



## **Does Capacity Utilization Rate Affect Imports of Raw Materials in Nigeria?**

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### **ABSTRACT**

This study adopted a modified traditional import demand framework to examine the effects of capacity utilization rate (CUR) on imports of raw materials (IMRM) in Nigeria. A number of striking results emerged from the analysis of data. 1% increase in CUR causes IMRM to increase by 1.1%. 1% increase in the real exchange rate (depreciation of the Naira) reduces IMRM by 0.12% whereas 1% increase in domestic inflation results into a 0.72% decrease in the importation of raw materials. Expectedly, we found that a 1% increase in real gross domestic product triggers a 77% increase in IMRM. In line with the traditional import function, we discovered that foreign exchange earnings positively and significantly determine IMRM. On the basis of our findings, we recommend that the relevant stake holders should make genuine efforts towards boosting Nigeria's CUR. This recommendation stems from the fact that many of the local manufacturing firms depend heavily on IMRM.

**Keywords:** Capacity Utilization Rate, Import, Raw Materials, Generalized Methods of Moments

**JEL Classifications:** C13, C3, F1

### **1. INTRODUCTION**

Capacity utilization rate (henceforth referred to as CUR) is used to gauge the extent to which the productive capacity of a plant, firm, or country is being used in the process of generation of goods and services. Unpredictable business shocks inject uncertainty in the total level of output that a given firm could produce in a given period. Among other things, firm's level of capacity utilisation determines how much fixed costs should be allocated per unit of its production. A number of reasons have been documented on why a firm might experience low capacity utilisation. Among them are; new competitors taking market share or causing over-supply in the market and fall in market demand arising from changes in consumer tastes or fashion. However, low capacity utilisation, according to expert opinions, could offer some benefits to a firm, at least, in the short term. A firm may have more time for maintenance and repairs and for staff training, to prepare for an upturn in trade; there may be less stress for employees than if they were working at full capacity; the firm can cope with new orders; and firms in expanding markets may expect to have low utilisation whilst they build their sales.

At the moment, the Nigerian industrial sector accounts for <10% of the economy's gross domestic product (GDP) with the CUR hovering around 53% from 2005 to 2011 (CBN, 2012). The productive sector of the Nigerian economy is replete with imports of raw materials (IMRM). The heavy importations have resulted into a number of problems among which are; high interest rates, unpredictable government policies, lack of effective regulatory agencies, dumping of cheap products, unfair tariff regime, and sometime low patronage of made in Nigeria goods. On the basis of this ugly scenario this study adopted the function of function approach in examining the effects of CUR on IMRM in Nigeria. In the Nigerian context this study is unique, at least in two-folds; (i) its focus on the impact of CUR of domestic industries on the IMRM while still recognizing the factors affecting CUR marks a point of contribution to existing stock of knowledge, and (ii) the adoption of the generalized methods of moments (GMM) estimation which takes care of the potential endogeneity that arises from the correlation of some regressors with the error terms resulted into unbiased estimates.

The remainder of this paper is structured as follows. Section 2 presents the profile of Nigeria's CUR and IMRM. Section 3 centers on review of related literature whereas Section 4 briefly describes the theoretical framework and methodology adopted. Section 5 presents and discusses the empirical results while section six concludes the study.

## 2. THE PROFILE OF NIGERIA'S CUR AND IMRM

Nigeria's IMRM as percentage of merchandise imports was <1% in each of the years before 1974 (Figure 1). It got to 2.2% for the first time in 1974 and declined after wards. In 1985, it reverted to 2.0% and again nosedived after wards. In the recent times, Nigeria's IMRM as percentage of merchandise imports witnessed jumps. At least, it drastically jumped to 4.2% in 2011 and later to 5.2% in 2012. On the other hand, CUR in Nigeria did not go below 70% until 1982 when it assumed a value of 63.6%. After this time, CUR noticeably dropped until it became about 29% in 1995. As from 1996, CUR began to gather another round of momentum and became 56.5% and 53.8% in 2003 and 2012, respectively.

