DEPARTMENT OF ACCOUNTANCY
ENUGU STATE UNIVERSITY OF
SCIENCE AND TECHNOLOGY

ESUT JOURNAL OF ACCOUNTANCY,
VOL. 8, NO. 1, JANUARY - JUNE, 2017

EXCHANGE RATE MOVEMENTS AND MANUFACTURING CAPACITY UTILIZATION IN NIGERIA

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Abstract

The study examines the effect of exchange rate fluctuations on the performance of the manufacturing sub-sector in Nigeria. To achieve this objective, changes in exchange rate and its key determinants were analyzed to ascertain the extent to which they impact on capacity utilization in the sub-sector. Key determinants of exchange rate behavior selected for analysis are interest rate, inflation rate and trade openness. Empirical studies related to the subject area have basically focused on the response of aggregate output (GDP) to changes in these economic indicators. Studies on sector-specific responses to changes in these economic indicators, particularly in developing economies like Nigeria, have not only been dearth but have produced mixed results. Quantitative research technique based on ex-post facto design was adopted for the study. Econometric method based on vector error correction mechanism was adopted in estimating the parameters of the model. Model estimates show that, in the long-run, all the exogenous variables (exchange rate, interest rate, inflation rate and trade openness) have significant positive impact on manufacturing capacity utilization. The study also shows significant positive effect of exchange rate and trade openness on manufacturing capacity utilization in the short-run. Inflation and interest rates were observed to exert non-significant impact on manufacturing capacity utilization during the period covered by the study. Diversification of the economy away from oil is strongly recommended in order to achieve enhanced foreign exchange inflow necessary for rapid development of domestic manufacturing.

Introduction

Unstable or fluctuating exchange rate is a characteristic feature of a variable or floating exchange rate policy regime. According to Mordi (2006), it refers to swings or fluctuations in exchange rate over a period of time or deviations from a benchmark or equilibrium exchange rate. Under the regime, exchange rate is determined by the interplay of the forces of demand and supply. Thus shocks in demand and supply conditions as well as elasticity of demand for and supply of foreign exchange are essential determinants of both the exchange rate level and its rate of change (volatility). In Nigeria, the frequency of change from one exchange rate management strategy to another has also been shown to be a source of volatility. For instance, Okafor (2011) shows that between 1962 and 2006, a total of 15 strategies have been adopted in the search for an effective and efficient system of exchange rate management. Of the 15 adopted measures, 10 were implemented between 1986 (when the variable exchange rate regime was introduced) and 2006. The frequent change of strategy manifests in unstable exchange rate of the Nigerian currency.

Exchange rate is a major macro-economic policy instrument of economic management (Ojo, 1995). Its movements have important macroeconomic implications for the performance of the economy. For instance, exchange rate movements have implications for inflation, price incentives, fiscal viability and competitiveness of exports, efficient resource allocation, international confidence and balance of payment equilibrium (Mordi, 2006). Changes in exchange rate impacts on private sector operators' portfolio holdings leading to capital gains or losses and may also hinder trade flows due, largely, to uncertainties surrounding eventual outcomes. When economic agents like the real sector operators consider exchange rate as part of their investment decision making variables, emphasis is on both its level (because of the cash outlay) and volatility (because of its impact on business outcomes). Exchange rate movements, therefore have important implications for the economic performance of a country. A change in exchange rate may lead to change in the price level, culminating in income redistribution in the economy.

Another school of economic thought however argues that exchange rate volatility is the result of weak economic fundamentals. For instance, Friedman (1953) argues that instability of exchange rate is a symptom of instability in the underlying economic structure. This implies that economies with low productive base, high inflation rate, weak and inefficient infrastructure, etc. are likely to contend with the challenge of volatile exchange rate.

In view of the pervasive effect of exchange rate, issues of proper and effective exchange rate management has continued to engage the attention of the Nigerian monetary authorities, economists, financial analysts, industry operators, academics and other major stakeholders over time. Getting exchange rate right (which implies maintaining relative exchange rate stability) is critical for both internal and external balance and hence economic growth. Inability to formulate and administer an effective exchange rate policy generates unstable or volatile exchange rate leading to uncertainty and risk for economic agents thereby breeding distortions in production and consumption patterns.

