**Mathematical and Quantative Methods**

# Aggregate Import Demand and Expenditure Components in Nigeria

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**Abstract:** This study uses disaggregated expenditure components of total national income to determine the behaviour of imports demand in Nigeria using annual time series data and by applying the Johansen-Juselius multivariate cointegration technique tests to find out if the relevant economic variables are cointegrated in the long run. Variables used in the study are volume of imports of goods and services, consumption expenditure, expenditure on investment goods, relative prices and a dummy variable for trade liberalisation policy in Nigeria. The empirical evidence suggests that cointegrating relationship exists among the variables. The error correction estimate reveals that almost all the coefficients of the variables tested came out with a statistically positive signs. Consumption expenditure, export and investment coefficient relates positively with import implying that increase in expenditure on these leads to a significant increase in import. Generally, the result showed that import demand function and expenditure component in Nigeria has a statistically significant relationship.

**Keywords:** Aggregate import demand; Expenditure components; Nigeria; Cointegration; Error Correction

**JEL Classification:** C22; F10; F41

## 1. Introduction

There have been various attempts to examine the linkage between imports and the macro components of aggregate expenditure, namely consumption, public spending, investment and exports (Giovannetti, 1989; Abbott and Seddighi, 1996; Alias and Cheong, 2000; Narayan and Narayan, 2005 and Frimpong and Oteng-Abayie, 2006). In addition to some policy concerns, previous research is also built upon an important econometric drawback of traditional modelling approach. In this regard, the standard import demand model relates the import demand to relative prices and an activity variable namely gross domestic product in most of the cases, and assumes that import content of each macro component of aggregate

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expenditure is the same (see Boylan et al. 1980; Goldstein and Khan, 1985; Asseery and Peel 1991; Arize and Ndubizu, 1992; Bahmani-Oskooee, 1998). It follows that if the different macro components of aggregate expenditure have different import content, then the use of a single demand variable in the aggregate import demand function will lead to aggregation bias (Giovannetti, 1989 and Abbott and Seddighi, 1996). In order to avoid from this problem, the import demand function is estimated as a function of relative prices and disaggregated expenditure components.

In Nigeria, Olayide (1968), Ajayi (1975), Ozo-Eson (1984) and Egwaikhide, (1999) had estimated Nigeria's import demand function. All the above studies employed the traditional approach which uses only domestic income and the relative prices and are therefore conducted in the aggregated level. No attempts, to the best of our knowledge , have been made to use the disaggregated import demand model to estimate the import demand function for Nigeria. Following recent studies by Tang (2003), Ho (2004), Narayan and Narayan, (2005), and Frimpong and Oteng- Abayie, (2006). We use the disaggregated components of domestic income (i.e. final demand expenditure components) together with the standard relative price variable to specify the aggregate import demand model for Nigeria.

The rest of the paper is organized as follows. Section 2 presents recent literature review of the aggregate import demand studies that used the disaggregation approach. Section 3 describes the econometric methodology used and presents the specification of the aggregate import demand model. Section 4 discusses the result while Section 5 concludes the paper.

## 2. Recent Empirical Import Demand Literature

There is plethora of empirical studies that have examined the causal factors of aggregate import demand models. From the empirical literature we surveyed, no study was found that specifically estimates the determinants of disaggregate import demand in Nigeria. It is therefore only logical for us to survey the literature that is directly relevant to the theme chosen for this study. At this point, we focus on reviewing only those studies that have used the disaggregate approach.

Abbott and Seddighi (1996) used the cointegration approach of Johansen and Juselius (1990) and the error correction models of Engel and Granger (1987) to estimate an import demand model for the UK. From their results consumption expenditure had the largest impact on import demand (1.3) followed by investment expenditure (0.3) and export expenditure (0.1). The relative price

variable (the ratio of import price to domestic price) had a coefficient of 20.1.

