bill has been rising due to the weakness and low level of domestic output from the various sectors of the economy. The demand for import is necessitated among other factors, by the need to meet the high and rising domestic demand for goods (including capital, intermediate, consumer goods and raw materials) and services by the various economic units. The trend in the nation's import over the last four decades is shown in Figure 1.

Figure 1: Trend in Nigeria's Imports
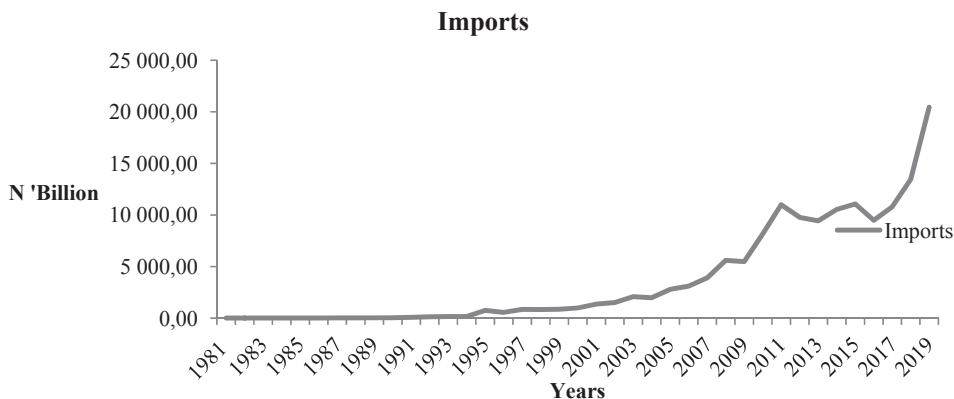
Source: CBN (2020)

The rising import demand has some implications for the nation's balance of trade and economic growth. The country's total balance of trade over the last four decades has been positive owing to the dominance of oil exports, except in 1981–83 and 1998 and recently in 2015–16 and 2019 where it was negative as a result of drop in crude oil price in the international crude oil market and the fall in demand for the country's crude oil by the United States as a result of exploitation of shale oil since 2014 which has been a useful alternative source of energy in the country. This also was partly responsible for the crash in global crude oil prices in those years (2015–2016). The trend in the country's BoT is shown in Figure 2.
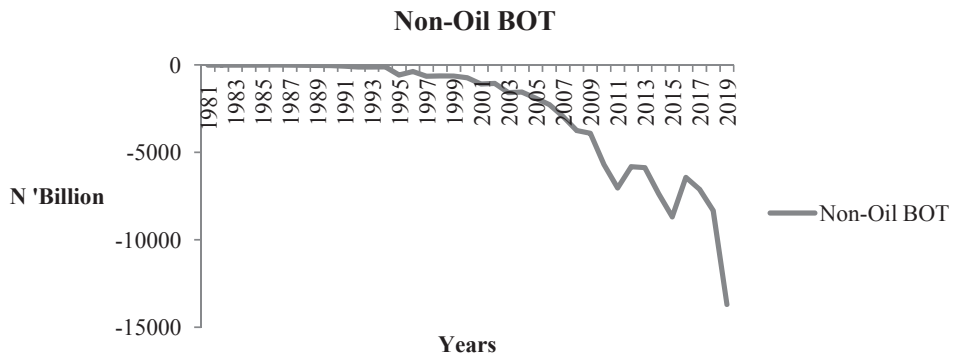
Figure 2: Trends in Nigeria's Balance of Trade

Total BOT
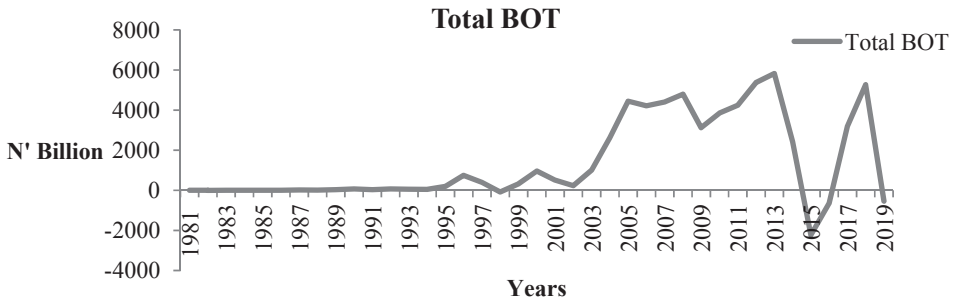
However, the balance in the country's non-oil trade has been negative all through the years. This can be attributed to the high dependence of the economy on imports, and low volume of non-oil exports. Figure 3 shows the trend in non-oil balance of trade.

