

Original Research Article

ARE THE DETERMINANTS OF IMPORTS SIMILAR ACROSS MANUFACTURED PRODUCTS? EVIDENCE FROM NIGERIA

Abstract

The study investigates the determinants of selected manufactured product imports in Nigeria in with special focus on the role of domestic production. The autogressive distributed lag (ARDL) in the context of Keynesian demand theory was utilized using data coverage between 1985 and 2016. Results show that imports of various manufactured products are affected differently by some factors. In particular, domestic output of electrical and electronic have significant and negative effect on own imports. However, there was no significant relationship between the domestic production of petroleum products and imports of same goods. Also, the effect of domestic output of food & beverages and imports of same product is positive. Import of each product was negatively affected, by real effective exchange rate. Further, the sensitivity imports to exchange rate changes differ across products, in some it have immediate effect while in some it delays for a year. In the same vein, while GDP is an important driver of imports for some products, it is unimportant for some. Also, it is only food & beverages imports that significantly respond to change in tariffs. The overall conclusion form this study therefor is that drivers of import demand differ across products. Some of these drivers are significant in some products but insignificant in some.

Keywords: manufactured imports, manufactured output, real effective exchange rate, autoregressive distributed lag

1. Introduction

Manufacturing sector is key to economic growth because of its dynamic nature which provides opportunities for efficient use of resources, allows for technological breakthrough, and access to varieties of products. It also enable a country not only to be able to export and thereby earn foreign exchange but also helps to reduce external shocks arising from factors that are outside the control of the policy makers. However, due to comparative advantage and lack of technological know –how, many countries in Africa are unable to unlock the benefit of manufacturing and this made them to depend mostly on imported manufactured products.

Im the case of Nigeria, ever since independence, the comparative advantage lies mostly on the production of agricultural goods and this make the share of manufactured output to be less than

20 percent of GDP in 1981 and further fell drastically to 7 percent in 2010 but rose slightly to 9 percent in 2016. In contrast to this, agriculture accounted for close to 25 percent of GDP in the recent years. This trend suggests that the structure of Nigeria output is skewed more to agriculture and mineral products than manufacturing. By implication, since domestic production of manufactured goods is minimal and declining, importation has to be carried out in order to meet local consumption.

The belief of the policymakers in the 1970s is that the share of manufacturing in total output is small because infant manufacturing firms were facing starch completion from the import substituting products. To encourage production therefore, an import substitution industrialization was introduced. Other policy instruments used include the application of tariff via annual budget. Unfortunately, this policy did not work out because apart from the reduction in total welfare of the populace, it worsens the current account balance, led to exchange rate crisis and overall balance of payments was in crisis (Nwogwugwu, 2015). Egwaikhide (1999) has earlier pointed out that Nigeria experienced persistent decline in foreign exchange earnings due specifically to oil price slump. Thus, even during the period of import substitution industrialization, there appear not to be any meaningful contribution of manufacturing to output.

The purpose for import substitution industrialization in the 1970s was to reduce importation and hence import dependence. But the country experienced huge and rising imports, increasing from an average of ₦4.23 billion or 16.9% of GDP in 1970 to 1980, to ₦16.86 billion or 16.0% of GDP, in 1981 and further to an average of ₦540.95 billion or 26.7% of GDP in 1991-2000 period. The substantial rise in import bills was attributed to the country's quest to develop its infrastructural facilities. What is worrisome in this importation is that manufactured products for which the country enjoys comparative advantage account for a substantial share of the imports.

According to the product classification in Nigeria, there are thirteen (13) manufacturing sectors, namely oil refining, cement, food, beverage and tobacco, textile, apparel and footwear, wood and wood products, pulp, paper and paper products, chemical and pharmaceutical products, non-metallic products plastic and rubber products, electrical and electronics, basic metal, motor vehicles & assembly, and other manufacturing. Out of these products, the most imported are the electrical & electronics, constituting 29 percent of total imports in 2010 up from 21 percent in 2000 but fell slightly to 23 percent in 2016. The second most imported product was transport

65 and transport equipment, hovering between 8 percent in 2016 and 21 percent in 2010. Among
 66 the top ten most imported manufactured products are food and beverages, textile and clothing,
 67 and plastic rubber. A special case is importation of petroleum products that accounted for almost
 68 30 percent of total import in 2016 but actually less than 10 percent before 2010.

69 Surprisingly, the products that are among the top 10 imported manufactured goods also form
 70 part of the top ten most produced manufactured goods domestically. Specifically, food and
 71 beverages accounted for 56 percent of domestic manufactured output while textile, oil refining
 72 and plastic & rubber product are correspondingly 15 percent, 5 percent, and 2 percent of total
 73 manufacture products. Domestic production of electrical & electronics and transport equipment
 74 are very low as their respective contribution to total manufactured products accounted for less
 75 than 1 percent. Thus the structure of domestic manufactured product and that of the
 76 manufactured import show that on the one hand, Nigeria import most of the products for which it
 77 has least comparative advantage, that is, electrical and electronics and on the other hand, there
 78 are products in which comparative advantage can provide more production domestically but for
 79 which it is highly imported, that is, food and beverages. Also, oil refining that could be
 80 produced domestically constitute less than 5 percent of domestic manufacturing output while it is
 81 almost 30 percent of total manufactured imports in the recent time.

82 One of the factors driving merchandize trade is the exchange rate. When measured indirectly,
 83 increase in exchange rate should reduce importation and benefits exports. But such situation will
 84 also have implication for the capital imports that is important for the production of domestic
 85 manufactured production. However, worrisome that during the period of exchange rate
 86 depreciation, importation of these manufactured products, that is, electrical & electronics, food
 87 and beverages, and oil refining, are on the increase. For instance, controlling for relative price,
 88 when real effective exchange rate rose from 69 in 2010 to 113 in 2016, imports of manufactured
 89 products rose from \$5.82 billion to \$35.19 billion in 2016. However, when the focus is shifted to
 90 the structure of manufactured products, oil refining had the highest response followed by
 91 footwear and then electronics. This implies that the way exchange rate influences imports vary
 92 across products and so, it is important to investigate this varying degree of response.

93 One of the measures to discourage importation is tariff. Although tariff measure is based on unit
 94 of products (about six-digit product code) the World Bank documents both weighted and
 95 unweighted average tariff across product line. In the case of Nigeria, weighted average tariff on
 96 petroleum products rose from 20 percent in the 1990s to around 30 percent in early 2000s but fell
 97 to 8.3 percent in 2005 while further reduction was experienced in 2010 through 2016. During
 98 the upward tariff adjustment, petroleum product imports was on the increase left alone when it
 99 was adjusted downwards. This suggests that importation of petroleum products may not be
 100 affected by tariff. This is to be further investigated in order to see clearly whether or not tariff
 101 influences petroleum imports or not. In the case of food and beverages, there has been high tariff
 102 placed on this products particularly in the 1990s through 2000s when the weighted average tariff
 103 was between 72 percent and 97 percent. In 2002, food and beverage imports experienced
 104 prohibitive tariff going to 104 percent ad-valorem. However, since 2007, tariff on food and
 105 beverages were reduced to 20 percent. Hence the role of tariff as a determinant of product
 106 imports tend to be unclear and requires further investigation.