Determination of optimum exchange rate constitutes a major macroeconomic policy challenge in Nigeria because, according to Okafor (2011), the Nigerian economy is very open which implies that the bulk of commercial transactions involve foreign exchange. Hence, an efficient and stable exchange rate management constitutes a key issue in the economic development strategy of the country. The mechanism adopted for the determination of exchange rate in Nigeria since independence has varied from a fixed exchange rate policy through a dual or two tier exchange rate policy to a variety of market-based but managed exchange rate policy regimes.

Prior to the introduction of the SAP in July 1986, the exchange rate of the Nigerian currency (the naira) was managed or administered (Odozi, 1986). Under the managed or administered regime, the naira was at different times either pegged to major currencies like the United States dollar or the British pound sterling or to a basket of currencies because it was not a traded currency. Major features of the regime include over-valuation and relative stability of the exchange rate.Obadan (2006) and Sanni (2006) aver that over-valuation of the domestic currencyduring the pegged policy regime was aimed at the development of industrial and infrastructure base of the economy through cheap imports. However, Sanni (2006) argues that the fixed exchange rate policy regime failed to correct imbalances in both external and internal trade positions.

Inability of the regime to achieve government's policy objectives of enhanced economic development for the country was largely due to unrestricted depletion of external reserves arising from outflows

associated with real sector development. Nwankwo (2001) explains that the use of exchange rate as monetary policy instrument during the fixed exchange rate policy regime was impaired because it made no allowance for credit expansion since it operated 100 per cent on reserves.

Following the introduction of the structural adjustment programme (SAP) in July 1986, the mechanism for exchange rate management was liberalized thereby setting the stage for transition from a fixed to a market-determined exchange rate regime. A policy shift in the nation's exchange rate management was initiated on September 29, 1986 following the introduction of the second-tier Foreign Exchange Market (SFEM).The first-tier (or official) market rate was fixed and applied only to specified transactions of the Federal Government while the second-tier market rate which was determined through a bidding process applied to all other transactions (Okafor, 2011). A unified foreign exchange rate was however achieved on July 2, 1987 following the convergence of the first and second-tier market rates at N3.74:$1.00. The fusion of the two markets produced an enlarged foreign exchange market (FEM) in which exchange rates were determined at bidding sessions through the interplay of the forces of demand and supply. The Central Bank of Nigeria (CBN) however retained the discretion to intervene in the operations of the market in order to ensure stability in the operations of the market.

The policy thrust of SAP was to achieve balance of payments viability by altering and restructuring the production and consumption patterns of the economy, eliminating price distortions, reducing the heavy dependence on consumer goods imports and crude oil exports, enhancing the non-oil export base, rationalizing the role of the public sector, accelerating the growth potential of the private sector and achieving sustainable growth (CBN, 1995).
Towards the attainment of optimal output performance across various sectors of the Nigerian economy, the Central Bank adopted several reform measures in the management of exchange rate aimed at promoting exchange rate stability in the post-SAP era. The last and obviously the most successful in the series of reform measures being the Retail Dutch Auction System (RDAS) introduced from July 19, 2002 to February 2006 and the Wholesale Dutch Auction System (WDAS) introduced on February 20, 2006. Under the WDAS method, authorized dealers no longer act as agents but assume the role of principals in the market, By surrendering liquidity through purchase of foreign exchange using own funds, the capacity of the authorized dealers to promote reckless price bidding is impaired.

The trend in the movement of exchange rate vis-à-vis the performance of the manufacturing sector in Nigeria suggests an existence of a link between exchange rate stability and manufacturing capacity utilization. For instance, average capacity utilization rate from 1975, when the CBN commenced the computation of the manufacturing capacity utilization dataset to 2013, was 50.08 per cent. However, in the post reform period (1986-2013), average manufacturing capacity utilization declined to 44.22 per cent (CBN, 2014). Table 2 shows with that the introduction of the RDAS in 2002 and subsequent adoption of the WDAS in 2006, average manufacturing capacity utilization stood at about 53.90 per cent.