## 3. REVIEW OF RELATED LITERATURE

Capacity utilization is the extent to which an enterprise or a nation actually uses its installed productive capacity. It is a concept used in describing the relationship between actual output that "is" actually produced with the installed equipment, and the potential output which "could" be produced with it, if capacity was fully used. Earlier in the literature, Berndt and Morrison (1981) believed that if market demand grows, capacity utilization will rise and vice versa. Further, in view of the obvious importance of capacity utilization in the overall resource-use efficiency of an economy, a number of studies have tried to examine its trends, determinants and impacts on some macroeconomic variables.

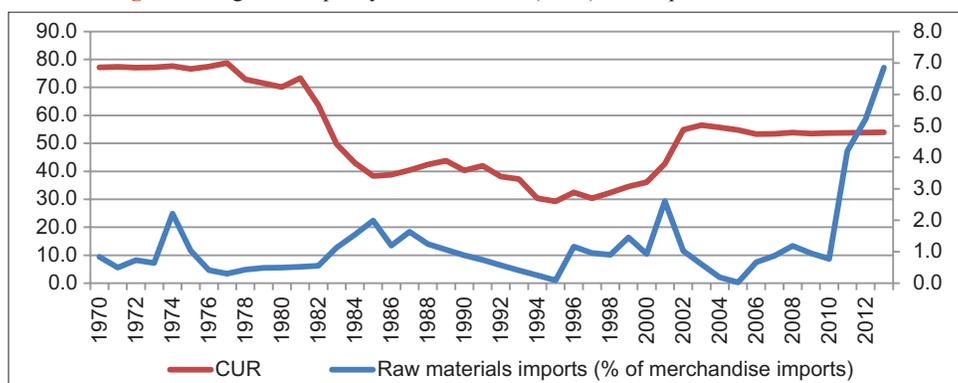
Gokcekus (1998) empirically tested the hypothesis that trade liberalization increases capacity utilization. He calculated capacity utilization for the Turkish rubber industry using a generalized Leontief cost function system and discovered that capacity utilization levels were low but improved when the trade regime shifted from a restrictive to a more liberalized one. According to

him, the location and size of plants were two significant factors which created capacity utilization differences among plants within the industry. Larger plants and plants located closer to international markets, *ceteris paribus*, had higher capacity utilization levels. Nevertheless, capacity utilization levels appeared to improve primarily because of trade liberalization. These occurrences, according to him, suggested that rubber industry producers were forced to use their installed capacity more fully following trade liberalization.

Goldar and Renganathan (2008) analyzed trends in import penetration and capacity utilization in Indian industries in the post-reform period. An attempt was made by them to assess econometrically the impact of import penetration on capacity utilization in Indian industrial firms using a dataset covering 62 industrial firms for 8 years, 1996-97 to 2003-04. The selected firms belong to industries that encountered significant import penetration during 1996-2003. Their analysis of trends revealed that a liberalization of imports of manufactures led to a significant increase in import penetration between 1991 and 1998, which was followed by a slight decrease in import penetration between 1998 and 2003. Estimates of capacity utilization presented in the paper showed that capacity utilization in organized manufacturing fell between 1995 and 2001, but rose between 2001 and 2004. Their firm-level analysis of the determinants of capacity utilization, based on cross-sectional regression and estimates of a dynamic model, suggested that capacity utilization is positively related to size of the firm, market share and market concentration. There are indications from the econometric results that while import penetration may have a short-term adverse effect on capacity utilization in industries, over time firms are able to make adjustments and thus contain, and even neutralize, the adverse effect.

Baldwin et al. (2011) examined the slowdown in the labour productivity growth in the Canadian business sector and found that at least half of the slowdown in aggregate productivity growth was because of the pro-cyclical nature of productivity growth arising from capacity utilization. According to them, almost all of the aggregate productivity growth slowdown is driven by exporters, who had large declines in labour productivity growth in the post-2000 period.

**Figure 1:** Nigeria's capacity utilization rate (CUR) and import of raw materials



Source: Authors initiative with data obtained from WDI (2013).