107 This study is aware of vast growing empirical works on the subject matter. Up till date,
 108 empirical research on the subject matter can be decomposed into three. First is the set of papers
 109 that focus on panel data of several countries (including developed, developing and transition
 110 economies) for many years. Recent works on this set of papers include Zhang et al (2015);
 111 Ediger and Berk (2011) and Zhao and Wu (2007). The result from such studies cannot be
 112 generalized at country-specific level controlling for country-specific fixed effect because the
 113 country specific effect controlled for is implicit in nature. The second type of the research is
 114 composed of studies focusing on regional blocs and country-specific (Samad, 1999 for Pakistan;
 115 Sinha, 2006 for Thailand; and Bathlomew, 2010 for Sierra Leone). The third set contains studies
 116 on country/regional based product-specific analysis. In this regard, Egwaikhide (2000)
 117 decomposed import demand into capital and consumer goods imports for Nigeria; Salisu and
 118 Ayinde (2016) and Adewuyi (2016) investigated the determinants for energy imports. However,
 119 while Salisu and Ayinde paid attention to aggregate energy demand, Adewuyi (2016) examined
 120 the case of non-renewable energy. Very recently, Fedoseeva and Zeidah (2018) also investigated
 121 determinants of energy import demand in the EU. All papers, excluding Fedoseeva and Zeidah
 122 (2018) employed the same estimation method, that is, the autoregressive distributed lags (ARDL)

but the work of Fedoseeva and Zeidah (2018) paid attention to how symmetry and asymmetry information influence the response of import demand to changes in its determinants.

A version of the third set, and which is relevant to the present study is contained in some studies such as Godbout and Longcake (2013) for China; Siddique (1997) for Malaysia and Camarero and Taimant (2004) for the EU countries, the US and Japan. These papers also employed ARDL estimation method. From this list of studies, virtually all readily available studies on import demand for Nigeria did not investigate the case of manufacturing products. Those that focus on manufacturing products did not study the case of Nigeria. As noted in earlier, Nigeria is a net importer of many manufactured products and so, it is important to investigate its determinants. Therefore, the first contribution of this work to the existing literature is to carry out empirical work on the determinants of manufactured imports for Nigeria with special focus on some most imported manufactured products.

Virtually all the papers investigating import demand in Nigeria use bilateral exchange rate, in this case, Naira to Dollar. While this measure of exchange rate is reasonable in the case of energy demand (because oil – which is the major aspect of energy in Nigeria – is sold in dollars) the same cannot be said for other products, particularly manufactured products which most are not from the United States. Most manufactured imports come from China, Japan, Germany, and other European countries. The appropriate variable that should enter the import demand of this kind is the effective exchange rate. The effective exchange rate incorporates the exchange rates of all countries of the world with respect to the share of trade of each country in total trade of the domestic economy. In order to control for changes in relative price, this study consider the use of real effective exchange rate. Thus the second contribution of this study to the existing literature is to include real effective exchange rate, which is more encompassing than bilateral exchange rate in the import demand model of manufactured goods. In the same vain, most empirical works on import demand, particularly in the case of Nigeria always omit the role of domestic production. The basis for imports, from the theoretical point of view is the difference between domestic production and domestic consumption. Including domestic production in the import demand model will capture the competitiveness of import substituting products in the economy. If domestic products are competitive, then increase in the production should reduce importation of such product. The only study that considers domestic products in the import

model is that of Adewuyi (2016) where production of domestic non-renewable energy was incorporated in the import demand model. Incorporating domestic production of manufactured goods in the manufactured import demand will show whether the manufacturing base is strong enough to compete with import of same product or not.

Following these gaps, this work seeks to contribute to the existing literature in the area of methodology and empirical. In the case of methodology, this study includes real effective exchange rate domestic output. It also models import demand at product level. The research work also validates empirical study and also extends the work of Adewuyi (2016) in the import demand of Nigeria.

In order to provide succinct information based on product level, the study penciled down the analysis to selected manufacturing products. These products are petroleum products, electrical and electronics, food and beverages and textiles. The basis for choosing petroleum products is as a result of its importance and peculiarity and also to compare the result with that of Adewuyi (2016). The inclusion of electrical and electronics was borne out of the fact that it is the most imported manufactured products, according to the trade statistics in Nigeria. Food and beverages was included because it is the most highly produced goods domestically while textiles is included because it is one of the least produced in the country as well as the least imported. The coverage period is from 1995 to 2016 based on the accessibility of data.

2. Brief literature review

There is a plethora of empirical evidence on the determinants of import demand. For the sake of volume, only the very recent evidence is documented. Siddique (1997) empirically estimated import demand function for aggregate imports, manufactured imports and machinery for Malaysia for the period 1979 to 1992. The result shows that income and price elasticities are important determinants of import demand. The researchers also noted that import demand to the country are generally income-elastic, suggesting that as the Malaysian economy grows, demand for imports will grow at a faster rate. In the same vein, price changes are a significant driver of imports in the country. It is also interesting to discover that price elasticity is also elastic,

suggesting that a slight decrease in relative price will more than increase demand for either aggregate imports or the disaggregated imports.

Camarero and Tamarit (2004) estimate the demand for imports (and exports) of manufactured goods for a panel containing the majority of the EU countries as well as the United States and Japan. After examining the stationarity and hence cointegration of the series, they invoke the error correction mechanism. Their result indicate that foreign direct investment (FDI) positively and significantly affect demand for manufactured imports. Godbout and Lagncake (2013) analyzes Chinese imports of manufactured goods and assesses whether the determinants of manufactured goods imports have changed over the past years. They considered domestic demand, exports and real exchange rate as explanatory variables in their industry-specific panel regressions covering 2001-2011 for 16 manufacturing industries. The result shows that exports have a positive effect on imports. in particular, a 1 percent increase in the level of exports is associated with an increase in imports of 0.25 percent. Also, domestic demand impacted positive effect on imports as 1 percent increase in domestic demand influenced imports level by 0.55 percent. This suggests that aggregate imports responds faster to domestic demand than exports. Further, exchange rate negatively and significantly affect manufactured imports. From the result, a 1 percent increase in exchange rate is associated with 0.97 percent reduction in imports. This suggests that imports becomes more expensive during depreciation and it is the case that the percentage change increase in depreciation will be met by almost the same percentage decrease in import of manufactured imports. Based on the argument that drivers of imports might vary across product stages, the panel regression was estimated separately for imports of intermediate goods and imports of final goods (composed of consumption and capital goods). In this case, exports are more closely associated with imports of intermediate goods when compared with final goods but the impact of domestic demand reduced.

Some empirical studies have employed the ARDL bounds test approach to investigate import demand functions. For example, Tang and Nair (2002) evaluate the stability of the import demand function in Malaysia using the bounds test. Import demand, income, and relative price are found to be cointegrated. Their study derived long-run income and relative price elasticities of 1.5 per cent and -1.3 per cent, respectively. Tang (2003) estimated China's import demand for 1970-1999 using the bounds testing approach to cointegration. In the long run, he found expenditure on exports having the biggest

correlation with imports (0.51), followed by investment expenditure (0.40). He concluded that the relative price variable had little impact on the demand for imports. Narayan and Narayan (2005) have also applied the bounds testing approach to cointegration to estimate the long-run disaggregated import demand model for Fiji using relative prices, total consumption, investment expenditure, and export expenditure variables over the period 1970 to 2000. Their results revealed a long run cointegration relationship among the variables with import demand elasticities of 0.69 for both export and consumption expenditures and 0.38 for relative prices. Following the same approach, Chang et al (2005) investigated the association that may likely exist between the demand for imports and its determinants for South Korea over the period 1980-2000. Their results show that the volume of imports, income, and relative prices are all cointegrated. The estimated long-run (short-run) elasticities of import demand with respect to income and relative price were 1.86 (0.86) and -0.2 (-0.05) respectively.