Evidence in the literature shows that enormous research efforts have been expended in the area in order to identify the extent to which exchange rate and other keyeconomic indicators like interest rate, inflation rateand trade openness explain the variations in aggregate output (GDP). However, little is known of the extent to which conclusions from these economy-wide studies could be confirmed for specific sectors or sub-sectors of the economy, particularly manufacturing. Studies in this area have been rather very scanty.

Sector specific studies are important because each sector has its peculiar attributes and therefore may likely respond differently to policy initiatives. Understanding sectoral responses to macro-economic policies therefore is important in policy formulation to avoid the occurrence of unintended consequences.

Empirical Literature Review

Rodriguez and Diaz (1995) estimated a six-variable VAR model using data on output, real wage growth, exchange rate depreciation, inflation, monetary growth and the Solow residuals to decompose the movements of national output in Peru. They find that output growth is driven by its own shocks but was also negatively affected by movements in exchange rate.

In another Latin American study, Rogers and Wang (1995) analyzed movements in Mexican output, estimating a five-variable VAR model using data on output, government expenditure, inflation, exchange rate and monetary growth. They find that most variations in Mexican output arise from its own shocks. They also find that exchange rate depreciation contracts output.

Akpan and Atan (2012) examined the effects of exchange rate movements on economic growth in Nigeria using quarterly data over the period 1986-2010. They estimate a relationship between output, exchange rate, inflation rate and money supply using both the simultaneous equation model and a generalized method of moments. They find no evidence of a strong relationship between output growth and exchange rate movements. They observe, rather, that Nigeria's economic growth has been directly affected by monetary variables.

Okonkwo (2012) studied the determinants of capacity utilization in the Nigerian manufacturing sub-sector using data over the period 1980 to 2009. Inflation rate, exchange rate, ratio of government expenditure to GDP, commercial bank loans and advances to the manufacturing sub-sector and electricity generation and consumption in the sub-sector were used as the independent variables while average manufacturing capacity utilization was the dependent variable. Employing the OLS estimation technique, evidence presented in the study shows that exchange rate, government capital expenditure in relation to GDP, and commercial bank loans and advances to manufacturing have positive influences on manufacturing capacity utilization.

Nwankwo (1984) investigated the allocation of foreign exchange in Nigeria, between the period 1970-1983, to determine how the allocation of foreign exchange among consumer goods, raw materials and capital goods imports contributed to business recession in Nigeria. Using the Wald – Wolfowitz Runs test, he finds that there was no objective criteria for the allocation of foreign exchange among competing uses as it was haphazardly conducted thereby leading to exhaustion of foreign exchange which could have been conserved to maintain the continued inflow of essential manufacturing imports required to keep industries running.

Branson and Love (1988) investigated the effects of swings in real exchange rate on the relative competitiveness of the U.S. and Japanese industries with respect to employment, and output in sectors producing tradable goods using time series data for the period 1970 to 1986. The authors employed a simple model of supply and demand to estimate the impact of swings in the real exchange rate of the dollar and the yen on manufacturing employment and output in the U.S and Japan, disaggregated by industry sector, and by production and non-production workers in the case of the U.S employment. They find significant and substantial effects of the dollar appreciation on employment and output in the U.S manufacturing. Specifically, the dollar appreciation leads to output and employment losses. Though, not as clear as for the U.S, they find also that the yen appreciation leads to employment and output losses in Japan's fabricated metal products, general machinery and electrical machinery.

Cushman (1988) investigated the United States' Bilateral Trade Flows and Exchange Risk during the Floating Period. He finds that exchange rate volatility inhibits the growth of export trade. Similar studies by Chowdhury (1993), Thursby and Thursby (1987), Kenen and Rodrik (1986) have also presented empirical evidence of contractionary effect of exchange rate volatility on export flows.

Arize*et al* (2000) examined the effect of exchange rate movements on the flow of foreign trade using quarterly data from thirteen less developed countries (LDCs) covering the period 1973 to 1996. Estimates of the co-integrating relationships are obtained using the Johansen and Juselius (1990) technique. Estimation of the short-run dynamics is obtained for each country using the error-correction technique. The study shows that high volatility in the behaviour of exchange rate, approximating exchange rate uncertainty exerts a significant negative effect on export flows in both the short-run and the long-run in each of the 13 LDCs. This implies a reduction in the output of export industries.