Mojekwu and Iwuji (2012) examined the impact of some macroeconomic variables and power supply on the performance of the Nigerian manufacturing sector, using ex-post facto research design. They discovered that power supply had positive and significant impact on capacity utilization while inflation rate and interest rate had negative impact on capacity utilization. However, the impact of interest rate was significant at 5% level while lending rate was insignificant. According to them, the regression model explained 88.54% of the variation in capacity utilization.

Akpan et al. (2013) analyzed economic CURs in the Nigerian sugar industry for the period 1970-2010 in. They discovered that trend in the economic CUR showed undulated pattern with an average index of 60.30% and excess economic capacity of 39.70%. Further, their empirical results revealed that economic CURs in the sugar industry was influenced by the inflation rate, per capita real GDP, energy consumption of the industry, federal government expenditure on the sugar industry and the period of liberalization.

## 4. THEORETICAL FRAMEWORK AND METHODOLOGY

### 4.1. Theoretical Framework

This study follows with modification the traditional import demand function framework. Typically, the framework states that import demand is traditionally a function of income and the real exchange rate (REXR). The REXR serves as the measure of the real cost of import. The position of the traditional function is that increase in income increases import demand whereas an increase in the REXR (real depreciation) results into expenditure switching from imports to domestic goods, thus, import demand reduces. This is what experts refer to as “the relative price effect on import.” While aligning with the traditional import demand function, Hemphill (1974) noted that imports of the developing countries are constrained by low foreign exchange whereas Egwaikhide (1999) showed that positive relationship exists between imports and foreign exchange. Countries require foreign exchange to IMRM, intermediate goods and capital goods needed in their domestic production. In a model for the IMRM and capital goods, Soludo (1995) included CUR as one of the explanatory variables, arguing that estimating such function is justified on the fact that local manufacturing firms depend heavily on imported capital goods. Inflation (INFL) was included in the model to reflect the impact of the domestic price level on the IMRM.

### 4.2. Methodology

#### 4.2.1. Model specification

The model of IMRM is thus specified as follows;

$$IMRM_t : \partial_0 + \partial_1 RGDP_t + \partial_2 REXR_t + \partial_3 IMRM_{t-1} + \partial_4 FEEXE + \partial_5 CAPUTL_t + \partial_6 INFL_t + \epsilon_t \quad (1)$$

Where:

IMRM = Import of raw materials

CAPUTL = CUR

FEEXE = Foreign exchange earnings

RGDP = Real gross domestic product

INF = Inflation rate

REXR = Real exchange rate

Further, realizing that CUR is as well determined by other factors as demonstrated in Mojekwu and Iwuji, 2012; Akpan et al., 2013, we treated it as endogenous because unanticipated shocks that affect IMRM in Nigeria may probably affect it as well. We algebraically specify the reduced form equation as follows:

CURs = f(per capita real GDP, energy consumption, government expenditure, interest rate).

$$CAPUTL_t : \phi_0 + \phi_1 PCRGD_t + \phi_2 ENECON_t + \phi_3 GCEXP_t + \phi_4 INTR_t + \mu_t \quad (2)$$

Where:

PCRGD = Per capita real GDP

ENECON = Energy Consumption

GCEXP = Government Capital Expenditure

INTR = Interest rate

#### 4.2.2. Estimation technique

The first step taken in the estimation process of the simultaneous equations was to check for the presence of endogeneity in the model using the Durbin–Wu–Hausman test. Next, the GMM estimation which is more suitable in addressing the function of function nature of the specification was used. The overriding consideration in making this choice is to obtain unbiased and consistent results. Data for this study were obtained from WDI (2013) Database.

## 5. EMPIRICAL ANALYSIS

### 5.1. Tests of Endogeneity

The significance of the *P* values in the Durbin–Wu–Hausman test indicated the presence of endogeneity in the model, thus reinforcing the adoption of the GMM estimation technique which corrects for it. Thus, we reject the null hypothesis that variables are exogenous. A rejection of the null indicates that endogenous regressors’ effects on the estimates were meaningful; thus, we employed the instrumental variables technique.