Zhao and Wu, (2007) investigated the determinants of China's energy import demand by using co-integration and VECM techniques. The findings suggest that, in the long run, growth of industrial production and expansion of transport sectors affects China's oil imports, while domestic energy output has a substitution effect. Thus, as the Chinese economy industrializes and the automotive sector expands, China's oil imports are likely to increase. Though China's domestic oil production has a substitution effect on imports, its growth is limited due to scarce domestic reserve and high exploration costs.

Ediger and Berk, (2011) determined the factors behind the crude oil import policy of Turkey and to measure their contribution to a well-organized import strategy. The study implemented a principle component analysis to construct an Oil Import Vulnerability Index (OIVI) based on four factors, which are crude oil import dependency of primary energy consumption, crude oil import bill as a share of Gross Domestic Product (GDP), non-diversification of import sources, and share of oil in total energy import. The contribution of these factors to the OIVI is found to be approximately equal. While an overall deterioration in the OIVI has been observed during periods of increasing oil prices, better diversification of oil import sources has lead to significant improvements.

Zhang, et al (2015) estimated the long-run and short-run demand equations for imported lumber based on classical production theory using Chinese monthly data from January 2000 to December 2013 data. The bounds testing approach for co-integration was employed within an autoregressive distributed lag framework and the results showed that there exists a long-run co-integrating relationship between China's lumber import and some specific explanatory variables. In the long run, the import demand was found to be elastic with respect to the lumber import price and a macroeconomic shifter at the 5% statistical level. Imported lumber seems to be a complement to other input factors, but the effect is not statistically significant. As expected, the short-run price and income elasticities are smaller in absolute terms than their long-run counterparts.

Gouvêa and Schettini, (2015) presented econometric estimates for the Brazilian aggregate imports over the period 1996 – 2010. The study explored the co-movements among total imports, gross fixed capital formation and household consumption (alternative model). The results underscore the role played by domestic income, which is the main determinant of total imports. The limited domestic supply of capital goods makes the allocation of domestic income also relevant to the imports dynamics. The out-of-sample assessment (one-step-ahead forecast) shows a good performance of the long-run vectors of the alternative models in predicting aggregate imports, meanwhile the best performance is obtained by the error correction representations of the canonical model.

In the case of Nigeria, Eme, Alwell and Marius, (2013) aimed at measuring the relative strengths and nature of effects of the variables that determine Nigeria's non-oil import demand, and the results indicates a deviations from the findings of earlier studies, as two key variables previously reported as significant (real exchange rate and real income) showed insignificant relationship.

Adewuyi, (2016) estimated determinants of import demand for refined petroleum products in Nigeria for the period 1984–2013. The paper employs autoregressive distributed lag (ARDL) bounds test co-integration method and analysed both long-run and short-run determinants of import demand for total and specific petroleum products. In the long-run, aggregate and sectoral incomes are significant determinants of import of refined kerosene. Further, real effective exchange rate (REER), aggregate income (GDP), manufacturing sector's income, domestic

energy production (DEP) and population growth rate (PGR) are significant drivers of import of refined motor spirit. Moreover, REER, DEP and manufacturing sector's income are propellers of import of refined distillate fuel. REER and total output of petroleum products are major drivers of total import of refined petroleum products. Short-run results show that previous period GDP, PGR and manufacturing and service sectors' incomes are determinants of import demand for refined kerosene. Moreover, REER, GDP, previous PGR and manufacturing sector's income exert significant effects on the import of refined motor spirit. Further, significant effects of REER, DEP, previous PGR, domestic output of the product and manufacturing and service sectors' incomes on the import demand for distillate fuel were found.

Nwogwugwu, Maduka and Madichie, (2015) used import substitution model framework to estimate the price and income elasticities of import demand in Nigeria for the period 1970 – 2013. The study used Autoregressive Distributed Lag (ARDL) bound test to study the long-run relationship between variables of interest. The estimated long-run coefficients showed that the price and income elasticities of import demand in Nigeria were about 0.03 and 0.55 respectively during the period covered and it implied that the long run import demand in Nigeria has been price-and income-inelastic since the sizes of the coefficients of real GDP and relative prices were less than unity and among the explanatory variables studied, real GDP was the main determinant of import demand in Nigeria. The results from the short-run dynamics of the model suggest that about 67 percent of the disequilibrium between the long term and short term import demand is corrected each year.

Ogbonna, (2016) estimated the aggregate import demand function for Nigeria for the period of 1980 - 2010. Co-integration approach was implemented while the error correction term in the estimated VEC model was evaluated for long-run causal relationship, the short term coefficients were gauged for short term causal relationship between the explained and the explanatory variables. Results indicated the existence of an underlying long-run stationary steady state relationship between import demand and real exchange rates, world price index and disposable in Nigeria. Real exchange rates, world price index, disposable income and the structural adjustment policy, jointly significantly cause import demand on the long run in Nigeria with causality running from the explanatory variables to imports. In the short run, all the explanatory variables

of interest, real exchange rate, world price index and disposable income, severally do not significantly cause import demand in Nigeria.

Nteegah and Nelson, (2016) investigated the factors influencing import demand in Nigeria over the period 1980 – 2014 using the Ordinary Least Square (OLS) and co-integration/error correction mechanism. The result revealed that real income level, domestic price change, exchange rate all have negative and significant impact on total import demand in Nigeria while degree of openness; gross capital formation and external debt have positive and significant implication on total import demand.

Fedoseeva and Zeidan (2018) claim to take a step in updating long-outdated estimates of import demand elasticities using recent data for crude oil and derive energy products and use this to contribute to the debate on the asymmetry of import demand by using recent development in econometric modelling. The model was used for the Eurozone between 1999 and 2015. Their results have important implications for the geopolitics of energy markets in Europe. (Asymmetric) Income seems to be the most relevant determinant of import demand; also, economic growth and fossil fuel consumption are correlated, even in the context of the European towards renewable energy. The result also suggests that the European economic recovery may derail the drive for lower fossil consumption and that changes in the natural gas market may further complicate this drive.

There are at least three conclusions to me made from this review. First, factors determining import demand varies across countries. Second, the terminates of import demand is better studied at product level because products respond differently to factors considered. Third, the outcome of the result depends on the type of estimation technique employed. Since most of the empirical works employ the autoregressive distributed lag, which is considered as the best due to its ability to predict and also to show both short and long run effect, the present study employs the same methodology. However, throughout the empirical review, there is no single paper that studies product level imports in Nigeria with special attention to competitiveness and real effective exchange rate. This is the gap that the present study fills

3. Theoretical Framework and methodology

3.1 Theoretical framework

The theoretical framework employed for this work is the new trade theory. The justification for choosing the theory is that first, virtually all manufacturing products imported are traded in the monopolistic competitive market where each firm differentiates its products with its registered trade mark. The theory suggests that products traded can be perfectly substituted or imperfectly substituted. Specifically, perfect substitute implies that both exports and import products are perfectly substitute, and so, consumers could choose between imports and exportable products because the import products are as good as the domestically produced products. In the case of imperfect substitute, export and import products are not exactly alike. The implication of this is that the market is neither filled completely by domestic nor foreign goods when each good is produced under constant or decreasing costs. Perceived in this way, the new trade theory allows the reason why domestic products should enter the import model. If import and domestically produced products (which can be exported) are perfectly substitute, the increase in domestic demand for a particular product should have an exact decrease in the imported competing products. If the products are imperfectly substitute, insofar that they are substitute, a one-for-one effect will not be observed. An extension to the new trade theory is that domestic product and import competing counterpart could be complement so that there will be large size of the product in the domestic market.