Yaqub (2010) studied the effect of exchange rate changes on the output performance of the agricultural, manufacturing and services sectors of the Nigerian economy. Data for the period 1970-2007 were analyzed using the modified IS-LM (goods market-money market) framework, estimating the behavioural equation as a system using the seemingly unrelated regression estimation (SURE) technique. The model for agricultural sector has GDP_A (dependent variable)as proxy for agricultural output while real effective exchange rate (REER), foreign income, money supply and government expenditure are the independent variables. Also, the model for the manufacturing sector has GDP_M (dependent variable)as proxy for manufacturing output, while REER foreign income, money supply, government expenditure (defined as expenditure on social and economic service) imports are the independent variables. For the services sector, GDP_S, was used as the dependent variable and REER, foreign income, money supply, government expenditure and imports were the independent variables. The results indicate that exchange rate has significant contractionary effects agricultural and manufacturing sectors while it has an expansionary effect on the services sector, the study also shows that government expenditure and money supply have positive effects on the sectors reviewed while imports have a negative influence on manufacturing and services outputs.

Berman *et al* (2012) examined the reactions of manufacturers to changes in exchange rate over an 11-year period, 1995-2005 using very rich French firm-level dataset with destination – specific export values and volumes. They find that high performance firms react to depreciation bysignificantly increasing their mark-up and at the same increasing less their export volume. The implication of the finding is that not only is there an increase in output price but there is also a contraction of production capacity.

Ibrahim and Amin (2005) sought to identify the relationship between exchange rate, monetary policy and manufacturing output in Malaysia using the vector autoregressive (VAR) model. The authors employed the generalized impulse response functions in analyzing their data. They find that monetary tightening leads to negative response from real activities. In their estimation, the response of manufacturing output seems bigger in magnitude than output from other sectors. In the case of exchange rate, the authors find the temporal responses of real activities to be consistent with the J-curve effect (the tendency to deliver negative returns in the early years and investment gains in the later years). Exchange rate shocks were also found to have large effects on manufacturing output,

Okoye (2006) studied the effect of interest rate on productive activities in Nigeria using primary data on selected in manufacturing industries. Major findings of the study include evidence of a positive and

significant relationship between interest rate and savings, and evidence of significant negative relationship between interest rate and demand for bank credit and thereby reduced manufacturing output. The study concludes that high interest rate contracts manufacturing capacity.

Okoh (2010) investigated the relationship between interest rate and economic growth in Nigeria using data for the period 1970-2009. Employing the ordinary least squares (OLS) regression method, he finds that interest rate, investment, trade openness, exchange rate, and inflation are all positively and significantly related to economy growth.

Obamuyi (2009) investigated the relationship between interest rate and economic growth in Nigeria using times-series data covering the period 1970-2006. He finds that real lending rates have significant and positive effect on economic growth.

Adebiyi and Obasa (2004) examined the impact of interest rate policy on the financing of the Nigerian manufacturing sub-sector using annual data over the period 1970-2002. They find that high interest rate impacts negatively on the growth of the sub-sector in Nigeria.

Akpokerere (2012) examined the effect of bank lending rates on the profitability of manufacturing companies in Nigeria using secondary data on six manufacturing companies. He finds that bank lending rates have no negative effect on the operations on the selected companies as they still declare huge net profit after tax in spite of prevailing high rates.

Gbadamosi (1989) examined the effect of high interest rates on economic development in a deregulated Nigerian banking system. He finds that even though high interest rates stimulate the supply of deposits (savings), it discourages borrowing for productive investment.

Okpara (2010) studied the effect of financial liberalization on Gross Domestic Product (GDP), foreign direct investment (FDI), financial deepening, savings, and inflation. The parametric paired sample statistic was used for the t-test while the non-parametric Wilcoxon signed rank test was used to determine if significant difference exist between the pre and post reform periods. The researcher also employed discriminant method to determine both the direction and magnitude of impact. Result of the analyses shows a significant positive effect of interest rate on GDP while financial deepening and inflation did not discriminate significantly between the pre and post reform periods