Mohammed and Tang (2000) also used the Johansen and Juselius (1990) cointegration technique and estimated the determinants of aggregate import demand for Malaysia, over the period 1970- 1998. The results indicated that while all expenditure components had an inelastic effect on import demand in the long run, investment expenditure had the highest correlation (0.78) with imports followed by final consumption expenditure (0.72). Expenditure on exports was found to have the smallest correlation with imports (0.385). They also found a negative (-0.69) and inelastic relationship between relative prices and import demand. All results were found to be statistically significant at the 1 per cent level.

Mohammad *et al*. (2001) examine the long-run relationship between imports and expenditure components of five ASEAN countries (Malaysia, Indonesia, the Philippines, Singapore and Thailand) through Johansen multivariate cointegration analysis (Johansen 1988; Johansen *et al.* 1991). Annual data for the period 1968-1998 are used for the countries (except Singapore, with a shorter period 1974-1998). The disaggregate model, in which the final demand expenditure is split up into three major components, is used. The results reveal that import demand is cointegrated with its determinants for all five countries.

Min *et al.* (2002) estimated South Korea's import demand using the Johansen and Juselius (1990) approach over the 1963-1998 period. They found evidence of long run elastic (1.04) impact of final consumption expenditure on import demand and inelastic (0.49) impact of export expenditure on import demand. Both results were statistically significant at the 1 per cent level.

However on the impact of investment expenditure, while they found it to be negatively related with import demand, it was statistically insignificant. On the impact of prices, they found relative prices negatively impacting import demand at the 1 per cent level of significance.

Tang (2003) estimated China's import demand 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) and final consumption expenditure (0.17). The relative price variable appeared with a coefficient of 20.6, implying that an increase in relative prices induces a 0.6 per cent fall in the demand for imports.

Ho (2004) has also estimated the import demand function of Macao by testing two popular models: (i) aggregate and (ii) disaggregate import demand model with the components of aggregate expenditure using quarterly data over the 1970 to 1986 period. Using JJ-Maximum likelihood cointegration and error correction technique, Ho (2004) found significant partial elasticities of import demand with respect to investment (0.1396), exports (1.4810) and relative prices (-0.3041) with their expected signs implied by the economic theory in the disaggregated model.

Narayan and Narayan (2005) recently 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 indicated a long run cointegration relationship among the variables when import demand is the dependent variable; and import demand to be inelastic and statistically significant at the 1 per cent level with respect to all the explanatory variables in both the long-run and the short-run. The results revealed long run elasticities of 0.69 for both export expenditure and total consumption expenditure respectively, followed by relative prices (0.38) and investment expenditure (0.17).

Fosu and Joseph (2006) studied the behaviour of Ghana's imports during the period 1970-2002 is studied using disaggregated expenditure components of total national income. We use the newly developed bounds testing approach to cointegration and estimated an error correction model to separate the short- and long-run elements of the import demand relationship. The study shows inelastic import demand for all the expenditure components and relative price. In the long-run, investment and exports are the major determinant of movements in imports in Ghana. In the short run household and government consumption expenditures is the major determinant of import demand. Import demand is not very sensitive to price changes

Guncavdi and Ulengin (2008) examined the role of macroeconomic components of aggregate expenditure in determining import demand in Turkey. Along with the empirical assessment, the paper also suggests a theoretical model of import demand, which is built upon a utility maximization of a country subject to budget constraints. The empirical model derived as a dynamic form of linear expenditure system was estimated with quarterly data from the Turkish economy for the period of 1987-2006. The results show that consumption and expenditure are two important demand components in determining imports in the long run whereas only the growth rates of consumption and investment are dominant factors in the short run. Public expenditure appeared to have no significant impact on import demand in Turkey

## 3. Methodology

### 3.1 Model Specification

To carry out this research effectively, there is need to represent the study in a functional form which is thus specified:

M = f (C, I, X, Rp and D) ------------------------------ (1)

Represented in log-linear econometric form:

$$InM_t = \alpha_0 + \beta_1 InC_t + \beta_2 InI_t + \beta_3 InX_t + \beta_4 Rp_t + \alpha_1 D_t + \varepsilon_t \text{----------------} (2)$$

Where

M = Import of goods and services

$C_t$ = Final Consumption expenditure

$I_t$ = Expenditure on Investment goods

$X_t$ = Expenditure on total export of goods and services

$Rp_t$ = Relative Prices (Import Price Index/domestic Price Index)

$D_t$ = Dummy variable for trade liberalization Policy

$\alpha_0$ is the constant term, 't' is the time trend, and 'ε' is the random error term.