3..2 Model Specification

Standard models of total imports usually include an aggregate demand for imports and aggregate supply of imports so that at equilibrium, demand for and supply of imports will be equal. In order to estimate imports by a single demand equation, these models generally assume that the supply elasticities are infinite and thus the import prices can be viewed as exogenously given. Hence, the basic import model in the context of imperfect substitute framework is specified in equation

$$M_{ity}^d = F(Y_t^h, P_t^d, P_t^m) \dots\dots\dots 1$$

360 That is import demand at time t (M_{ity}^d) is a function of domestic nominal income (Y_t^d), domestic price
 361 index (P_t^d) and import price index (P_t^m). Due to possible multicollinearity between the two prices in
 362 equation 1, and the assumption of homogeneity, the prices are expressed in relative term, that is,

$$363 \quad M_{ity}^d = F\left(Y_t^d, \frac{P_t^m}{P_t^d}\right) \dots\dots\dots 2$$

364 Equation 2 says import demand is a function of nominal income and relative price. The relative price
 365 explains why economic agents switch demand between imports and domestic goods (Carone, 1999).
 366 Following the theoretical framework articulated above, foreign manufactured goods imported are
 367 of different nonhomogeneous products. The manufacturing imports considered in this study are
 368 the petroleum products, electrical & electronics, and food and beverages. Therefore, the
 369 respective model for each product is presented in equations 3 to 5.

$$370 \quad M_{t,Pet}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 \left(\frac{P_t^m}{P_t^d} \right) \dots\dots\dots 3$$

$$371 \quad M_{t,Pet}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 \left(\frac{P_t^m}{P_t^d} \right) \dots\dots\dots 4$$

$$372 \quad M_{t,Pet}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 \left(\frac{P_t^m}{P_t^d} \right) \dots\dots\dots 5$$

373 Where the respective subscripts in the import demand function is petroleum products, electrical
 374 and electronics and food & beverages. Meanwhile, equations 3 to 5 need to be modified because
 375 it is difficult to get import price index of each of the products. To deal with this problem, real
 376 effective exchange rate is used. This proxy is common the literature of international trade (see
 377 Adewuyi, 2016). Fortunately, the use of real exchange rate is consistent with the theory of
 378 purchasing power parity of exchange (Adewuyi and Akpokodje, 2010; Zhao and Wu, 2007). In
 379 recognition of the fact that the manufactured products considered in equations 3 to 5 may (and
 380 actually) have domestic counterparts, which is also have substitutes, that is, import competing
 381 goods (just like the theoretical framework suggests), it is imperative to incorporate domestic
 382 output of the respective products. Further, it is important to recognize the influence of tariff in

import demand. Countries impose tariff on import competing products in order to discourage or at best, reduce import demand. Replacing relative price with real effective exchange rate, including the domestic production of the respect goods and taking cognizance of tariff placed on each products yield equations 6 to 8

$$M_{t,pet}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 REER_t + \beta_4 PET_t^d + \beta_5 TAR_{t,pet} + \mu_t \dots\dots\dots 6$$

$$M_{t,elect}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 REER_t + \beta_4 ELECT_t^d + \beta_5 TAR_{t,elect} + \mu_t \dots\dots\dots 7$$

$$M_{t,bev}^d = \beta_1 + \beta_2 Y_t^d + \beta_3 REER_t + \beta_4 BEV_t^d + \beta_5 TAR_{t,bev} + \mu_t \dots\dots\dots 8$$

The long run specification of equations 6 to 8 is given as follows:

$$\ln M_{t,pet}^d = \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln PET_t^d + \beta_5 \ln TAR_{t,pet} + \mu_t \dots\dots\dots 9$$

$$\ln M_{t,elect}^d = \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln ELECT_t^d + \beta_5 \ln TAR_{t,elect} + \mu_t \dots\dots\dots 10$$

$$\ln M_{t,bev}^d = \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln BEV_t^d + \beta_5 \ln TAR_{t,bev} + \mu_t \dots\dots\dots 11$$

3.3 Technique of Estimation

Data on manufactured products cannot be accessed for a long period. As noted in the scope of study, the period for which data are available is between 1995 and 2016 (21 years) representing small sample size. The implication of this is that the ordinary least square (OLS) cannot be relevant to estimate equations 9 to 11 based on the inability to satisfy the assumption/condition for large sample. In place of the OLS, the autoregressive distributed lag (ARDL) bounds test cointegration approach is employed while the error correction models (ECMs) are estimated to analyse the short run determinants of import demand for total and specific manufactured goods in Nigeria. the use of ECMs provide another very useful information to predict the future reaction of the importation of a particular product. In particular, the ECM allows the study to examine the speed of adjustment in order to know how long it takes to restore equilibrium when there are changes in any of the factors determining it. The ARDL specification for each product and the aggregate manufactured product is presented in equations 12 to 15

407 **Model 1: ARDL form of import demand for petroleum products**

$$\begin{aligned} \Delta \ln M_{t,pet}^d = & \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln PET_t^d + \beta_5 \ln TAR_{t,pet} + \sum_{i=1}^p \alpha_1 \Delta \ln M_{t-i,pet}^d + \\ & \sum_{i=0}^q \alpha_2 \Delta \ln Y_{t-i}^d + \alpha_3 \sum_{i=0}^r \Delta \ln REER_{t-i} + \alpha_4 \sum_{i=0}^s \Delta \ln PET_{t-i}^d + \alpha_5 \sum_{i=0}^t \Delta \ln TAR_{t-i,pet} + \iota_t \end{aligned} \quad \dots\dots 12$$

409

410 **Model 2: ARDL form of import demand for electrical and electronics products**

$$\begin{aligned} \Delta \ln M_{t,elect}^d = & \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln ELECT_t^d + \beta_5 \ln TAR_{t,elect} + \sum_{i=1}^p \alpha_1 \Delta \ln M_{t-i,elect}^d + \\ & \sum_{i=0}^q \alpha_2 \Delta \ln Y_{t-i}^d + \alpha_3 \sum_{i=0}^r \Delta \ln REER_{t-i} + \alpha_4 \sum_{i=0}^s \Delta \ln ELECT_{t-i}^d + \alpha_5 \sum_{i=0}^t \Delta \ln TAR_{t-i,elect} + \iota_t \end{aligned} \quad \dots\dots 13$$

412 **Model 3: ARDL form of import demand for textiles products**

$$\begin{aligned} \Delta \ln M_{t,bev}^d = & \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln BEV_t^d + \beta_5 \ln TAR_{t,bev} + \sum_{i=1}^p \alpha_1 \Delta \ln M_{t-i,bev}^d + \\ & \sum_{i=0}^q \alpha_2 \Delta \ln Y_{t-i}^d + \alpha_3 \sum_{i=0}^r \Delta \ln REER_{t-i} + \alpha_4 \sum_{i=0}^s \Delta \ln BEV_{t-i}^d + \alpha_5 \sum_{i=0}^t \Delta \ln TAR_{t-i,bev} + \iota_t \end{aligned} \quad \dots\dots 14$$