**Figure 3**: Trends in Nigeria's Non-Oil Balance of Trade

Non-Oil BOT

The huge import bill has had adverse effect on the country's economic growth through excessive pressure on her reserves of foreign exchange, and its depressing effect on the value of the domestic currency causing it to depreciate rapidly. Furthermore, high level of imports has also had adverse effect on the nation's infant industries whose outputs are not able to compete with imports from the developed countries. Most of them are also not able to import foreign technologies to deploy or engage in domestic production as a result of increase in cost of importation caused by depreciation of the currency. These and many other factors including macroeconomic policy inconsistency, infrastructural decay, security challenges, low and unstable commodity prices, etc. have tended to adversely affect the growth of the nation's economy which has been quite slow and unstable as shown in Figure 4.

Figure 4: Nigeria's real GDP annual Growth Rates
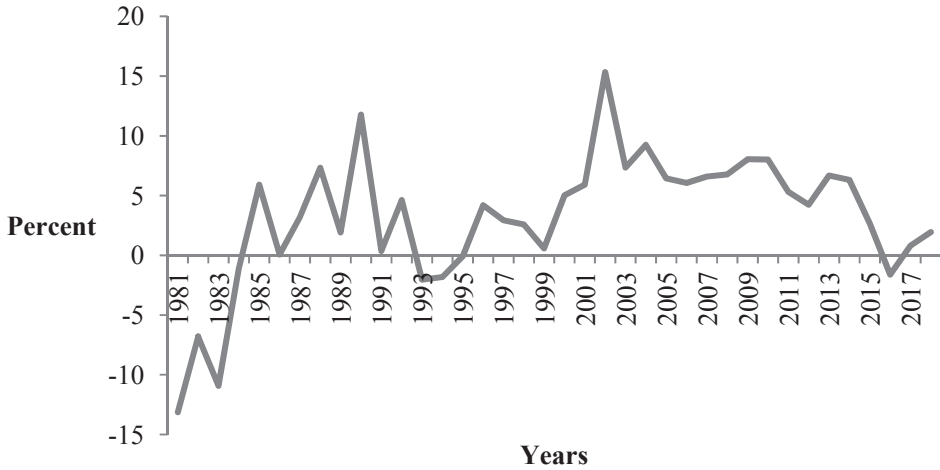
International trade theory and some thread in empirical literature argue that imports are necessary for growth. Through importation, countries are able to access variety of goods and services which cannot be sourced locally. High-tech or capital goods can be imported to the economy to boost productivity of firms thereby enhancing their outputs. However, high dependence on imports or high import penetration rate (especially for primary and final consumer goods) could adversely affect the growth of an economy. Figure 5 shows the scatter chat for Nigeria's import dependence (measured as total imports as a percentage of apparent consumption (also known as domestic demand) and her economic growth (measured as real GDP growth) during the 1981–2019 period.

Figure 5: Scatter Chat for Nigeria's real GDP annual growth and import dependence rates
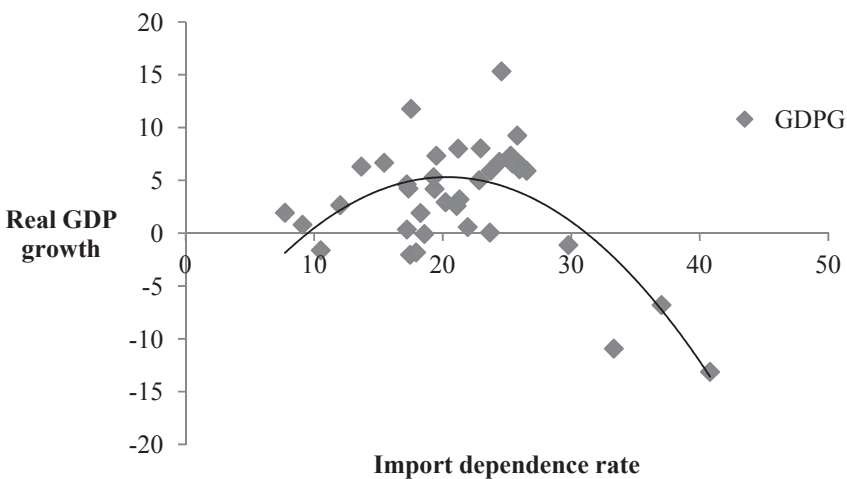
The scatter chart shows that the relationship between economic growth and import dependence in Nigeria has been an inverted U-shaped relationship. This suggests existence of a threshold level for import dependence. Economic growth trends positively at lower levels of import dependence, but at higher levels, economic growth is adversely affected. From the figure, the inflexion point in the relationship is between 20% and 30% import dependence rate. Determining the actual threshold level for import dependence is a major objective of this paper.