Malik and Chowdhury (2001) examined the relationship between inflation and output (GDP) growth using data from the Asian countries of Bangladesh, India, Pakistan, and Sri Lanka. They used un-even sample size as follows: Bangladesh, 1974-1997; India, 1961-1997; Pakistan, 1957-1997; and Sri Lanka, 1966-1997. Consumer Price Index (CPI) and real GDP were adopted as appropriate proxies for inflation and economic growth respectively. They find evidence of a long-run or co-integrating positive relationship between inflation and economic growth with significant feedbacks. They opine that moderate inflation promotes economic growth and that inflation is more sensitive to changes in output growth rates while output growth rate is less sensitive to change in inflation rates, thereby putting the countries on the "knife edge" in their struggle to achieve non-inflationary growth. However, they failed to determine what the moderate level of inflation (inflation threshold) should be.

Ahmed and Mortaza (2005) studied the relationship between inflation and economic growth in

Bangledesh, using annual data on real GDP (RGDP) and CPI over the period 1980-2005. Using co-integration and error correction models, they estimate an inflation threshold or structural break point of 6 per cent beyond which inflation impedes economic growth.

Chimobi (2010) examined the relationship between inflation and economic growth in Nigeria over the period 1970-2005 using annual data on CPI and GDP. Employing the Johansen and Juselius (1990) co-integration technique, he finds no evidence of a long-run relationship between inflation and output growth. However the Granger causality test shows a unidirectional causality from inflation to economic growth.

Mubarik (2005) studied the relationship between inflation and economic growth in Pakistan using time series data covering the period 1973 -2000. He finds a threshold level of 9 per cent and concludes that inflation becomes an impediment to economic growth when the estimated threshold level of 9 per cent is exceeded.

Hussain (2005) also examined the relationship between inflation and economic growth in Pakistan using annual data over the period 1973-2005. He estimates the threshold level of inflation to be in the range of 4-6 per cent. Also, Singh (2003) studied the relationship between inflation and output growth in India and finds inflation threshold to be in the range of 4-7 per cent.

Hussain and Malik (2011) investigated the relationship between inflation and economic growth in Pakistan using annual data over the period 1960-2006. Employing Granger causality test, they find a unidirectional influence from inflation to economic growth. They also find a positive correlation between inflation and economic growth as well as evidence of inflation threshold at 9 per cent. They conclude that beyond 9 per cent, inflation lowers economic growth over the long-run but not in the short-run

Fabayo and Ajilore (2006) studied the relationship between inflation and economic growth in Nigeria to identify the onset of the harmful effect of inflation on economic growth using annual data over the period 1970-2003. They find that inflation threshold exists at 6 per cent in Nigeria and conclude that below 6 per cent, inflation promotes economic growth but retards it at when the rate exceeds 6 per cent

Paul *et al* (1997) examined the link between inflation and economic growth using annual data over the period 1960-1987 on 70 countries (48 developing and 22 developed nations). They find evidence of negative relationship in some countries and evidence of positive relationship in others. Similarly, the CBN (1974) investigated the impact of inflation on the growth of eleven African economies and finds evidence of negative effect of inflation on economic growth in six countries (Egypt, Gabon, Ghana, Cote de' Ivorie, Ivory Coast, Kenya and Sudan). Evidence of positive correlation was found in five other countries (Morocco, Nigeria, Tunisia, Uganda and Zambia).

Faria and Carneiro (2001) investigated the relationship between inflation and economic growth using data from Brazil. They find that in the short-run, inflation impairs economic growth. Evidence of negative relationship between inflationand economic growth exists also in Smyth (1992) which estimates that each of percentage point increase in theUSAinflation rate reduces the country's annual growth rate by 0.223 per cent. Smyth (1994) also shows that each one percentage increase in inflation rate reduces America's output growth by 0.158 per cent. Smyth (1995) also shows that a 10 per cent increase in inflation rate reduces total factor productivity growth in Germany by 0.025 per cent.

Simon and Bulman (2003) studied the effect of inflation on productivity growth in Australia adopting an industry-level approach to overcome the difficulty in establishing a statistical causation at the aggregate level. They find clearly significant results, with industry-level inflation explaining industry

productivity. The authors find, however, that the relationship varies by industry, with the strongest evidence of a negative relationship being found in the cases of industries dominated by large firms (concentrated industries). Finally they find that the negative effects of inflation do not operate solely through a reduction in capital accumulation but also through a reduction in multifactor productivity growth.

