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Manufacturing Exports and Import of Capital Goods Nexus: the Nigeria's Case

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Abstract

The declining share of manufactured export in total export in Nigeria has continued to raise some concerns. The apprehension is based on the preference of the sector promote economic growth. Among others, one of the factors that could be responsible for this is poor technological capacity, hence the need for importation of foreign capital goods. This paper used the UECM-Bounds test and Error Correction Model (ECM) based on 1970 and 2012 data to obtain evidence for the long-run and short-run relationship between manufacturing export, capital import, human capital and real effective exchange rate in Nigeria. Findings revealed that manufacturing export, capital import, human capital and real effective exchange rate are cointegrated. The results further showed that capital import impede manufacturing export in the both short and long-run in Nigeria.

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1. Introduction

Nigeria's total export to the World witnessed an exceptional increase in the last couple of decades. It increased from $1.32 billion in 1970 to $107.3 billion in 2012. This phenomenal increase however, has been at the expense of the manufacturing sector. Specifically, while the share of oil in total export increased from 2.58% in the 1970 to 96.5% in 2012 that of non-oil declined from 97.4% to 3.45% in 2012. The dominance of oil export is not a healthy one for the country, considering the volatility and instability of oil prices at the international markets. Especially that oil exports account for over 90% of the country's total revenue generation. It is equally unhealthy to observe that not only was non-oil export declining, but also, the share of manufacturing sector also declined consistently in the same period. For instance, the share of manufacturing sector in total export declined from 3.1% in 1970 to 0.75% in 2012. This appalling situation is a source of concern for a nation that seeks to become the 20th economy in the World in 2020.

A number of oil producing countries like Indonesia, Malaysia, and Syria have been able to diversify their economies in the past few decades. It becomes imperative to identify the factors militating against the performance of the manufacturing sector in Nigeria outside the effects of the oil sector. Onuoha (2009) identified some of these factors to include: low level of technology, high cost of operation, poor infrastructure, finance, competition from imported goods, limited scope of operation etc. The low level of technology and high cost of operation are very difficult to address domestically. Poor technological capacity will require reliance on importation of foreign and capital goods. This undoubtedly will result to high cost of production.

Countries that have reached high level of economic development seem to have higher equipment investment rates. However, most of the world capital goods are produced in a small number of research and development (R&D)-intensive countries, while the rest of the world generally imports its capital equipment (De Long and Summers, 1991). The importance of the imports of capital goods by developing countries cannot be over stressed, basically for the international spillovers effects from developed countries. Most of developing countries rely on imports of capital goods, which can boost national productive capacity by increasing total factor productivity. Moreover, capital import can also drive structural changes and increase competitiveness in the world market. The quality of imported capital stocks differs with its composition, and thus the overall contribution to growth is different across countries (Caselli and Wilson, 2004).

This study examined the relationship between capital goods import and export of manufactured goods Nigeria. Aside the fact none of such study existed for Nigeria, the present examined the relationship between capital import and manufacturing exports, as against the aggregate export and imports that dominated previous studies. The ARDL-ECM model, also known as "bounds testing for cointegration", proposed by Pesaran et al (2001) was used instead of granger causality and VECM commonly utilized previously. Although, Jiranyakul (2012) had previously used ARDL-ECM model to examine the relationship between manufacturing exports and imports of capital good in Thailand, empirical evidence for the Nigerian case was desirable. This study become justified, particularly that the results obtained is at variance with the findings of Jiranyakul (2012).

Several studies have sought to examine the link between aggregate export and import; such studies include Tang (2005), Konya and Singh (2008), Uddin (2009), and Alias *et al.* (2009). While Tang (2005), Konya and Singh (2008) concluded that long run relationship does not exist between export and import for Malaysia and India respectively, which indicate a violation of their international budget constraint, Uddin (2009), and Alias *et al.* (2009) had respectively obtained long run relationship for Bangladesh and Malaysian. Similarly, Rahman (2011) obtained significant relationship between exports and imports for Indonesia and Malaysia.

Empirical efforts at establishing the relationship between export and exports at sectoral level have been very limited. For instance, Jiranyakul (2012) examined the relationship between manufacturing exports and imports of capital good in Thailand. His results support causality from imports to growth rate of manufacturing export. Also, on the impact of imported capital on export performance, Veeramani (2011) analyzed the type of intermediate goods and capital equipment a country imports. The study found that the productivity level associated with a country's imports leads to a faster growth rate of income per capita in the subsequent years and vice versa. Habiyaremye (2013) used an imported input growth model to analyze how the importation of capital goods contributes to export diversification. The results showed that imported machines and equipment have increase manufacturing export after 1-2 years following the investment.