**In** represents natural logarithm

### 3.2 Data Description and Source

The sample period runs from 1970 to 2005, to allow for a wide range of stability test. The data source is from the IFS CD ROM 2007. The data used in this work include Measure of the volume of Import of goods and services ($M_t$); the final consumption expenditure ($C_t$) which is the sum of household and government final expenditure; Expenditure on Investment goods ($I_t$), proxied by Gross capital formation; Expenditure on total export of goods and services ($X_t$); Relative Prices ($Rp_t$), which is a proxy for Import price Index (proxied by USA export Price Index) as a Percentage of Domestic Price Index; and Dummy variable ($D_t$) represented by Zero (0) for the period before trade liberalization (1970 – 1985) and One (1) for the period after trade liberalization (1986 to date).

### 3.3 Estimation Techniques

The technique used in this study is the cointegration and error-correction modeling technique. To estimate the cointegration and error-correction, three steps are required: these are testing for order of integration, the cointegration test and the error correction estimation.

#### *3.3.1 Unit Root Test*

The unit root test involves testing the order of integration of the individual series under consideration. Several procedures has been developed for the test of order of integration including the choice for this study: Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series. The general form of ADF test is estimated by the following regression

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{i=1}^{n} \alpha \Delta y_i + e_t \quad \text{--------------------- (3)}$$

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{n=1}^{n} \alpha_1 \Delta y_i + \delta_t + e_t \quad \text{-------------------------- (4)}$$

Where:

Y is a time series, t is a linear time trend, Δ is the first difference operator, $\alpha_0$ is a constant, n is the optimum number of lags in the dependent variable and e is the random error term the difference between equation (1) and (2) is that the first equation includes just drift. However, the second equation includes both drift and linear time trend pp.

$$\Delta y_t = \alpha_0 + \alpha y_{t-1} + e_t \tag{5}$$

### *3.3.2. Cointegration Test*

This is the testing of the presence or otherwise of cointegration between the series of the same order of integration through forming a cointegration equation. The basic idea behind cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary (Hall and Henry, 1989). A lack of cointegration suggests that such variables have no long-run relationship: in principal they can wander arbitrarily far away from each other (Dickey et. al., 1991). We employ the maximum-likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991). Specifically, if $Y_t$ is a vector of n stochastic variables, then there exists a p-lag vector auto regression with Gaussian errors. Johansen's methodology takes its starting point in the vector auto regression (VAR) of order P given by

$$y_t = \mu + \Delta_1 y_{t-1} + --- + \Delta p \ \ y_{t-p} + \varepsilon_t \tag{6}$$

Where

$Y_t$ is an nx1 vector of variables that are integrated of order commonly denoted (1) and $\varepsilon_t$ is an nx1 vector of innovations.

This VAR can be rewritten as

$$\Delta y_t = \mu + \eta_{yt-1} + \sum_{i-1}^{p-1} \tau_i \Delta y_{t-1} + \varepsilon_t \tag{7}$$

Where

$$\prod = \sum_{i-1}^{p} A_{i-1} \quad \text{and} \quad \tau_i = -\sum_{j=i+1}^{p} Aj$$

To determine the number of co-integration vectors, Johansen (1988, 1989) and Johansen and Juselius (1990) suggested two statistic test, the first one is the trace test ($\lambda$ trace). It tests the null hypothesis that the number of distinct cointegrating vector is less than or equal to q against a general unrestricted alternatives q = r. the test is calculated as follows:

$$\lambda \text{ trace ( r) } = -T \sum_{i=r+1} \text{In} \left(1 - \hat{\lambda}_t\right) \tag{8}$$

Where

T is the number of usable observations, and the $\lambda_{1,s}$ are the estimated eigenvalue from the matrix.

