An Investigation of the Impact of Exchange Rate Policy on Manufacturing Sector Output: Evidence from Nigeria

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Abstract: The study examined the impact of exchange rate policy on manufacturing output, using evidence from Nigeria for the period 1981-2016. Johansen cointegration test and Vector Error Correction (VECM) model were applied in the analysis. Time series data obtained from the Central Bank of Nigeria (CBN) statistical bulletin on manufacturing output (MOP), exchange rate (EXR), manufacturing sector capacity utilization (MCU) and import (IMP) were engaged in the investigation. After the necessary integration, co-integration and correcting the error in the estimated equation, a causality analysis via Granger causality test among the relevant variables was undertaken in order to verity the relevance of the exchange rate-led hypothesis to manufacturing sector output growth in Nigeria. The results revealed that growth increasing the quantity of naira exchanged for the dollar caused a fall in the manufacturing output in Nigeria. However, this impact was found to be insignificant. Thus, exchange rate volatility does have significant impact on the growth of manufacturing output in Nigeria. Hence, since exchange rate volatility was indicated to impact on manufacturing output in Nigeria significantly, the study recommends that the policy makers should vigorously pursue macroeconomic policies that will keep the exchange rate of the naira at a tolerably stable low rate. This would therefore, help in making Nigerian market more attractive to foreign investors; thus, improve the output growth of the manufacturing sector of the economy.

Keywords: Exchange Rate Policy, Manufacturing Output, Johansen cointegration Test, Vector Error Correction Model, Granger Causality Test

I. INTRODUCTION

Exchange rates play a very crucial role to economic growth and development of every economy, both in the developed and the developing economies. Whether appreciated or depreciated exchange rate, it has direct effect on the level of economic growth and development of nations, especially the developing nations like Nigeria where there has been persistent of exchange rate depreciation overtime. Exchange rates can be of appreciation or depreciation during a particular period of time. Appreciation of exchange rate entails when a nation's exchange rate gained more value against a foreign currency of another country while depreciation of exchange rate occurs when the currency of a country lost value relative to other countries of the world in the foreign exchange market. Therefore, exchange rate is an important relative price that affects the external competitiveness of domestic goods. Following naira exchange rate depreciation, which accompanied the introduction of the Structural Adjustment Programme (SAP) in the year 1986, the subject matter of exchange rate depreciation has become a matter of great concern in Nigeria. The essence of this, for obvious reason is that the macroeconomic objective of achieving exchange rates stability has not been attained in the economy. More so, the macroeconomic theorists postulated that a depreciated or devalued exchange rates bring about improve on the balance of trade of a nation; hence, increase in exports level and economic growth (Marshall, 1923; Lerner, 1944)..

The importance of exchange rate in foreign trade of a nation cannot be over-emphasized. Persistent exchange rate depreciation is one of the major challenges facing most of the developing economies including around the world (Nwokoro, 2017). In Nigeria for instance, the economic structure reflects the totality of the complex nexus that exist between the economy's resources and its outputs of the resources. The manufacturing is one of the indispensible sectors in the Nigerian economy. Manufacturing sector in particular, is generally conceived as an engine of economic growth and development due to its role in diversification of the economy. It

comprises industries that play role of raw materials conversion into finished products or producer goods (Anyanwu, 1993).

Generally, the level of exchange rate of a country reflects the worth of the economy relative to economic growth and development when compared to the growth of other economies. The more the exchange rate of a country depreciates, the lower the value of the goods and services produced for its foreign trading partners thereby leading to increase in the exports level of the country whose exchange rate is depreciated. Thus, every nation strives to stabilize its exchange rates through exchange rate management, which aims to guarantee the economic growth and development of the country (Nyong, 2010). Researchers have it that those nations with strong economic conscious and background diversify their economies faster through exchange rate depreciation than the nations with weak economic background. In Nigeria, exchange rate depreciation policy has since the adoption of the structural adjustment programme in 1986, utilized to diversify the economy away from mono-product (i.e. oil exports) to non-oil exports in order to boost international competitiveness status of the nation. More so, exchange rate policy as a crucial tool in the international trade of countries is very essential in the determination of net exports and economic growth levels of a country as changes in the exchange rate have significant implications in the economic trade life of nations such as balance of payments position, growth and income distributions. The behaviour of exchange rate is no doubt determines the behaviours of other macroeconomic variables, especially in the developing countries like Nigeria who is committed to achieve rapid economic growth but is highly imports dependent (Oyejide, 2012).

Manufacturing sector is conceived as a catalytic for modern economic growth and development; its many dynamic benefits are very important for economic transformation of nations of the world. In the developed countries such USA, Japan, Australia, etc, the manufacturing sector plays a major role in the economic transformation of the countries as a leading sector. It also plays a leading role in raising productivity of a nation by creating foreign exchange earnings capacity, raising employment opportunities, import substitution and exports expansion, investments growth and providing wider and efficient linkage among different sector at faster rate than other sectors of the economy (Fakiyesi, 2013). For Nigeria, in which there is under-industrialized and characterized by low capacity utilization, effective manufacturing sector is needed to foster growth among the various sectors of the economy (Obadan, 2012). This, if it is done would help to withdraw the economy from the persistent dependent on the foreign countries for the imports of consumable goods (Okigbo, 2010).