3   Data and Methodology

3.1   Data

Data used for the study are annual time series data spanning the period from 1981–2018. They were all obtained from the World Bank's WDI (2019). The data were on real GDP growth (proxy for economic growth), inflation (measured as annual percentage change in consumer price index) and real exports, real imports and real GDP used for the computation of import dependence (measured as imports as percentage of aggregate domestic demand or domestic absorption), i.e.

$$Import\ dependence\ \text{(IMDPD)} = \frac{REAL\ IMPORTS}{AGGREGATE\ DOMESTIC\ DEMAND} * 100\%$$

$$Import\ dependence\ \text{(IMDPD)} = \frac{REAL\ IMPORTS}{REAL\ GDP - REAL\ EXPORTS + REAL\ IMPORTS} * 100\%$$

3.2   Theoretical Framework

The Solow (1956) growth model provides the theoretical framework for this study. The model is presumed to provide the framework for comprehending the determinants of economic wellbeing (Mankiw *et al.* 1992). It relates real output (Y) to factor inputs such as technology (A), capital (K) and labor (L). The relation is expressed as:

$$Y = f(A, K, L) \tag{1}$$

Taking the growth rate of Equation 1, we have:

$$Y_g = f(A_g, K_g, L_g) \tag{2}$$

where Y_g represents growth rate of real GDP, A_g represents technological growth, K_g represents capital growth, and L_g represents annual growth rate of labour.

The endogenous growth model recognizes knowledge (W) as an important determinant of economic growth (Lucas, 1988; Romer, 1990; Chen & Looi, 2005). Incorporating W into equation [2] yields:

$$Y_g = f(A_g, K_g, L_g, W)$$ [3]

The new growth theory relates international trade to economic growth through the channel of knowledge and technology transmission. This occurs mainly through capital and intermediate goods imports. According to Lowey and David (2003), the growth effect of openness depends on the extent of knowledge spillovers from abroad. Considering that importation component of trade is one of the key channels for transmission of knowledge and technology, which engenders growth in total factor productivity (Navaretti & Tarr, 2000; Belitz & Moulders, 2016), knowledge and technology growth can be said to be functions of import dependence. This is expressed functionally as:

$$W, A_g = f(\text{import dependence (IMDPD)})$$ [4]

Import dependence can be substituted for W, A_g and incorporated in the growth model [equation 3] as a potential growth determinant as:

$$Y_g = f(K_g, L_g, \text{IMDPD})$$ [5] [5]

3.3   Model Specification

In empirical applications, the Solow model is augmented to incorporate policy variables which affect growth (Mankiw *et al.* 1992). In order to achieve the objectives of this study, the basic Solow growth model is augmented by incorporating import dependence (which is the key explanatory variable of interest) and its squared term, and inflation. Thus, the model of the study is specified functionally as:

$$\text{GDP\_GR} = f(\text{IMDPD}, \text{IMDPD}^2, \text{INF}, \text{GCF\_GR}, \text{POPG})$$ [6]

The econometric representation of equation [6] is specified as:

$$GDP\_GR_t = a_0 + a_1 IMDPD_t + a_2 IMDPD_t{}^2 + a_3 INF_t + a_4 GCF\_GR_t + a_5 POPG_t + \varepsilon_t$$ [7]

where: GDP_GR represents economic growth, measured as annual growth of real GDP; IMDPD represents import dependence, $IMDPD^2$ is the squared term of import dependence incorporated in the model make it flexible and to ascertain the presumed quadratic relationship between import dependence and economic growth; INF represents Inflation; and GCF_GR represents investment calculated as growth of real gross capital formation; POPG represents annual population growth, proxy for labour growth; t indexes time; ε is the error term.