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415 **ARDL model 4: form of import demand for aggregate manufactured products**

$$\begin{aligned} \Delta \ln M_{t,manuf}^d = & \beta_1 + \beta_2 \ln Y_t^d + \beta_3 \ln REER_t + \beta_4 \ln MANUF_t^d + \beta_5 \ln TAR_{t,manuf} + \sum_{i=1}^p \alpha_1 \Delta \ln M_{t-i,manuf}^d + \\ & \sum_{i=0}^q \alpha_2 \Delta \ln Y_{t-i}^d + \alpha_3 \sum_{i=0}^r \Delta \ln REER_{t-i} + \alpha_4 \sum_{i=0}^s \Delta \ln MANUF_{t-i}^d + \alpha_5 \sum_{i=0}^t \Delta \ln TAR_{t-i,manuf} + \iota_t \end{aligned} \quad \dots\dots 15$$

418 In equation 15, MANUF represent aggregate manufactured products and TAR implies average weighted
419 tariff across all manufactured products.

420 Narayan and Smyth (2005) suggest that the strength of ARDL bounds test cointegration and
421 ECM method over the traditional Engel-Granger and Johansen approaches include the avoidance

of endogeneity problem, the small sample properties, ability to handle models with single order integration $I(0)$ and $I(1)$ or mixed order of integration. Also, the use of AEDL may not even require a pre-test for unit root. The method also have ability to produce both short run and long-run model estimates simultaneously.

The bounds test for cointegration is guided by two critical values. A conclusive decision about the null is made when the calculated F-statistic falls outside the critical value bounds. An inconclusive inference about the null exists when the calculated F-statistic falls within the critical value bounds. Thus, knowledge of the order of integration of the regressors in z_t is required in order to further examine the relationship in the inconclusive case. Co-integration is confirmed among z_t variables if the F-statistic exceeds the upper critical value while the null of no co-integration cannot be rejected if the F-statistic is sensitive to the lag length for each differenced variable in z_t . Once co-integration is established, estimates of the long-run coefficients can be obtained and the ECM associated with the long-run estimates can also be estimated. The optimal lag length for each of the first differenced z_t variables is chosen based on the AIC and/or SBIC.

4.1 Results and discussions

The descriptive statistics of the variables is presented in Table 1. The average growth of food and beverages imports was 9.54 while that of electrical & electronic, petroleum products, and aggregate imports were 7.37, 12.1, and 15.4 respectively. This implies that on average, petroleum products imports had the highest growth followed by electrical & electronics and then food and beverages. The average growth of domestic output of beverages was 2.7. The growth of domestic output of electrical & electronics was 0.9 while that of petroleum products was 1.2 and the average growth of domestic aggregate output was 2.8 during the sample period. Tariff on food & beverages had the highest average growth (3.98) followed by tariff on petroleum products (2.9) and then electrical & electronics (2.84). The growth of GDP on average was computed to be 24.9 while the growth of effective exchange rate was 4.65.

There is no evidence of dispersion in the distribution of the series since the mean value of each series was greater than the standard deviation. The implication of this is that one of the necessary conditions for utilizing the ordinary least square method is fulfilled. However, not all the series are normally distributed. This is evidenced in the probability values of the Jarque-Bera that was less than 0.05 for series such as electrical & electronic imports, aggregate imports,

453 tariff on petroleum products and the real effective exchange rate. Not fulfilling the normality
454 condition violates condition for employing the ordinary least square technique. The implication
455 is that these series will have to be transformed before it can be appropriate for a technique of
456 estimation in the context of least square.

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465 **Table 1: Descriptive Statistical Analysis**

Statistics	BEVERAGE IMPORTS	BEVERAGE OUTPUT	TARIFF ON BEVERAGE	GDP	ELECT IMPORTS	ELECT OUTPUT	TARIFF ON ELECT	TARIFF ON MANUFACTURES	MANUFACTURE IMPORTS	MANUFACTURES OUTPUT	PETROLEUM IMPORTS	PETROLEUM OUTPUT	TARIFF ON PETEROLEUM IMPORTS	LNPOP	LNREER
Mean	9.54	2.65	3.95	24.88	7.37	0.90	2.84	2.74	15.43	2.84	12.11	1.16	2.86	18.55	4.65
Median	8.73	2.76	4.40	24.30	6.67	0.93	3.00	2.88	15.38	2.92	11.66	1.26	3.00	18.55	4.52
Maximum	12.92	3.63	4.65	27.03	12.89	2.43	3.40	4.06	17.46	3.95	16.01	2.62	6.40	18.94	6.19
Minimum	7.72	1.39	2.86	23.48	5.26	-0.44	2.09	2.02	7.93	1.57	7.93	-1.34	1.94	18.17	3.91
Std. Dev.	1.71	0.71	0.75	1.11	1.93	0.83	0.45	0.46	2.21	0.74	2.15	1.20	0.81	0.23	0.52
Skewness	0.51	-0.40	-0.57	0.73	1.16	0.07	-0.30	0.31	-2.50	-0.27	0.18	-0.49	2.56	0.01	1.24
Kurtosis	1.68	1.96	1.39	2.14	3.80	2.20	1.54	3.34	9.28	1.95	2.51	1.98	12.60	1.82	4.17
Jarque-Bera	3.60	2.21	5.02	3.72	7.84	0.85	3.24	0.63	83.20	1.80	0.48	2.56	152.87	1.79	9.72
Probability	0.17	0.33	0.08	0.16	0.02	0.65	0.20	0.73	0.00	0.41	0.79	0.28	0.00	0.41	0.01
Sum	295.77	82.18	122.49	771.24	228.50	27.77	88.18	85.03	478.18	88.05	375.40	36.07	88.78	575.12	144.15
Sum Sq. Dev.	87.78	15.11	17.09	36.92	112.04	20.46	6.14	6.38	146.15	16.22	138.45	43.11	19.86	1.62	8.05
Observations	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31

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Before proceeding to the analysis of stationarity, it is important to establish the association between various pairs of the series. This is done for two reasons. First, analysis of pairwise correlation will provide information about the association of these variables and hence show whether there is any evidence of multicollinearity or not. In the event that there is multicollinearity, the use of OLS will be avoided. Second, one of the objectives of this study is to explore into the nature of association between any pair of the variable so as to determine their degree of relationship.

The pair wise correlation matrix is presented in Table 2. Their relevant associations for the first reason is to , examine the association between any pair of independent variables in equations 11 through 14, that is, relationship between exchange rates, GDP, domestic production of aggregate, food and beverages, petroleum and electrical & electronics and the tariff imposed on the importation of the respective products. As can be verified from the Table, real effective exchange rate had weak association with virtually all the independent variables present in the models of equations 11 through 14. The relationship between GDP and tariff on petroleum, tariff on electrical and electronic, and tariff on aggregate manufacturing was negative and but less than 0.9. The interpretation of this is that negative association exist between GDP and each of the tariff variables but the degree of association is not so serious that it could lead to multicollinearity. However GDP with each of the components of manufactured output was positive and very strong. This is not surprising since each of these output is a share of aggregate output. Tariff on food &a beverage import and the domestic production this good was negative (-0.8), while tariff on electrical & electronics and domestic production of same goods had a degree of relationship to be -0.6 and it is negative. Further, domestic production of petroleum products and tariff imposed on the importation of the product was also negative but with weak degree of association, the negative association observed in the result is consistent with expectation. That is imposition of tariff is expected to increase import prices, thereby making imports more expensive and hence reduction in import demand do such product.