Umaru and Zubairu (2012) investigated the effect of inflation on the growth and development of the Nigerian economy using time-series data for the period 1970 to 2010. A single equation, bivariate regression model was employed with GDP as the dependent variable and inflation as the independent variable. Causality test was also conducted to determine the magnitude and direction of causality. Evidence presented in the study shows that inflation exerts a positive influence on output though the magnitude of the influence is not significant. The causality test also shows that GDP Granger-causes inflation but inflation does not Granger-cause GDP.

Edwards (1992) investigated the relationship between trade orientation and economic growth in developing economies. He finds evidence of positive relationship between trade openness and economic growth. Krueger (1997) examined the relationship between trade policy and economic development. The study also documents evidence of positive relationship between trade openness and economic development,

Rodriguez (2000) studied the effect of trade openness on the output of an open economy using 1996 data from 106 countries. According to the author, 1996 was chosen for the study because it was the nearest period of which complete data for a large number of countries existed. Employing the ordinary least square (OLS) regression of trade openness on the logarithms of GDP and GDP per capita, he finds strong empirical support for a positive relation between per capita GDP and trade openness based on the assumption that GDP per capita and protection are negatively related. The study also shows a strong negative association between GDP (size) and trade openness.

Methodology

Quantitative research technique based on ex-post facto research design was adopted for the study. Quantitative research is suited for the purpose because it is a formal, objective and systematic process in which numerical data are utilized to obtain information about the world or events (Kerlinger, 1986). Also, the ex-post facto research design shall be adopted because the study involves the use of data, on variables, which the researcher cannot change or manipulate (Onwumere, 2009). It involves the use of available data to explain past events by identifying the extent to which the data relate to the events. It is a standard experimental method of most scientific discipline, particularly the social sciences, education, and economics (Iwueze, 2009).

Model Specification

This model (a multiple regression model) tests the extent to which the independent variables explain the behavior of the dependent variable. Itis a single equation which assumes a linear relationship between manufacturing capacity utilization and the macroeconomic variables (exchange rate, interest rate, inflation rate and trade openness). The explicit form of the model is stated as follows:

$$\mathbf{MCUR} = {}_0 + {}_1\mathbf{EXR} + {}_2\mathbf{IR} + {}_3\mathbf{INF} + {}_4\mathbf{OPEN} + \mu_t$$

where:

MCUR = Manufacturing capacity utilization rate

EXR = Exchange rate

IR = Interest rate
INF = Inflation rate
OPEN = Trade openness
$_{o}$ = Regression equation intercept = constant
$_{1....4}$ = Regression coefficients to be estimated
μ = Error term or random variable introduced to take account of factors or variables that have theoretical influence on the dependent variable but were not be included in the model (Koutsoyiannis,1977). Such variables include infrastructure, (particularly electricity), corruption, taxation, etc.

Data Analysis, Interpretation and Discussion

Econometric Analysis

The results of the econometric tests are presented and interpreted in this section.

Unit Root Analysis

The unit root test was carried out using techniques of the Augmented Dickey Fuller and Phillip Perron tests in order to determine the suitability of the data for policy decisions. The results are presented below:

Table 1: Unit root result derived from Augmented Dickey Fuller test.

Variable	ADF Test @Levels	ADF Critical values at 5% level	Test @ First Difference	ADF Critical values at 5% level	Remark
LMCU	-1.227749	-2.981038	-3.701864	-2.981038	Integrated of order 1
LEXRV	-4.058340*	-2.981038	-9.584792	-2.981038	Integrated of order 1
LINTR	-4.837530*	-2.981038	-4.836890	-2.981038	Integrated of order 1
LINFL	-2.827535	-2.981038	-4.703239	-2.981038	Integrated of order 1
LOPEN	-3.094394*	-2.981038	-5.020677	-2.981038	Integrated of order 1