The Second statistical test is the maximum eigenvalue test ($\lambda$ max) that is calculated according to the following formula

$$\lambda \max (r, r + 1) = -T \text{ In } (1 - \lambda r + 1) \tag{9}$$

The test concerns a test of the null hypothesis that there is r of co-integrating vectors against the alternative that r + 1 co-integrating vector.

### *3.3.3 Error Correction Model*

This is only carried out when cointegration is proven to exist; it requires the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model from the short-run to the long-run. We represent equation (2) with an error correction form that allows for inclusion of long-run information thus, the error correction model (ECM) can be formulated as follows:

$$\Delta InM_t = \alpha_0 + \sum_{t=1}^{n} \beta_{1t} \Delta InC_{t-1} + \sum_{i-1}^{n-1} \beta_{2t} \Delta InI_{t-1} + \sum_{i-1}^{n-1} \beta_{3t} \Delta InX_{t-1} + \sum_{i-1}^{n-1} \beta_{4t} \Delta InRp_{t-1} + \sum_{i-1}^{n-1} \alpha_{1t} \Delta D_{t-1} + \lambda Ec_{t-1} + \varepsilon_t \quad (10)$$

Where

$\Delta$ is the first difference operator

$\lambda$ is the error correction coefficient and the remaining variables are as defined above.

# 4. Empirical Result

## 4.1 Stationarity Test

The Augmented Dickey Fuller (ADF) and Phillips – Perron (PP) tests were applied to find the existence of unit root in each of the time series. The results of both the ADF and PP tests are reported in Table 1 and 2.

**Table 1. Unit Root test for Stationarity at Levels**

| Variables | ADF (Intercept) | ADF (Intercept and Trend) | PP (Intercept) | PP (Intercept and Trend) |
|---|---|---|---|---|
| LM | -0.138 (-3.632)* | -1.470 (-4.243)* | -0.220 (-3.632)* | -1.700 (-4.243)* |
| LCE | 0.245 (-3.639)* | -2.038 (-4.252)* | 0.481 (-3.646)* | -1.667 (-4.243)* |
| LI | -0.322 (-3.639)* | -1.987 (-4.252)* | -0.255 (-3.632)* | -1.673 (-4.243)* |
| LX | -0.232 (-3.632)* | -2.099 (-4.243)* | -0.143 (-3.632)* | -2.037 (-4.243)* |
| LRp | 0.170 (-3.639)* | -2.688 (-4.252)* | 0.874 (-3.646)* | -2.063 (-4.243)* |
| D | -1.092 (-3.632)* | -1.859 (-4.243)* | -1.092 (-3.632)* | -1.921 (-4.243)* |

**Note:** Significance at 1% level. Figures within parenthesis indicate critical values.

Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.

*Source: Author's Estimation using Eviews 6.0.*

The result in table 1 reveals that all the variables (except LINV which was stationary at ADF and PP Intercept & Trend) were not stationary in levels. This can be seen by comparing the observed values (in absolute terms) of both the ADF and PP test statistics with the critical values (also in absolute terms) of the test statistics at the 1%, 5% and 10% level of significance. Result from table 1 provides some evidence of non stationarity. Therefore, the null hypothesis is accepted for LGDP and LEX (but rejected for LINV in Intercept & Trend) and it is sufficient to conclude that there is a presence of unit root in the variables at levels, following from the above result, all the variables were differenced once and both the ADF and PP test were conducted on them, the result as shown in table 2