The result from the association of independent variables in each of the models indicate that there is no evidence of multicollinearity and so, all these variables can appear altogether in each of the models.

	LNBEVTARIF														
	LNBEVIMP1	LNBEVOUTPU T	F	LNGD P	LNELECMP 1	LNELECTTPU T	LNELECTTARI F	LNMANTRIF F	LNMANUIIMP 1	LNNAOUT P	LNPETIMP 1	LNPETOUTPU T	LNPETTARI F	LNPO P	LNREE R
LNBEVIMP1	1.0														
LNBEVOUTPUT	0.8	1.0													
LNBEVTARIFF	-0.9	-0.8	1.0												
LNGDP	1.0	0.8	-0.9	1.0											
LNELECTP	0.8	0.6	-0.8	0.8	1.0										
LNELECTOUTPU T	0.9	1.0	-0.8	0.9	0.7	1.0									
LNELECTTARIF	-0.8	-0.5	0.9	-0.8	-0.7	-0.6	1.0								
LNMANTRIFF	-0.8	-0.7	0.9	-0.8	-0.6	-0.7	0.7	1.0							
LNMANUIIMP1	0.6	0.7	-0.6	0.6	0.3	0.7	-0.4	-0.5	1.0						
LNNAOUTP	0.9	1.0	-0.8	0.9	0.6	1.0	-0.6	-0.7	0.7	1.0					
LNPETIMP1	0.8	0.9	-0.7	0.9	0.6	0.9	-0.5	-0.7	0.8	0.9	1.0				
LNPETOUTPUT	0.8	1.0	-0.8	0.8	0.6	1.0	-0.5	-0.7	0.6	1.0	0.8	1.0			
LNPETTARIF	-0.6	-0.4	0.6	-0.7	-0.6	-0.4	0.6	0.8	-0.3	-0.4	-0.5	-0.4	1.0		
LNPOP	0.9	1.0	-0.8	0.9	0.7	1.0	-0.6	-0.8	0.7	1.0	0.9	1.0	-0.5	1.0	
LNREER	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.2	0.1	-0.1	1.0

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509 **Table 2: Pairwise Correlation Matrix of the Variables**

510 In the case of the second reason, attention will be paid to the association between each of the
 511 dependent variables in the models and any of the independent variable in each model. From the
 512 Table, the correlation result shows that there is a strong and positive association between
 513 manufacturing imports and GDP (0.6) and negative association between the importation of the
 514 product and domestic output (-0.7). The negative relationship between imports and GDP is
 515 consistent with the theory. That is increase in domestic output should reduce importation of such
 516 product, while reduction in the importation of should facilitate more domestic production.

517 Importation of food & beverages in relation to domestic production of same product was
 518 positive and strong. This is not expected but such situation may occur when some imported
 519 products can serve as input to the domestic output. The relationship between tariff on food
 520 & beverages and the importation of the product was negative and strong. Further, there is a
 521 perfect relationship between GDP and food & beverage imports, suggesting that increase in
 522 GDP is associated with increase in food & beverage imports.

523 There is also a negative relationship between food & beverage imports and real effective
 524 exchange rate. This is also consistent with the theory because theoretically, real appreciation
 525 (reduction in real effective exchange rate) implies relatively cheaper imports and hence more of
 526 such goods will be imported.

527 Imports of electrical & electronics is also strong and positive while tariff on the product showed
 528 negative association with the importation of the product. Like it was observed in the case of
 529 food & beverages, there is negative but weak association between imports of electrical &
 530 electronics and real effective exchange rate . A positive and very strong association was
 531 observed in the case of petroleum products imports and GDP. Also, domestic output of
 532 petroleum products was positively associated with importation of the products. The relationship
 533 between effective exchange rate and importation of petroleum product was positive but weak.
 534 Also, tariff on petroleum import had negative association with the importation of the product.

535
 536 The result from the correlation analysis suggests that first, there appear not to be any
 537 multicollinearity in any of the models. Second, degree and direction of relationship differ across
 538 products. It is interesting to discover that that food and & beverage imports had the strongest
 539 association with GDP even though it was the second largest manufactured products produced
 540 domestically. Petroleum product import had the second strongest degree of association with

GDP while the electrical & electronics had the least correlation with GDP in the product category despite being the most imported products. Further, it is surprising to observe positive, albeit different degree of association between import and domestic output of respective product. Tariff levied on the importation of each product are of diverse degree in relation to the importation of these goods. As can be revealed, food & a beverage had the highest degree of association with own tariff while petroleum products had the least. It follows therefore that estimating import demand at product level should provide more reliable result than at aggregate level.

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The result of the unit root test

Result of the unit root test is presented in Table 3. The Table reveals that only GDP was stationary at level while others were stationary at first difference. Since GDP appears as independent variable in each of the models, it follows that OLS cannot be used to estimate the parameters. The appropriate method is the autoregressive distributed lag (ARDL) as discussed in the methodology section..

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Table 3: Result of the augmented Dukes-Fuller unit root test

VARIABLES	AT LEVELS				AT FIRST DIFFERENCE				REMARK
	CRITICAL VALUE	1%	5%	10%	CRITICAL VALUE	1%	5%	10%	
LOG OF FOOD AND BEV	-0.81	-3.66	-2.96	-2.62	-6.97	-2.64	-1.95	-1.61	I(1)
LOG OF TARIFF ON FOOD AND BEV	-0.81	-3.66	-2.96	-2.62	-6.97	-2.64	-1.95	-1.61	I(1)
LOG OF GDP	2.13**	-2.64	-1.95	-1.61	-5.10	-2.64	-1.95	-1.61	I(0)
LOG OF ELECT & ELECT	0.35	-2.64	-1.95	-1.61	-7.31	-2.64	-1.95	-1.61	I(1)
LOG OF TARIFF ON ELECT & ELECT	-0.75	-2.64	-1.95	-1.61	-5.43	-2.64	-1.95	-1.61	I(1)
LOG OF AGGREGATE MANUF	-0.16	-2.64	-1.95	-1.61	-5.68	-2.64	-1.95	-1.61	I(1)
LOG OF TARIFF ON AGGREGATE MANUF	-0.74	-2.64	-1.95	-1.61	-7.96	-2.64	-1.95	-1.61	I(1)
LOG OF PETROLEUM	1.16	-2.64	-1.95	-1.61	-6.97	-2.64	-1.95	-1.61	I(1)
LOG OF TARIFF ON PETROLEUM	-0.74	-2.64	-1.95	-1.61	-9.13	-2.64	-1.95	-1.61	I(1)
LOG OF REER	-1.04	-2.64	-1.95	-1.61	-4.41	-2.64	-1.95	-1.61	I(1)

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562 4.2. Presentation of results of the determinants of import demand in Nigerian

563 Following the outcome of the unit root test and the models specified in equations 11 to 14, Tables 4 to 7
 564 provides the results. Table 4 shows the determinants of aggregate imports in Nigeria.. The first part of
 565 the Table present the cointegrating (parsimonious) result while the bottom panel is the long run result.
 566 The result from the cointegrating equation shows that contemporaneous output, 2-year lag of output and
 567 contemporaneous real effective exchange rate significantly determine aggregate manufactured import.
 568 The model converges to its long run equilibrium after 3years with 18% per year. While contemporaneous
 569 domestic output positively influences aggregate import, 2-year lag of domestic output have negative
 570 effect. Thus suggests that it takes two years before domestic output could have negative and significant
 571 effect on aggregate imports. Meanwhile, real effective exchange rate had positive effect on aggregate
 572 imports , implying that depreciation leads to increase in imports. The reason for this result could be that
 573 most factor I put for the production of manufactured output are affected by exchange rate movement and
 574 hence aggregate import.