Ho: variables are exogenous

Durbin (score) Chi-square(1) = 11.8014 (*P* = 0.0473)

Wu-Hausman F(1,5631) = 11.7847 (*P* = 0.0453)

Further, the first-stage regression summary statistics showed that the variables suspected to be affecting CUR, as demonstrated in the reduced function equation, jointly explained about 86% of its changes (Table 1). Away from this, we regressed the CUR on IMRM.

**Table 1: First-stage regression summary statistics**

Variable	R-square	Adjusted R-square	Partial R-square	F (2,34)	<i>P</i> > <i>F</i>
CAPUTL	0.8690	0.8381	0.7871	46.7147	0.0000

**Table 2: GMM results of the impact of CUR affect IMRMs in Nigeria**

Variable	Coefficient	P> z
CAPUTL	0.0111183	0.358
FEXE	0.2128495	0.245
REXR	-0.0012249	0.048
RGDP	0.773865	0.026
INFL	-0.0071785	0.065
RMIM (-1)	0.9733615	0.000

Chi-square (27)=24.89, P value=0.4761, FEXE: Foreign exchange earnings, REXR: Real exchange rate, RGDP: Real gross domestic product, IMRM: Imports of raw materials, GMM: Generalized methods of moments

## 5.2. GMM Results of the Impact of CUR on IMRM in Nigeria

Table 2 presents the effects of a number of factors on IMRM in Nigeria. CUR (CAPUTL) positively but insignificantly affects the IMRM in Nigeria. To be precise, a unit increase in CUR causes IMRM to increase by 1.1%. This result concurs with the standard expectation that CAPUTL of domestic industrial capacities move in the same direction with the IMRM.

The REXR has negative and significant effect on IMRM. We found that a 1% increase in the REXR (depreciation of the Naira) reduces IMRM by 0.12%. This finding aligns with the traditional import demand function characterised earlier. If the REXR appreciates it means that the real value of dollar has depreciated; that is, the purchasing power of the Dollar has fallen in relative terms. An appreciation of the REXR indicates that the foreign price (in Dollars) of a bundle of goods has risen relative to the domestic price. This, all other things being equal, discourages imports. INFL has a negative impact on IMRM. Its impact is significant only at 10% level. Our result shows that a 1% increase in INFL results into a 0.72% decrease in the IMRM.

Expectedly, at least in the case of Nigeria, real GDP (RGDP) positively and significantly affects IMRM. We found that a 1% increase in RGDP triggers a 77% increase in IMRM. In addition, the lag of the IMRM (-1) significantly and positively (97%) determines IMRM. The Table 2 also shows that foreign exchange earnings (FEXE) positively and significantly determine IMRM. This discovery conforms to Egwaikhide (1999).

## 6. CONCLUSION AND POLICY RECOMMENDATION

This study adopted the function of function approach to examine the effects of CUR on IMRM in Nigeria. In the Nigerian context this study is unique, at least, in two-folds; (i) its focus on the impact of CUR of domestic industries on the IMRM while still recognizing the factors affecting CUR marks a point of contribution to existing

stock of knowledge, and (ii) the adoption of the GMM estimation which took care of the potential endogeneity that arises from the correlation of some regressors with the error terms resulted into unbiased and consistent estimates.

A number of striking results emerged from this study. 1% increase in CUR causes IMRM to increase by 1.1%. 1% increase in the REXR (depreciation of the Naira) reduces IMRM by 0.12% whereas 1% increase in domestic inflation results into a 0.72% decrease in the IMRM. Expectedly, we found that a 1% increase in RGDP triggers a 77% increase in IMRM. In line with the traditional import function, we discovered that FEXE positively and significantly determine IMRM.

On the basis of our findings, we recommend that the relevant stake holders should make genuine efforts towards boosting Nigeria's CUR. This recommendation stems from the fact that many of the local manufacturing firms depend heavily on IMRM.

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