**Table 2. Unit Root test for Stationarity at First Difference**

| Variables | ADF (Intercept) | ADF (Intercept and Trend) | PP (Intercept) | PP (Intercept and Trend) |
|---|---|---|---|---|
| LM | -4.531(-3.639)* | -4.458(-4.252)* | -4.531(-3.639)* | -4.458(-4.252)* |
| LCE | -3.950(-3.639)* | -3.952(-3.548)** | -4.000(-3.639)* | -3.914(-3.548)** |
| LI | -3.766(-3.639)* | -3.704(-3.548)** | -3.787(-3.639)* | -3.726(-3.548)** |
| LX | -7.232(-3.639)* | -7.144(-4.252)* | -7.232(-3.639)* | -7.144(-4.252)* |
| LRp | -2.709(-2.614)*** | -2.824(-4.252)* | -2.570(-3.639)* | -2.720(-4.252)* |
| D | -5.830(-3.639)* | -5.749(-4.252)* | -5.831(-3.639)* | -5.749(-4.252)* |

**Note:***,** and *** denotes significance at 1%, 5% and 10% levels, respectively. Figures within parenthesis indicate critical values.

Mackinnon (1991) critical value for rejection of hypothesis of unit root applied.

*Source: Author's Estimation using Eviews 6.0.*

The table reveals that all the variables were stationary at first difference, on the basis of this, the null hypothesis of non-stationarity is rejected and it is safe to conclude that the variables are stationary. This implies that the variables are integrated of order one, i.e. 1(1).

### 4.2. Cointegration Test

The result of the cointegration condition (that is the existence of a long term linear relation) is presented in Table 3.1 and 3.2 below using methodology proposed by Johansen (1990):

**Table 3.1. Unrestricted Cointegration Rank Test (Trace)**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.665388 | 123.9087 | 95.75366 | 0.0002 |
| At most 1 * | 0.627052 | 86.68604 | 69.81889 | 0.0013 |
| At most 2 * | 0.481103 | 53.15132 | 47.85613 | 0.0147 |
| At most 3 * | 0.437030 | 30.84562 | 29.79707 | 0.0377 |
| At most 4 | 0.274156 | 11.31162 | 15.49471 | 0.1930 |
| At most 5 | 0.012199 | 0.417333 | 3.841466 | 0.5183 |

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

**Table 3.2. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)**

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None | 0.665388 | 37.22268 | 40.07757 | 0.1013 |
| At most 1 | 0.627052 | 33.53472 | 33.87687 | 0.0549 |
| At most 2 | 0.481103 | 22.30570 | 27.58434 | 0.2051 |
| At most 3 | 0.437030 | 19.53400 | 21.13162 | 0.0824 |
| At most 4 | 0.274156 | 10.89429 | 14.26460 | 0.1596 |
| At most 5 | 0.012199 | 0.417333 | 3.841466 | 0.5183 |

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 3.1 rejected null hypothesis that there were no cointegrating vectors among the system. The result of the trace statistic test in table 3.1 indicates the existence of 4 cointegrating equations. Having ascertained that the variables are non-stationary at their levels but stationary at first difference and that these are evidence of cointegrating vector, the stage is set to formulate the error-correcting model, the reason for this is to recover the long-run information lost by differencing the variables.

### 4.3. Error correction Result and Analysis

Dependent Variable: DLM(-1)