575 In the long run, GDP had positive and significant effect on aggregate manufactured imports. In the short
 576 and long run, tariff have no significant effect on manufactured import even though it shows positive
 577 effect.

578 **Table 4: Determinants of aggregate manufactured import demand (ARDL Cointegration and**
 579 **Long-run form): selected model is ARDL(2, 3, 0, 3); included observation = 28**

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMANUIMP1(-1))	0.198737	0.209853	0.947030	0.3713
D(LNNAOUTP)	40.114631	11.270582	3.559233	0.0074
D(LNNAOUTP(-1))	-1.317890	17.527197	-0.075191	0.9419
D(LNNAOUTP(-2))	-36.071141	15.970390	-2.258626	0.0538
D(LNMANTARIFF)	2.727859	1.961779	1.390503	0.2018
D(LNREER)	4.229032	2.002730	2.111634	0.0677
D(LNREER(-1))	-0.272961	1.074083	-0.254134	0.8058
D(LNREER(-2))	1.482553	0.841299	1.762219	0.1161
D(LNGDP)	-1.617746	1.417012	-1.141660	0.2866
D(LNGDP(-1))	-3.201472	1.795689	-1.782865	0.1125
D(LNGDP(-2))	-3.491803	1.978337	-1.765019	0.1156
CointEq(-1)	-0.186451	0.090772	-2.055643	0.0019

$$\text{Cointeq} = \text{LNMANUIMP1} - (4.3619 * \text{LNNAOUTP} + 2.2992 * \text{LNMANTARIFF} + 1.3276 * \text{LNREER} + 1.0328 * \text{LNGDP} - 24.3535)$$

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNAOUTP	4.361939	1.015836	4.293940	0.0026
LNMANTARIFF	2.299172	1.890449	1.216204	0.2586

LNREER	1.327575	1.009897	1.314565	0.2251
LNGDP	1.032772	1.914536	0.539437	0.6043
C	-24.353450	44.119833	-0.551984	0.5960

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581 At the product level, factors that significantly affect electrical & electronics imports are 2-year lag of
582 import of the products, domestic output of electrical &a electronics and real effective exchange rate.

583 **Table 5: Determinants of Electrical & electronics import demand (ARDL Cointegration and**
584 **Long-run form): selected model is ARDL(3, 3, 3, 3,0); included observation = 28**

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNELECTIMP(-1))	0.446753	0.394377	1.132808	0.2946
D(LNELECTIMP(-2))	0.382848	0.201084	1.903923	0.0986
D(LNELECTOUTPUT)	-1.485530	3.112271	-0.477314	0.6477
D(LNELECTOUTPUT(-1))	-12.428255	4.351857	-2.855851	0.0245
D(LNELECTOUTPUT(-2))	8.445173	4.595203	1.837824	0.1087
D(LNELECTTTARIF)	0.391183	1.173926	0.333226	0.7487
D(LNELECTTARIF(-1))	-0.784343	1.151179	-0.681339	0.5176
D(LNELECTTARIF(-2))	-1.603565	1.097960	-1.460494	0.1875
D(LNREER)	0.095846	0.820526	0.116811	0.9103
D(LNREER(-1))	-1.434688	0.677291	-2.118275	0.0719
D(LNREER(-2))	-0.577674	0.552124	-1.046275	0.3302
D(LNGDP)	0.875751	0.946738	0.925019	0.3857
CointEq(-1)	-0.037769	0.017431	-2.166772	0.0534
Cointeq = LNELECTIMP1 - (-6.6052*LNELECTOUTPUT + 4.8757 *LNELECTTARIF + 0.7104*LNREER + 0.8439 *LNGDP -64.9664)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LELECTOUTPUT	-6.605211	2.869110	-2.302182	0.0548
LNLEHTARIF	4.875714	2.928118	1.665136	0.1398
LNREER	0.710370	0.850855	0.834889	0.4313
LNGDP	0.843879	0.711233	1.186501	0.2741
C	-64.966442	26.082739	-2.490783	0.0415

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586 Previous import of electrical & electronics influences current importation of the product but increase in
587 the production electrical &a electronics reduces importation of the product. It can therefore be said that
588 domestic production of electrical and electronic tend to substitute tithe imported one. In the same vein,
589 lagged values of real effective exchange rate had negative effect on the importation electrical & electronic
590 in Nigeria. The interpretation of this is that real depreciation makes imported electrical & electronics
591 relatively more expensive and therefore, people reduces the demand for it. This result is consistent with

the trend of electrical & electronic overtime because during the marked increase in real effective exchange rate in Nigeria, importation of this product fell considerably.

The model converges to its long run equilibrium state but the speed of adjustment is slow. Specifically, only 3% of the adjustment will take place per year following any shock in the system. This implies that if there is either exchange rate or domestic output shock in the electrical & electronic sector, it will take more than 32 years before the equilibrium will be restored. In the long run, only GDP was found to significantly affect import demand for electrical electronics. In the case of petroleum m products import, 2-year and immediate period of petroleum imports are important determinant of current importation of petroleum product. Also, current real effective exchange rate negatively influences petroleum imports but it eventually had positive effect.

Table 6: Determinants of petroleum import demand (ARDL Cointegration and Long-run form): selected model is ARDL(3, 3, 3, 3, 3, 3); included observation = 28

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPETIMP1(-1))	-0.624652	0.407957	-1.531172	0.2005
D(LNPETIMP1(-2))	-0.207413	0.181412	-1.143322	0.3167
D(LNPETOUTPUT)	0.667641	1.273217	0.524373	0.6277
D(LNPETOUTPUT(-1))	-1.878973	1.019445	-1.843133	0.1391
D(LNPETOUTPUT(-2))	1.803943	1.137647	1.585679	0.1880
D(LNPETTARIF)	0.043793	0.303487	0.144299	0.8922
D(LNPETTARIF(-1))	-1.378609	0.522318	-2.639404	0.0576
D(LNPETTARIF(-2))	-1.911468	0.736026	-2.597012	0.0602
D(LNREER)	-4.777902	1.923936	-2.483399	0.0680
D(LNREER(-1))	0.276297	0.527274	0.524011	0.6280
D(LNREER(-2))	1.571756	0.774730	2.028778	0.1124
D(LNGDP)	0.381879	0.709534	0.538212	0.6190
D(LNGDP(-1))	-1.691336	1.451239	-1.165442	0.3086
D(LNGDP(-2))	1.320666	1.039292	1.270736	0.2727
CointEq(-1)	-0.332760	0.431957	-2.770355	0.0241

$$\text{Cointeq} = \text{LNPETIMP1} - (8.0482 * \text{LNPETOUTPUT} - 15.8740 * \text{LNPETTARIF} + 18.3862 * \text{LNREER} + 3.1743 * \text{LNGDP} - 3.9140)$$

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPETOUTPUT	8.048168	6.788783	1.185510	0.3014
LNPETTARIF	-15.874000	16.583242	-0.957231	0.3927
LNREER	18.386150	18.502948	0.993688	0.3766
LNGDP	3.174266	2.089737	1.518979	0.2034
C	-3.914034	47.255264	-0.082827	0.9380

The speed of adjustment is notable since 33% of adjustment to any shock will be achieved per year, implying that unlike in the eclectically & a electronic sector that take around 33years for the full adjustment to take place, it will only take approximately two years after the current year. This difference in adjustment is one of the reasons why analysis of import demand should be carried out at the product level. The long run result shows that none of the variables significantly affect importation of petroleum product.