The *a priori* expectations are: $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 < 0$, $\alpha_4 > 0$, $\alpha_5 > 0$. These are based on theoretical predictions. The expected signs on α1 and α2 suggests existence of a non-linear (inverted U-shaped) relationship between import dependence and economic growth. This implies that a threshold level (or inflexion point) exists in the relationship below which the growth effect of import dependence could be positive, and above which it could be adverse. The long run growth effect of high and persistent inflation is expected to be adverse in line with the monetarists' thought or the distortionist view as a result of increase in cost of production and reduction in consumption and welfare amongst others (Mundell, 1971; Taylor, 1979, Jung & Marshall, 1986; Flood, 2001; Barro, 2013). At the heart of every growth theory is investment (Baldwin & Forslid, 2000). The theories predict positive growth effect of investment in all economies. The growth of population which is the source of labour supply is expected to be positively related to growth of real GDP.

A two-step methodology was employed for the study. The first step involved OLS estimation of the flexible (quadratic) growth equation specified in Equation 7 as suggested in Rosenblad (2020). This was done to establish the nature of the relationship between import dependence and economic growth. For robustness, the equation was estimated using the fully modified OLS estimator developed by Phillips and Hansen (1990) and further developed by Phillips (1993) to correct the problems of autocorrelation and endogeneity associated with cointegrated regressors to yield optimal long run estimates. The relationship was found to be nonlinear or non-monotonic, implying existence of an inflexion point or a threshold level. Consequently, the second step was undertaken, and this involved specification and estimation of a threshold model to determine the threshold level of import dependence and its growth effects. The threshold model was specified as:

$$GDP\_GR_t = \beta_0 + \beta_1 IMDPD_t + \beta_2 d(IMDPD - k)_t + \beta_3 INF_t + \beta_4 GCF\_GR_t + \xi_t \quad [8]$$

This is the baseline model for determination of the threshold level of import dependence. ξ is the error term. k represents arbitrarily assumed threshold values of import dependence (in %), while *d* is a dummy variable which takes up the value of 1 if IMDPD > k, and 0 (zero) if IMDPD ≤ k. This is expressed symbolically as:

$$d = \begin{cases} 1, IMDPD > \text{k} \\ 0, IMDPD \leq \text{k} \end{cases}$$

The aim is to determine the optimal value of k that minimizes the residual sum of squares or maximizes the R^2 or adjusted R^2 of equation 8.

Following Fabayo and Ajilore (2006), POPG which was incorporated in the growth model in Equation 7 was omitted in Equation 8 because it was found to be statistically not significant, though it was positively signed as reported in Section 4. However, its relevance in growth in theory and empirics is not undermined. Omitting the non-significant variable also helped avoid the problem of over-parameterization of the threshold model.

Conditional least squares technique was employed for estimation of Equation 8 as proposed by Khan and Senhadji (2001). This technique involves OLS estimation of threshold equation using various values of k to obtain the one for which the sum of squared residuals is minimized. Since application of the OLS estimator requires that the variables of the model be integrated

of order zero (i.e. be stationary at level, or they should not contain unit root), the variables were tested for unit root using the KPSS unit root test. All the variables were found to be I(0), except import dependence. The cyclical component of the IMDPD series was removed using the Hodrick-Prescott (HP) filter, and the (long run) trend component which tested to be stationary at level was used along with other variables for estimation of the models.

4 Results and Discussions

The results of estimations of the specified models are presented and discussed in this section. The section begins with presentation and discussion of the descriptive statistics of the variables. This is followed by presentation of the results of the test for unit roots in the variables to ascertain their stationarity or otherwise. The results of estimations of the specified models are also presented and discussed.

Table 1: Descriptive Statistics

	GDPG	IMDPD	INF	GCF_GR	POPG
Mean	3.175	13.953	19.300	3.463	2.582
Maximum	15.329	24.226	72.836	59.301	2.710
Minimum	-13.128	3.134	5.382	-43.260	2.489
Skewness	-0.870	-0.155	1.742	0.287	0.086
Kurtosis	4.540	2.412	4.835	2.771	1.706
Jarque-Bera	8.548	0.700	24.558	0.587	2.697
Probability	0.014	0.705	0.000	0.745	0.260
Observations	38	38	38	37	38