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.188653 | 0.038760 | -4.867235 | 0.0003 |
| DLM(-2) | -0.895588 | 0.149008 | -6.010338 | 0.0000 |
| DLM(-3) | -0.413401 | 0.144777 | -2.855427 | 0.0135 |
| DLCE(-1) | 0.310305 | 0.163145 | 1.902017 | 0.0796 |
| DLCE(-2) | 0.379738 | 0.148630 | 2.554926 | 0.0240 |
| DLCE(-3) | 0.094489 | 0.149735 | 0.631041 | 0.5390 |
| DLI(-1) | 0.712721 | 0.112951 | 6.310024 | 0.0000 |
| DLI(-2) | 0.539503 | 0.129752 | 4.157963 | 0.0011 |
| DLI(-3) | 0.352429 | 0.156794 | 2.247724 | 0.0426 |
| DLX(-1) | 0.180884 | 0.058938 | 3.069084 | 0.0090 |
| DLX(-2) | 0.207019 | 0.068782 | 3.009776 | 0.0100 |
| DLX(-3) | 0.184408 | 0.052572 | 3.507711 | 0.0039 |
| DLRP(-1) | 0.020998 | 0.232225 | 0.090420 | 0.9293 |
| DLRP(-2) | -0.431134 | 0.295117 | -1.460893 | 0.1678 |
| DLRP(-3) | 0.015332 | 0.202227 | 0.075813 | 0.9407 |
| DD01(-1) | 0.474258 | 0.113323 | 4.185010 | 0.0011 |
| DD01(-2) | 0.504098 | 0.126708 | 3.978435 | 0.0016 |
| DD01(-3) | 0.286475 | 0.156899 | 1.825860 | 0.0909 |
| ECM(-1) | -0.843324 | 0.132042 | -6.386781 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.972785 | Mean dependent var | 0.252383 |
| Adjusted R-squared | 0.935103 | S.D. dependent var | 0.329282 |
| S.E. of regression | 0.083884 | Akaike info criterion | -1.832046 |
| Sum squared resid | 0.091475 | Schwarz criterion | -0.961765 |
| Log likelihood | 48.31274 | Hannan-Quinn criter. | -1.543573 |
| F-statistic | 25.81555 | Durbin-Watson stat | 1.241360 |
| Prob(F-statistic) | 0.000000 | | |

As indicated in the result above, the error correction term appears with a statistically significant coefficient with the appropriate negative sign as is required for dynamic stability. This follows well with the validity of an equilibrium relationship among the variables in the cointegrating equation. This term provides clear evidence of the significant relationship of Import demand and expenditure components in Nigeria. The estimated coefficient indicates that about 84 percent of the errors in the short run are corrected in the long run. The error correction estimate shown in the table above reveals that almost all the coefficients of the variables tested above came out with a statistically positive signs. Consumption expenditure, export and investment coefficient relates positively with import implying that increase in expenditure on these leads to a significant increase in import. Except the coefficient of the second lag of relative price, the first and the third lag coefficient still indicated positive prices leading to the finding that the higher the relative price compared to the price of import, the higher the volume of both ceteris paribus. The dummy variable used to represent before and after trade liberalization in Nigeria came out statistically significant, which explains the fact that periods of liberalization have effect on import.

A further look at Table 4.3 indicates that the error correction model has a high coefficient of determination, this can been seen from R-squared of 97 percent and the adjusted R-squared of 93 percent. The R-squared measured the fitness of the regression result and show the percentage of variation in the dependent variable that was accounted by the variation in the explanatory variables. The Durbin-Watson statistic which measures autocorrelation shows that the error correction model is free from the problem of serial correlation due to its value (1.24). As a result of this, the estimated error correction model can be relied upon to make inference on the use of disaggregated expenditure components of total national income to determine the behaviour of imports demand in Nigeria

Generally, the result showed that import demand function and expenditure component in Nigeria has a statistically significant relationship.