After this introductory section, succeeding section provided the theoretical framework for the study and equally discussed the methodology for the study. The empirical analysis was presented in section 3, while concluding remarks was in the last section.

2. Theoretical Framework and Methodology

In providing the theoretical framework for the interconnection between manufacturing export and capital goods imports, the standard trade theory is adopted. It showed that imports and exports are the product of relative resource endowments and consumer preferences. This linkage was pioneered by Husted (1992). The theory gives the individual current-period budget constraint as

$$C_0 = Y_0 + B_0 - I_0 - (1+ r)\, B_{-1}, \tag{1}$$

where C_0 is current consumption; Y_0 is output, I_0 is investment, r is the one-period world interest rate, B_0 is the international borrowing, and $(1 + r_0)B$-1 is the historically given initial debt. An empirically testable model was then developed from equation (1):

$$X_t = \alpha + \beta M_t + \varepsilon_t \tag{2}$$

where M_t is imports of goods and services and X_t is exports of goods and services. The intertemporal budget constraint is stable when cointegration exists between imports and exports. Arising from equation (2) this paper followed Jiranyakul (2012) to estimate equation (3). The equation expresses capital impact as a determinant of manufacturing export. This is the case of developing countries that do not have the capacity to produce capital goods. Equation (3) establishes the relation between capital goods import and manufacturing export. And in line with

Jiranyakul (2012), human capital, labour force growth and real effective exchange rate were included as control variables.

$$mx_t = \alpha + \beta mcg_t + \pi hc_t + \infty lfg_t + \Omega reer_t + \varepsilon_t \quad (3)$$

Where mx_t represents export of manufacturing exports, mcg_t is capital goods imports, hc_t is human capital, lfg_t is the labor force growth and $reer_t$ is the real effective exchange rate. α is the constant, ε is the error term, while $\beta, \pi, \infty, \Omega$ are the coefficients. It is theoretically expected that capital goods import will have positive impact on manufacturing export, human capital, labour force growth are equally expected to have positive impact on manufacturing export.

The ARDL model specification is used to empirically analyze the functional forms in equation (4). The Autoregressive Distributed Lag (ARDL) co-integration test popularly known as the bound test shows the long-run relationships and dynamic interactions among manufacturing export, capital goods import and other control variables. The importance of this method is that it allows for the estimation of the long-run and short run parameters of the model.

The ARDL estimable model is specified as:

$$\Delta mx_t = \delta_0 + \delta_1 mx_{t-i} + \delta_2 mcg_{t-i} + \delta_3 hc_{t-i} + \delta_4 lfg_{t-i} + \delta_5 reer_{t-i} +$$

$$\sum_{i=1}^{j} \delta_{6i} \Delta mx_{t-i} + \sum_{i=1}^{j} \delta_{7i} \Delta mcg_{t-i} + \sum_{i=1}^{j} \delta_{8i} \Delta hc_{t-i} + \sum_{i=1}^{j} \delta_{9i} \Delta lfg_{t-i} + \sum_{i=1}^{j} \delta_{10i} \Delta reer_{t-i} + \varepsilon_t \quad (4)$$

Δ is first differencing operator while ε = white noise disturbance error term, while other variables remained as defined previously.

The bound test approach for the long-run relationship between manufacturing export and other variables is based on the Wald test (F statistic), by imposing restrictions on the long-run estimated coefficients of one period lagged level of manufacturing export, capital goods imports, human capital, labor force growth and real effective exchange rate be equal to zero, that is, Ho: $\delta_1=\delta_2=\delta_3=\delta_4=\delta_5= 0$ for eqn. 4. The F-statistic calculated is then compared to the tabulated critical value in (Pesaran (2001) to see if the calculated F-statistic is higher than tabulated lower and upper bound asymptotic critical values at 5% and 1% significant levels. The error correction model was used to capture the speed of adjustment of saving rate model and it also reveals the short-run determinant of saving rate. Thus, this is expressed below:

$$\Delta mx_t = \delta_0 + \sum_{i=1}^{j} \delta_{1i} \Delta mx_{t-i} + \sum_{i=1}^{j} \delta_{2i} \Delta mcg_{t-i} +$$

$$\sum_{i=1}^{j} \delta_{3i} \Delta hc_{t-i} + \sum_{i=1}^{j} \delta_{4i} \Delta lfg_{t-i} + \sum_{i=1}^{j} \delta_{5i} \Delta reer_{t-i} + \delta_6 ect_{t-1} + \omega_t \quad (5)$$

Where: ect_{t-1} = the error correction term lagged for one period and δ = the coefficients for measuring speed of adjustment in equation (5).