The descriptive statistics of the variables are presented in Table 1. Average GDP growth in the period under consideration was 3.18% and it ranged between -13.13% and 15.33%. The series was not normally distributed as indicated by the p-value of the Jarque-Bera (JB) statistic which is less than 0.05, and the coefficient of skewness and Kurtosis. Import as a percentage of domestic demand averaged about 13.95%. It ranged between 3.13% and 24.226%. The series is normally distributed as indicated by the p-value of the JB statistic which is greater than 0.05. Mean (average) inflation was 19.30%. Maximum inflation in the period was about 72.84%, while minimum inflation was about 5.38%. The series was not normally distributed as indicated by the coefficient of skewness, kurtosis and the p-value of the JB statistic which is less than 0.05. Gross capita formation growth rate follows normal distribution as indicated by the p-value of the JB statistic. It ranged between -43.26% and 59.30%, averaging 3.463 in the period under consideration. Annual population growth rate averaged 2.58%. Minimum population growth rate within the period was 2.49%, while the maximum was 2.71%. The series followed normal distribution as shown by the p-value of the JB statistic and the coefficient of skewness.

Table 2: Unit Root Test Results

Variables	KPSS Unit Root Test			ADF Unit Root Test		
	Level			Level		
	KPSS test stat.	Critical Value (5%)	Inference	ADF test stat.	Critical Value (5%)	Inference
GDPG	0.144	0.146	S	-4.106	-2.943	S
IMDPD	0.105	0.146	S	-4.000	-3.548	S
INF	0.104	0.146	S	-3.967	-3.540	S
GCF_GR	0.104	0.146	S	-3.415	-2.951	S
POPG	0.249	0.463	S	-5.453	-2.968	S

Results of unit root test involving KPSS and ADF tests are presented in Table 2. The results indicate that all the variables are stationary at levels.

Table 3 shows the result of OLS estimation of the growth quadratic regression model specified in Equation 4 to determine the nature (linearity or non-linearity) of the relationship existing between import dependence and economic growth. The choice of this technique was informed by the fact that all the variables are stationary at level.

Table 3: OLS Estimation of Quadratic Growth Regression Equation.

Dependent Variable: GDPG

Method: Least Squares

Sample (adjusted): 1982 2018

Included observations: 37 after adjustments

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	C	-45.409	28.033	-1.620	0.115
	IMDPD	1.878	0.478	3.926	0.000
	IMDPD2	-0.046	0.011	-4.100	0.000
	INF	-0.068	0.039	-1.744	0.091
	GCF_GR	0.052	0.028	1.897	0.067
	POPG	12.599	10.204	1.235	0.226
R-squared		0.538	Adj R-squared		0.463
F-statistic		7.209	Durbin-Watson stat		1.955
Prob(F-statistic)		0.000			

Diagnostics

Normality: Jarque Bera = 4.509 p = 0.105

Serial Correlation (B-G LM): $F_{(2,29)}$ = 0.179 p = 0.837

Heteroscedasticity(B-G-P): $F_{(5,31)}$ = 0.491 p = 0.780

RESET: $F_{(1,30)}$ = 2.107 p = 0.157

The result shows that all the variables are statistically significant individually (as indicated by their respective t-statistics and p-values) and jointly as indicated by the F-statistic which is highly significant even at the 1% level as indicated by its p-value. The coefficient of determination (R-squared) indicates that the model has a good fit, as the regressors account for nearly 54% of the variation in real GDP growth. The Durbin-Watson statistic of 1.955 evidences absence of autocorrelation problem. The Jarque-Bera statistic indicates that the residuals are normally distributed, while the serial correlation and heteroskedastic test statistics respectively indicate absence of problems of serial correlation and heteroscedasticity. The Ramsey RESET test statistic indicates that the specification of the regression equation is error-free.

Key explanatory variables of interest are IMDPD and IMDPD^2 which are highly significant at the 1% level with positive and negative signs respectively. These imply that the relationship between import dependence and economic growth is quadratic, that is, it follows a concave or an inverted U-shape (∩). Import dependence is favourable to growth at lower level, but at higher levels, it adversely affects economic growth. The observed adverse effect of high import penetration rate on economic growth is in sync with evidence from Aigheyisi (2019) which found significant negative effect of import penetration on economic growth in ECOWAS sub-region, and Owolabi-Merus, *et al.* (2015) and Omoke *et al.* (2021) which showed adverse effect of imports on Nigeria's long run economic growth. Inflation negatively affects economic growth, and the effect is significant at the 10% level. The observed negative growth effect of inflation corroborates evidence from Adekunle (2018) and Adaramola and Dada (2020) which also found adverse effect of inflation on economic growth in Nigeria. The long run growth effect of investment is positive and significant at the 10% level. The positive growth effect of investment conforms to a priori expectation and aligns with findings from Oyedokun and Ajose (2018) and Ijirshar, et al (2019) which also found growth effect of investment in Nigeria and in Africa respectively. Though the effect of population growth on GDP growth is positive as expected a priori, it is however not statistically significant. This may be due to the fact that a small percentage of the population is engaged in productive economic activities. The observed growth effect of population growth corroborates evidence from Adenola and Saibu (2017) which also found positive, but non-significant growth effect of population growth, and buttresses the observation from Ogunleye, et al. (2018) which found positive, though significant effect of population growth on economic growth in the country. The difference in statistical significance could be due the different time scopes of the studies, and to their usage of (natural logarithm of) real GDP to proxy economic growth, whereas this study uses real GDP growth as the measure of economic growth.