## 5. Conclusions

The purpose of this study is to analyze Aggregate Import Demand and Expenditure component in Nigeria using Cointegration and Error Correction test. Estimating the import demand function, expenditure components like consumption expenditure, expenditure on investment, expenditure on the export of goods and services, relative price (proxied by ratio of import and domestic price index) and a dummy variables which represented before SAP as zero (0) and after SAP as 1(1). The series test was carried out using Augmented and Dickey-Fuller (ADF) and Phillip-Perron (PP) test to investigate the presence or otherwise of unit root in the variables used in the study. Stationarity of the variables was achieved at first difference which indicates the fact that the variables were integrated of other 1 (1). Johansen and Juselius cointegration test was carried out to find out the presence or otherwise of cointegration. It was observed the four (4) cointegrating vectors were found in trace statistics, leading to the conclusion that a long-term relationship exists among the variables so tested. To correct the long term effect of the cointegration, Error Correction Model (ECM) was included in estimating the equation. The coefficient of the error correction came out with a negative and statistical significant value as is required for dynamic stability. This was agreed to follows well with the validity of an equilibrium relationship among the variables in the cointegrating equation. Also the term provided clear evidence of the significant relationship of Import demand and expenditure components in Nigeria. The estimated coefficient indicated that about 84 percent of the errors in the short run were corrected in the long run. It was also observed from the estimated result that the different expenditure components used in the study were statistical significant. This leads to the conclusion that there exist an empirical of expenditure relationship between aggregate import demand and expenditure components in Nigeria

## 6. References

Abbott, A.J. and Seddighi, H.R. (1996). Aggregate Imports and Expenditure Components in the UK: an Empirical Analysis. *Applied Economics*, Vol. 28, pp. 1119-25.

Agbola F.W. and M.Y. Damoense (2005). Time-series estimation of import demand functions for pulses in India. *Journal of Economic Studies*, Vol. 32 No. 2, 2005, pp. 146-157. Emerald Group Publishing Limited

Ajayi, S.I. (1975). Econometric analysis of Import demand function for Nigeria". *The Nigerian Journal of Economic and Social Studies*, vol. 17, no. 3: 169–182.

Alias, M.H. and T.T. Cheong (2000). Aggregate Expenditure Components in Malaysia. *ASEAN Economic Bulletin* 17 (3): 257-269.

Arize, A. and G. Ndubizu (1992). Cointegration, Error-correction Representation and Import Demand Function with Implications for International Finance and Accounting. *Review of Quantitative Finance and Accounting*, December: 359-376.

Armington, P.S. (1969). *A Theory of Demand for Products Distinguished by Place of Production*. *IMF Staff Papers* 16: 159-176.

Asseery, A. and D.A. Peel (1991). Estimates of a Traditional Aggregate Import Demand Model for Five Countries. *Economics Letters*, April: 435-439.

Bahmani-Oskooee, M. (1998). Cointegration Approach to Estimating the Long-Run Trade Elasticies in LDCs. *International Economic Journal* 12 (3): 89-96.

Boylan, T.A., M.P. Cuddy, and I. O'Muircheataigh (1980). The Functional Form of the Aggregate Import Demand Equations. *Journal of International Economics*, November: 561-566.

Carone, G. (1996). Modeling the US demand for imports through cointegration and error correction. *Journal of Policy Modeling*. Vol. 18, pp. 1-48.

Central Bank of Nigeria CBN. *Annual Report and Statement of Accounts*, various issues. Lagos.

Charemza, W.W. and D.F. Deadman (1992). *New Directions in Econometric Practice*. Cambridge: Edward Edgar.

Deaton, A. and J. Muellbauer (1980). *Economics and Consumer Behaviour*. Cambridge: Cambridge University Press.

Egwaikhide, F.O. (1997). Import substitution industrialisation in Nigeria: A selective review. *The Nigerian Journal of Economic and Social Studies*, vol. 39: 183–203.

Egwakhide, F.O. (1999). Determinants of Imports in Nigeria: A Dynamic specification. *AERC Research Paper 91*.

Frimpong, J.M. and E.F.Oteng-Abayie (2006). Aggregate Import Demand and Expenditure Components in Ghana: An Econometric Analysis. *MPRA Paper No. 599*. (online at http://mpra.ub.uni-muenchen.de/599/).

Giovannetti, G. (1989). Aggregate imports and expenditure components in Italy: an econometric analysis. *Applied Economics*, Vol. 21, pp. 957-71.

Goldstein, M. and Khan, M. (1985). Income and Price Effects in Foreign Trade. *Handbook of International Economics, Vol. 2* (Jones, R. and Kenen, P. Ed.). Amsterdam and New York, North-Holland, Elsevier, pp1041-1105.