Source: Author's computation, 2015

Table 2: Unit root result derived from Phillip Perron test

Variable	PP Test @Levels	PP Critical values @ 5%	Test @ First Difference	PP Critical values @ 5%	Remark
LMCU	-1.155508	-2.981038	-3.701864	-2.981038	Integrated of order 1
LEXRV	-4.063298*	-2.981038	-12.93123	-2.981038	Integrated of order 1
LINTR	-4.832721*	-2.981038	-9.890596	-2.981038	Integrated of order 1
LINFL	-2.827535	-2.981038	-5.440659	-2.981038	Integrated of order 1
LOPEN	-3.097207*	-2.981038	-11.08968	-2.981038	Integrated of order 1

Source: Author's computation, 2015

The unit root tests shown in the Augmented Dickey Fuller and Phillip Perron tests indicate that exchange rate, interest rate and trade openness are stationary at levels but all the variables show evidence of stationary trend at their first difference.

Co-integration Analysis

Table 3: Co-integration result based on trace and maximum-eigen statistics

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.724290	86.80236*	69.81889	0.0012	None	33.49854	33.87687	0.0554
At most 1 *	0.659246	53.30382*	47.85613	0.0141	At most 1 *	27.99148	27.58434	0.0444
At most 2	0.454694	25.31234	29.79707	0.1506	At most 2	15.76661	21.13162	0.2388
At most 3	0.285545	9.545735	15.49471	0.3173	At most 3	8.742126	14.26460	0.3082
At most 4	0.030435	0.803609	3.841466	0.3700	At most 4	0.803609	3.841466	0.3700

Source: Author's computation, 2015

From the perspective of trace statistics, the co-integration result shows evidence of 2 co-integrating equations while the max-eigen statistic shows the at most 1 co-integrating equation exists. There is therefore evidence of co-integrating relationship in the model, an indication that the variables do not have a tendency to drift apart.

Regression Analysis

The effect of changes in the selected macroeconomic indicators on manufacturing capacity utilization was determined using the technique of the vector error model (VECM). Tables 4 and 5 show the long-run and short-run estimates produced by the vector error correction model.

Table 4: Long-run estimates

Co integrating Eq:					
		C			
CointEq1	-10.08947	LEXRV(-1)	LINTR(-1)	LINFL(-3)	LOPEN(-1)
Coefficients		0.120729	0.671325	0.667562	0.597865
Standard Error		(0.02261)	(0.23046)	(0.04040)	(0.08129)
T-Statistic		[5.34045]	[2.91295]	[16.5249]	[7.35505]

Source: Author's Computation, 2015

The long-runestimates presented in table 4 showthat all the exogenous variables (exchange rate, inte**r**est rate, economic openness and inflation rate)have significant positiveimpact on manufacturing capacity utilizationat their respective lag levels. This result indicates that an increase in the values of the exogenous variables leads to increase in manufacturing capacity utilization. However, it is observed that the degree of the responsiveness of manufacturing capacity utilization to the variations in exchange rate, interest rate, trade openness and inflation is statistically significant though inelastic. For instance, a percentage change in exchange rate brings about 0.12 percentage change in manufacturing capacity utilization. This shows that a percentage change in exchange rate will lead to a less than proportionate percentage change in manufacturing capacity utilization holding other factors at constant. The result also shows that a percentage change in interest rate produces a 0.67 percentage change in manufacturing capacity utilization. The responsiveness of manufacturing capacity to change in interest rate is also shown to be inelastic. The result further indicates that a percentage change in inflation leads to a 0.67 percentage change in manufacturing capacity utilization. With regard to trade openness, it was observed that a percentage change in trade openness leads to 0.59 percentage change in manufacturing capacity utilization.

Table 5: Short-run estimates

Error Correction:	D(LMCU)	D(LEXRV(-1)	D(LINTR(-2)	D(LINFL(-3)	D(LOPEN(-1)
ECM (-1)	-0.267540	0.032791	-0.264414	0.106064	0.208602
Standard Error	(0.09394)	(0.01493)	(0.18452)	(0.05473)	(0.07805)
T-Statistic	[-2.84812]	[2.19557]	[-1.43300]	[1.93805]	[2.67265]