Table 4: FMOLS Estimation of Quadratic Growth Regression Equation

Dependent Variable: GDPG				
Method: Least Squares				
Sample (adjusted): 1982 2018				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-39.634	24.600	-1.611	0.118
IMDPD	1.527	0.519	2.944	0.006
IMDPD2	-0.036	0.013	-2.758	0.010
INF	-0.081	0.034	-2.348	0.026
GCF_GR	0.052	0.024	2.157	0.039
POPG	11.664	9.025	1.292	0.206
R-squared	0.446	Adj R-squared		0.353

For robustness check the quadratic growth equation was estimated using the FMOLS estimator. The result is presented in Table 4. As in the OLS-estimated equation, the result also shows that IMDPD and IMDPD^2 are significant at the 1% level, and their coefficients are respectively, positively and negatively signed. This further confirms that the relationship between import dependence and economic growth in Nigeria follows a concave (inverted-U) shape. Inflation is also observed to adversely affect economic growth, while investment and population growth positively affect economic growth, though only the growth effect of investment is significant. Thus the results are robust to alternative estimation techniques.

Table 5: OLS Estimation of Threshold Regression Equation using Various Values of k Arbitrarily Selected.

K	Regressors	Coeff.	Std Error	t-stat.	Prob.	R^2	Adj. R^2	SSR
10	C	-16.734	19.215	-0.871	0.390	0.307	0.221	597.098
	IMDPD	2.284	2.012	1.135	0.265			
	d(IMDPD – k)	-2.420	2.076	-1.166	0.252			
	INF	-0.058	0.044	-1.325	0.195			
	GCF_GR	0.089	0.031	2.830	0.008			
15	C	-7.612	6.100	-1.248	0.221	0.387	0.311	528.098
	IMDPD	1.024	0.467	2.196	0.036			
	d(IMDPD – k)	-1.357	0.568	-2.390	0.023			
	INF	-0.085	0.043	-1.974	0.057			
	GCF_GR	0.073	0.030	2.417	0.022			
20	C	-3.280	3.759	-0.873	0.389	0.453	0.384	471.672
	IMDPD	0.554	0.219	2.527	0.017			
	d(IMDPD – k)	-1.141	0.357	-3.198	0.003			
	INF	-0.089	0.040	-2.208	0.035			
	GCF_GR	0.066	0.029	2.294	0.029			