Guncavdi. O and Ulengin. B (2008). Aggregate Imports and Expenditure Components in Turkey: Theoretical and Empirical Assessment' *MPRA Paper* No. 9622, (online at http://mpra.ub.uni-muenchen.de/9622/).

Ho, W.S. (2004). Estimating Macao's Import Demand Functions. *Monetary Authority of Macao*.

Hong, P. (1999). Import Elasticities Revisited. *DESA Discussion Paper Series*, ST/ESA/1999/DP.10, Department of Economic and Social Affairs, The United Nations.

Johansen (1988). Statistical Analysis of Cointegrating Vectors. *Journal of Economic Dynamic and Control*, Vol.12, pp. 231-54.

Johansen and Juselius **(**1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications the Demand for Money. *Oxford Bulletin of Economics and Statistics*, Vo1 52, No. 2, 169-210.

Johansen, *et al*, (1991). Estimation and Hypothesis Testing of Cointegration Vector Autoregressive Models. *Econometrica*, Vol. 59, 1551-1580.

Khan, M.S. (1974). Import and export demand in developing countries. *IMF Staff Papers*, vol. 21: 678–693.

Khan, M.S. and Ross, K.Z. (1977). The Functional Form of the Aggregate Import Demand Equation. *Journal of International Economics*, May: 149-160.

Magee, S.P. (1975). Prices, income and foreign trade: a survey of recent economic studies. In Kenen, P.B. (Ed.). *International Trade and Finance: Frontiers for Research*. Cambridge University Press, Cambridge.

Min, B.S., Mohammed, H.A. and Tang, T.C., (2002). An analysis of South Korea's import demand. *Journal of Asia Pacific Affairs*, Vol. 4, pp. 1-17.

Mohammed, H.A. and Tang, T.C., (2000). Aggregate imports and expenditure components in Malaysia: a cointegration and error correction analysis. *ASEAN Economic Bulletin*, Vol. 17, pp. 257-69.

Mohammed, H.A., Tang, T.C., and J. Othman (2001). Aggregate Import Demand and Expenditure Components in five ASEAN Countries: An Empirical Study. *Jurnal Ekonomi Malaysia*, Vol. 35, 37-60.

Narayan, P.K. (2004). Reformulating critical values for the bounds F-statictics approach to cointegration: an application to the tourism demand model for Fiji. *Department of Economics Discussion Papers N0.02/04*, Monash University, Melbourne.

Narayan, P.K. and Narayan, S., (2005). An empirical analysis of Fiji's Import Demand Function. *Journal of Economic Studies*, Vol. 32 No. 2, 2005, pp. 158-168. Emerald Group Publishing Limited

Olayide, S.O. (1968). Import demand model: An econometric analysis of Nigeria's import Trade. *The Nigerian Journal of Economic and Social Studies*, vol. 10, no. 3: 303–319.

Ozo-Eson, P.I. 1984. Determinants of imports demand in Nigeria: A monetary approach. *The Nigerian Journal of Economic and Social Studies*, vol. 26, no. 1: 73–83.

Phillips, P.C.B. and Perron, P. (1988). *Testing for a Unit Root in Time Series Regression*. Biometrika, 75, 335–346.

Senhadji, A. (1998). Time-series estimation of structural import demand equations: a crosscountry analysis. *IMF Staff Papers*, Vol. 45 No. 2, pp. 236-68.

Sinha, D. (1997). Determinants of import demand in Thailand. *International Economic Journal*, Vol. 11, pp. 73-83.

Tambi N. E. (1998). Trade liberalization effects on commodity imports in Cameroon. *Journal of Economic Studies*, Volume 25 Number 3 1998, pp. 193-202.

Tang, T.C. (2003). An empirical analysis of China's aggregate import demand function. *China Economic Review*, Vol. 12 No. 2, pp. 142-63.