The annual data covering the period of 1970-2012 sourced from World Development Indicator (WDI) 2013 and World Integrated Trade Solution (WITS) 2013.

3. Empirical Analysis

The result of the bounds test is presented in Table 1, it showed that the F-Statistics computed for equation (4) was 13.61. The computed value is higher than the upper bounds critical values for 5% significant level (5.73) and 1% significance level (7.84). The implication of this is that capital import, manufacturing export, human capital, labour force growths and real effective exchange rate are co-integrated. It can therefore be inferred that based on this that the long run relationship exist between manufacturing export, capital import, human capital, labour force growth and real effective exchange rate.

Table 1: ARDL bound test result for equation (4)

	Equation 4
	SIC Lags = 1
Computed F-Statistic:	13.61
1% critical bound value	6.84
Lower:	7.84
Upper:	
5% critical bound value	4.94
Lower:	5.73
Upper:	

Notes: Asymptotic critical value bounds are obtained from Table C1.iii: Case III: unrestricted intercept and no trend for k=1 (Pesaran, et. al 2001, p300).

Table 2: The Estimated UECM for the Saving Function

Variable	Coefficient	t-Statistic
C	-13.326	-3.658***
mx_{t-i}	-0.5103	-2.261**
mcg_{t-i}	-0.0192	-3.108***
hc_{t-i}	0.0033	0.778
lfg_{t-i}	1.9508	1.634
$reer_{t-i}$	0.0930	2.428**
Δmx_{t-i}	-0.0641	-0.317
Δmcg_{t-i}	-.1288	-0.580
Δhc_{t-i}	-0.0207	-1.616
Δlfg_{t-i}	1.2501	2.142***
$\Delta reer_{t-i}$	-0.1997	-2.870**

Notes: (***) (**) and (*) indicates 1%, 5% and 10% significance levels respectively. R-squared: 0.68, Adjusted R-squared: 0.56, Durbin Watson Statistics: 1.771 and Prob (F-Statistic): 0.013.

The result further indicated that manufacturing exports decline as capital import increases in Nigeria. Consequent upon this finding, the impact of capital import, human capital, labour force growth and real effective exchange rate was estimated using the error correction model. This was with the view of determining the short run impact of capital import and other control variables on manufacturing export. The analysis was also aimed at establishing the speed adjustment of the model to equilibrium.

The result of the error correction model is presented in Table 3. The result reveal that the lagged value of the residual (ect_{t-1}) is negative (-1.49) and statistically significant (0.001). The result showed that approximately 149% of the discrepancy in the previous year is adjusted for by the current year. The result further imply that changes in the values of capital import (Δmcg), labour force growth (Δlfg), and real effective exchange rate ($\Delta reer$) impact on changes in manufacturing exports (Δmx). Short run human capital does not impact on manufacturing export in Nigeria. In addition to the above results, the CUSUM and CUSUM square parameter stability test was conducted. Figure 4 and 5 show that the estimated parameter are stable during the sample period 1970-2012.

Table 3: Manufacturing Export Short-run Equation Result

Variable	Coefficient	t-Statistic
Δmcg	-0.045	-2.149**
Δlfg	0.7464	2.354***
$\Delta reer$	0.239	2.214***
Δmcg_{t-1}	-0.116	-1.968**
Δhc_{t-1}	0.005	1.002
Δlfg_{t-1}	5.436	2.381***
ect_{t-1}	-1.496	-9.587**

R^2 = 0.68; Adj R^2 = 0.56; DW Stat = 1.91; Prob (F-Stat) = 0.0001
Note: (***), (**) and (*) indicates 1%, 5% and 10% significance level respectively

Figure 4: Stability of the estimated coefficients of equation (CUSUM)