K	Regressors	Coeff.	Std Error	t-stat.	Prob.	R^2	Adj. R^2	SSR
25	C	-1.089	2.649	-0.411	0.684	0.580	0.528	361.982
	IMDPD	0.338	0.125	2.702	0.011			
	d(IMDPD – k)	-1.616	0.337	-4.799	0.000			
	INF	-0.061	0.033	-1.826	0.077			
	GCF_GR	0.042	0.026	1.604	0.119			
26	C	-0.343	2.573	-0.133	0.895	0.580	0.528	361.925
	IMDPD	0.287	0.118	2.424	0.021			
	d(IMDPD – k)	-1.705	0.355	-4.799	0.000			
	INF	-0.059	0.033	-1.753	0.089			
	GCF_GR	0.042	0.026	1.580	0.124			
27	C	-0.037	2.583	-0.014	0.989	0.570	0.516	370.605
	IMDPD	0.266	0.118	2.259	0.031			
	d(IMDPD – k)	-1.845	0.396	-4.663	0.000			
	INF	-0.057	0.034	-1.703	0.098			
	GCF_GR	0.046	0.027	1.724	0.094			
28	C	0.274	2.608	0.105	0.917	0.556	0.500	383.035
	IMDPD	0.247	0.118	2.083	0.045			
	d(IMDPD – k)	-2.010	0.450	-4.472	0.000			
	INF	-0.057	0.034	-1.663	0.106			
	GCF_GR	0.051	0.027	1.901	0.066			
29	C	0.756	2.649	0.285	0.777	0.532	0.474	403.129
	IMDPD	0.216	0.119	1.816	0.079			
	d(IMDPD – k)	-2.156	0.517	-4.172	0.000			
	INF	-0.056	0.035	-1.602	0.119			
	GCF_GR	0.057	0.027	2.130	0.041			
30	C	1.350	2.702	0.500	0.621	0.501	0.439	429.716
	IMDPD	0.180	0.120	1.496	0.144			
	d(IMDPD – k)	-2.285	0.603	-3.788	0.001			
	INF	-0.056	0.036	-1.532	0.135			
	GCF_GR	0.065	0.027	2.353	0.025			
35	C	3.686	2.945	1.251	0.220	0.358	0.277	553.737
	IMDPD	0.046	0.128	0.359	0.722			
	d(IMDPD – k)	-4.722	2.370	-1.993	0.055			
	INF	-0.055	0.041	-1.322	0.196			
	GCF_GR	0.082	0.030	2.691	0.011			

Following the determination of the nature of the relationship existing between import dependence and economic growth in Nigeria, the point of inflexion in the relationship (that is the threshold level) was determined by estimating the specified threshold model. The results of estimations of the models for various assumed values of k (threshold value) are presented

in Table 5. The aim was to determine the optimal k, that is the value of k for which the sum of squared residuals (SSR) is minimized, or the R^2 or adjusted R^2 is maximized. From the results, it can be seen that the optimal k for which R^2 or adjusted R^2 is maximized, and the sum of squared residual is minimized is 26%. This is because for values of k = 10%–25%, R^2 keeps rising till it gets to maximum 0.580 at 26% and thereafter begins to fall; and SSR keeps falling till it gets to minimum 361.925 also at 26% and begins to rise thereafter. Thus, a threshold level of import dependence is derived. If imports account for less than 26% of aggregate domestic demand or domestic absorption, the growth effect of import dependence is positive, however if imports accounts for more than 26% of domestic demand (or the country relies on imports to satisfy 26% of its domestic demand or more), then economic growth will be adversely affected. The adverse growth effect stems from the adverse effect of high import dependence on local infant industries, domestic employment, foreign exchange reserves, etc.

5   Conclusion and Recommendations

The paper had a three-fold objective of investigating the growth effect of import dependence, the nature of the relationship between import dependence and economic growth, and estimating the threshold import demand level for Nigeria's economy. The study found the relationship between the variables to be quadratic. Low levels of import dependence are favourable to long run economic growth. However, high levels of import dependence adversely affect economic growth. A threshold level of import dependence was estimated as 26%, implying that below 26% import dependence is favourable to growth, and above 26% it harms growth. The long run growth effect of inflation is adverse, while investment promotes economic growth.

In view of the empirical findings, it is recommended that Nigeria's government takes deliberate steps to revive and boost the nation's productive capacity in various sectors of the economy especially the industrial and agricultural sectors (considering that industrial and agricultural items constitute the bulk of the nation's imports) and implement trade policies including exchange rate, tariff and non-tariff policies targeted at reducing importation of specific categories of goods especially those for which she has the resource endowment to produce locally. Import dependence rate of less than 26% should be targeted. In addition, the government, through the monetary authority should bring inflation under control; strive to encourage investment by creating the ambience favourable to investment such as infrastructural development, especially energy and road infrastructure, etc., favourable tax regimes, tightening security, and so on.

The study is not without some limitations. There are limitations relating to data and coverage. However, estimating a threshold import dependence/penetration rate for Nigeria marks its novelty. A motivation has been created for future research. Available data from the source used for this study were annual data. As a recommendation for further study, future researchers may use higher frequency datasets. Alternative methodologies (specifications, techniques) may be applied for this investigation which may also be extended to other countries and regions especially the developing and under-developed areas where import-dependence is 'dangerously' high.

Furthermore, the estimated threshold level of 26% for import dependence is the overall threshold level. The threshold could vary across sectors for different categories of imports. Future studies may investigate separately, the threshold effects of capital goods, services and merchant (or consumer goods) import dependence on economic growth in Nigeria.

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