Table 7 presents the short and long run determinants of food & beverages import demand. The immediate lag of domestic output of the product, immediate and 2-year lag of real effective exchange rate, current and lag period of GDP are candidates.

Table 7: Determinants of Food & Beverage import demand (ARDL Cointegration and Long-run form): selected model is ARDL(3, 3, 3, 3,0); included observation = 29

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBEVOUTPUT)	-0.081797	2.471035	-0.033102	0.9741
D(LNBEVOUTPUT(-1))	8.164751	3.483030	2.344152	0.0371
D(LNBEVOUTPUT(-2))	-4.174943	2.744511	-1.521197	0.1541
D(LNBEVTARIFF)	-0.442308	0.253351	-1.745831	0.1064
D(LNBEVTARIFF(-1))	0.397088	0.260177	1.526222	0.1529
D(LNREER)	-0.224456	0.274215	-0.818542	0.4290
D(LNREER(-1))	-0.777195	0.389119	-1.997318	0.0690
D(LNREER(-2))	0.663782	0.265116	2.503744	0.0277
D(LNGDP)	0.898181	0.433967	2.069697	0.0607
D(LNGDP(-1))	0.895508	0.413590	2.165207	0.0512
D(LNGDP(-2))	-0.373276	0.383917	-0.972283	0.3501
CointEq(-1)	-0.903447	0.254956	-3.543546	0.0040
Cointeq = LNBEVIMP1 - (0.4881*LNBEVOUTPUT -0.9563*LNBEVTARIFF -1.2459*LNREER + 0.6122*LNGDP + 2.5335)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBEVOUTPUT	0.488093	0.319260	1.528828	0.1522
LNBEVTARIFF	-0.956333	0.305598	-3.129380	0.0087
LNREER	-1.245892	0.342193	-3.640908	0.0034
LNGDP	0.612163	0.259665	2.357514	0.0362
C	2.533494	8.028001	0.315582	0.7577

Tariff is not one of the variables that significantly determine importation of food & beverages, even though the system recognizes its presence. Increase in the domestic production of food & a

beverages leads to more importation of same product. This is unexpected, but it may occur if the two products are complements. Since the products are taken at the third digit, aggregation may becloud the influence of some products that are actually complementary. Increase in real effective exchange rate, that is, real depreciation, reduces importation of food & beverages. This implies that depreciation tend to make imported food &a beverages relatively more expensive and therefore consumers reduces the consumption of the product. Increase in the importation of food &a beverages following increase in GDP is a clear indication that this product is a normal good.

The seeped of adjacent stem tissue of this model is so high that a shock to the system will take less than 2 years ore the system adjust fully. In the long run, real effective exchange rate, tariff and GDP play significant role in determining the importation of food & beverages. Continuous increase in tariff will reduce the purchase of imported food &a beverages. Continuous and consistent increase in GDP will continue to positively influence importation of food & beverages. Also, continuous depreciation of real exchange rate will lead to reduction in the importation of food &a beverages. Interestingly, domestic output did not significantly influence demand for imported food & beverages.

5. Conclusion and policy implications

The study investigates the determinants of selected manufactured product imports in Nigeria. The study is not only interested in the association between manufactured imports and their determinants, but also focused on the nature of magnitude and direction of effects. The theoretical framework utilized was the Keynesian demand theory and the method employed was the autoregressive distributed lag (ARDL) for data on relevant variables spanning 31 years from 1985 to 2016. There is strong association between each of the product import and domestic output of respective product and GDP but there is weak relationship between each of the products and tariff and real effective exchange rate. Real effective exchange rate and tariffs show expected sign for some of the products, such as food &a beverages, electrical &a electronics. This fondly nag was consistent with the works of Adewuyi (2015) where real effective exchange rate was found to negatively influenced imports.

The argument which forms the basis for this study is that domestic output should be a determinant of product import. This argument was empirically established in the case of electrical & electronics, where domestic output of this product have negative effect on own imports. This outcome corroborates the work of Adewuyi (2015) as well. However, in contrast to this study, there was no significant relationship between the domestic production of pert role I'm products and imports of same goods. Also, the effect of domestic output of food &a beverages and imports of same product is positive. This implies that unlike electrical and electronics, domestic output of food &a beverages complements importation of the product.

In the case of real effective exchange rate, import of each of the products was negatively affected by real effective exchange rate. However, the nature of effect differs. Unlike the case of electrical &a electronics where contemporaneous real effective exchange rate influences imports of same product, it will take a year hence before such negative effect takes place in the case of food &a beverages and in 2 years hence, import of that product will be affected positively. Hence it can be concluded that although real effective exchange rate is an important driver of product imports, the sensitivity differ across products, in some it have immediate effect while in some it delays for a year.

Another very important driver of import from the Keynesian point of view is GDP (proxy for national income). Surprising, petroleum and electrical &a electronics did not respond to changes in GDP. But food &a beverages had positive response to GDP. This case of food &a beverages is in line with some studies such as Cakmak eat all (2016) and Englama et al (2013) while the case of the first two products contracts their findings. Thus it is concluded that it not in all case that GDP serve as important variable for import demand, it can be important for some products while it is unimportant for some.

In the same, it is only in the food &a beverages model where tariffs matter for import demand for the product. Other product did not respond to changes in tariffs. The also strengthen the fact that it not reasonable to assume or believe that tariff imposes negligible effect on imports. I. The case of food &a beverages, the effect is significant, notable and negative. The overall conclusion form this study therefor is that drivers of import demand differ across products. Some of these

drivers are significant in some products but insignificant in some. Some of these drivers supports theoretical underpinnings and received evidence while some breaks down.

Following the results of this study, it is recommended that first, since import and domestic output of food & beverages are complements and tariff significantly influences the product, tariff on food and beverages should be revisited. It will be reasonable if tariff on this product could be raised so as to give more protection for the domestic producers. Alternatively, the authorities could provide more incentive for producers in this sector so as to motivate them to increase production. This recommendation also goes for the electrical & electronics sector. Since tariff does not drive import demand for this product, while domestic output reduces importation, the producer should continue to increase production while government should provide an enabling environment.

Second, exchange rate impacts negatively on importation of all the products under study. This is a good sign, however so far as factor input used to produce domestic counterpart of the imports for which exchange rate affects, further depreciation could be counterproductive. What can be done in this case is for the authorities to arrange for special exchange rates for the manufacturing sectors producing products for which it serves as a substitute for imports such as electrical & electronics.

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