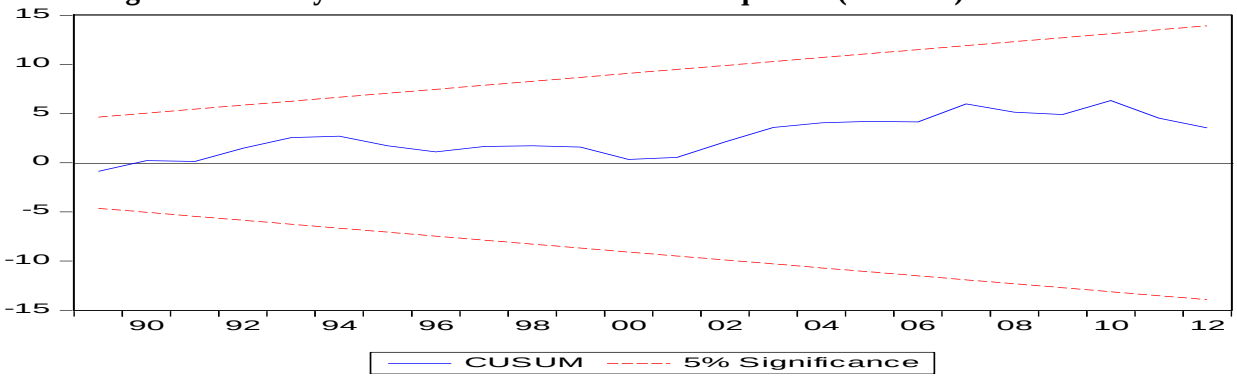
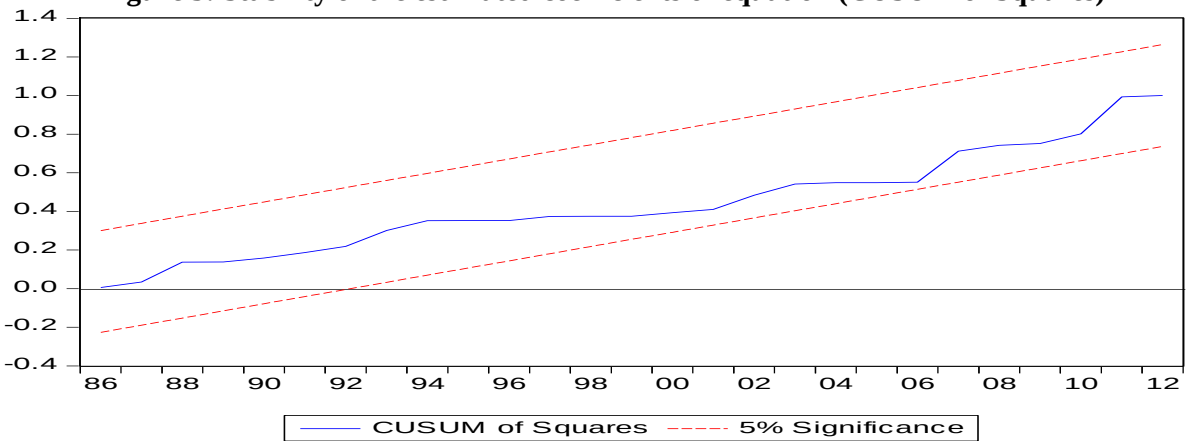


Figure 5: Stability of the estimated coefficients of equation (CUSUM of Squares)



4. Conclusion Remarks

The declining share of manufactured export in total export in Nigeria has continued to raise some concerns. Among others, one of the factors that could be responsible for this is poor technological capacity, hence the need for importation of foreign capital goods. This paper used the UECM-Bounds test and Error Correction Model (ECM) to obtain evidence for the long-run and short-run relationship between manufacturing export, capital import, human capital and real effective exchange rate in Nigeria. Findings revealed that manufacturing export, capital import, human capital and real effective exchange rate are cointegrated. The results showed that capital import impede manufacturing export in the both short and long-run in Nigeria.

The implication of the result is that the increasing capital import to the country has not been channeled towards the manufacturing sector. Greater proportion of capital import must have been consumed in the oil sector that supplies over 96% of the country's export. The quality of imported capital stocks differs with its composition. It connotes therefore that the contribution to economic growth and exports may be felt more by the sector that receives greater proportion of the capital imports. The policy lesson therefore, is that, efforts should be made to import capital goods that could be used in the manufacturing sector to salvage the dwindling fortune of the sector in Nigeria. Moreover, infrastructural facilities that can complement the capital import should be improved upon.

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