Table 5 shows the result of the short-run relation between manufacturing capacity utilization and the explanatory variables (exchange rate, interest rate, trade openness and inflation rate). The result shows that exchange rate and trade openness have significant positive effect on manufacturing capacity utilization at lag 1. The result also shows non-significant impact of interest rate and inflation rate on manufacturing capacity at lag 2 and lag 3 respectively. It further shows that the degree of the responsiveness of manufacturing output to variations in exchange rate, interest rate, economic openness and inflation rate is inelastic. This implies that the a

percentage change in exchange rate, interest rate, trade openness and inflation rate will lead to a less than proportionate change in manufacturing output utilization. This is evidenced by thevalues of the respective coefficients being less than unity,

The result of the error correction term which reveals the adjustment speed of the system is correctly signed, with a coefficient of -0.2675. This indicates that over 26 percent of the disequilibrium as a result of external forces in the system could be reversed within a year.

Summary of Findings, Conclusion and Recommendations

The regression result shows that, in the short-run, exchange rate and trade openness have significant positive effect on manufacturing capacity utilization in Nigeria. Inflation and interest rates have non-significant impact.

Long-run estimation of the model shows significant positive impact of all the exogenous variables (exchange rate, interest rate, inflation rate and trade openness) on manufacturing capacity utilization.

Based on the above results, the study concludes that changes in exchange rate have significant effect on capacity utilization in the manufacturing sub-sector in Nigeria. Also, other economic indicators included in the model(interest rate, inflation rate and trade openness) significantly affect manufacturing capacity utilization in Nigeria.

Following from the findings of this study, it is recommended that the Nigerian economy be diversified in order enhance the foreign exchange earning capacity of the economy. Inflow of foreign exchange from diverse sources would help stabilize foreign exchange movements and thereby reduce production shocks. Also, since reformed interest rate regime enhances output performance, the monetary authorities should sustain and deepen the financial liberalization programme.

It is further recommended that government should monitor movement in inflation rate to ensure it does not go beyond the threshold that supports output growth. Finally, policies that promote liberalization of essential imports used in production should be encouraged to support local production capacity.

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APPENDIX

A1. Sectoral Contributions to GDP

Sector	1960-1970	1971-1980	1981-1990	1991-2000	2001-2010
Agriculture	55.8	28.4	32.3	34.2	40.6
Industry	11.3	29.1	41	38.6	24.4
Manufacturing	6.6	7.3	6.1	4.9	4.1
Building & Construction	4.8	8.3	2.3	1.8	1.9
Wholesale & Retail Trade	12.8	17.6	14.5	13.8	16.4
Services	15.3	16.5	9.8	11.5	16.8

Source: National Bureau of Statistics (2011)

A2 : Data on the research variables

Year	Manufg Capacity Utilizatn Rate (%)	% Change in Exchange Rate(N:$)	Interest Rate (%)	Inflation Rate (%)	Tradeopenness (%)
1986	38.8	70	11.25	5.4	21.6
1987	40.4	20.9	18.35	10.2	45.8
1988	42.4	21.7	17.05	38.3	37.8
1989	43.8	40	25.7	40.9	41
1990	40.3	15	26.6	7.5	56.7
1991	42	7.7	20.405	13	67.6
1992	38.1	50.1	30.5	44.5	65.5
1993	37.2	13.1	27.205	57.2	56.2
1994	30.4	-3.5	21	57	41
1995	29.29	74.1	20.485	72.8	88.2
1996	32.46	-6.3	20.3	29.3	48.5
1997	30.4	-6.7	18.43	10.7	74.5
1998	32.4	11.5	19.815	7.9	58.7
1999	34.6	8.8	24.255	6.6	64.2
2000	36.1	15.5	19.765	6.9	64
2001	42.7	2.6	19.815	18.9	68.3
2002	54.9	11	27.52	12.9	47.1
2003	56.5	6.7	21.795	14	60.9
2004	55.7	-2.1	20	15	57.8
2005	54.8	-2.1	18.72	17.8	68.9
2006	53.3	-1.3	17.65	8.2	56.2
2007	53.38	-8.7	17.65	5.4	59.2
2008	53.84	9.8	18.63	11.6	63.2
2009	58.92	10.7	16.92	12.5	54.3
2010	55.82	1.3	20.805	13.7	56.3
2011	48.34	3.1	20.5	10.8	65.4
2012	48.96	2.7	19.205	12.3	58.3
2013	52.28	5.3	21.46	9.8	63.29