This is because; the country has since the collapse of the oil price in the world market dependent heavily on the imports of consumers goods which is not healthy for a growing economy like Nigeria. Diversification of the economy through industrial oriented policies will help Nigeria to produce most of the goods it imports from other countries of the world, and as such promote the economic base of the country up to international competitive level. Oyejide (2013) postulated that the breakdown of Breton woods system engenders variability in the rate of exchange worldwide including Nigeria. In this view, Umubanwer (2010) identified the consequences associated with the overdependence of Nigeria on imports to feed its growing population. These include overdependence of foreign countries for imports of consumable goods; it exposes economy to external shocks which would make economy venerable; and it could also results to exchange rate instability and deficit balance of trade. As a result, net exports will low thereby leading to slow economic growth (Ojo, 2014).

In Nigeria, economic experts and government have expressed the role that manufacturing and industrialization can play in the economic structural transformation. The industrial policy in Nigeria enunciated in 1988 postulated that its main objective is to attain an improved growth of industrial development for the nation thereby making industrial sector the backbone of the Nigerian economy. In this view, several monetary, fiscal, commercial and exchange rate policies and other industrial policy measures have been adopted to promote industrialization within the limit of available resources in the country.

1.2 Statement of the Problem

At independence in 1960, Nigeria was an agrarian economy with the sector accounting for about 70% of the foreign exchange earnings of the country, over 60% of the total gross domestic product and government revenue. It was also the employment leading sector in the economy. However, in the earlier 1970s, oil was discovered in commercial quantities and was associated with oil boom which occurred as a result of Middle East crises; a situation that led to a neglect of the popular agricultural sector as the share of the agriculture to exports sector dropped significantly. The oil sector now took over the position of the agricultural sector thereby accounting for over 90% of the foreign exchange earnings of the country and government revenue. Naira exchange rate then was relatively stable, especially between 1975 and 1979 during the period of the oil boom (Ewa, 2011). However, when the oil prices declined in the early 1980s, Nigerian economy got into crises with the country experiencing several economic problems such as low investments, low growth, high unemployment,

balance of payments disequilibrium, low productivity, financial sector and exchange rate instabilities, import dependent, etc.

Furthermore, the manufacturing sector was not left behind; manufacturing companies faced the problem of importation of industrial input materials as naira exchange rates depreciated tremendously as against other trading partners. Not minding the adverse effect of rapid depreciation in exchange rate on the output level of manufacturing sector, Nigeria decided to the condition of IMF-World supported Structural Adjustment Programme (SAP) in 1986, which include the devaluation of the domestic currency. Consequently, the manufacturing sector output decreased alongside economic growth of the country (Obadan, 2012). The major problem faced by manufacturing sector in Nigeria is inadequate raw material for industrial production of finished products. This situation no doubt lowers productivity of industrial sector in Nigeria. In an attempt to source industrial inputs, industrialists go as far as sourcing inputs externally in which level of exchange rate is the major determinant factor. The ability of the industrialists to imports input materials depend on the level of the exchange rates. In the face of exchange rate depreciation/devaluation hampers the ability of the manufacturers to import and hence, affects international trade as well as the productivity of the sector which invariably limits the diversification of the export sectors as it introduce uncertainties in the economy Jhingan (2012). Thus, uncertainty in trade transaction posits a lot of problems such as inflation, which determine the net balance of trade of the country. It also tends to undermine the international competitiveness of non-oil export and make planning and projection very difficult at both micro and macro levels of the economy; some small and medium scale enterprise would be strangled out as a result of low naira exchange rate relative to U. S dollar. It is against this background that this study investigates the effect of exchange rate on the manufacturing sector output in Nigeria for the period between 1981 and 2016.

II. REVIEW OF RELATED LITERATURE
2.1 Conceptual Review

Exchange rate can be defined as the rate by which a currency exchanged for another currency. It is also referred to as the ratio in which a unit of currency of a nation is exchanged in terms of currency of another nation. Jhingan (2014), expressed that exchange rate involving US dollar and UK pound explains units of US dollars needed to exchange one unit of UK pound in the foreign exchange market. A foreign exchange market refers to a market in which the currencies of various nations are traded (i.e. bought and sold). More so, exchange market is a market where the value of domestic currency and the foreign currencies are determined. According to Jhingan (2014), exchange market is found everywhere around the world and it is functional in every country of the world to ease international trade.

Economic growth is an economic indicator which measures the persistent increase in national output or national income which reflects the rise in the quantity of goods and services produced in the economy. Growth occurs when the productive capacity of a country increases (Akpan, 2008 cited in Ilechukwu & Nwokoye, 2015). Production of goods and services include imports and exports that in turn involve foreign exchange transactions. Exchange rate in post Breton Wood System was shown to characterize instability which has raised doubt about the influence of exchange on economic growth. The effect of volatility in exchange rate on economic growth, as observed in the comprehensive measure of the costs and benefits of exchange rate stabilization is explained via foreign trade, credit flow, foreign direct investment and asymmetric shock, which are some of the major channels of transmission from volatility of exchange rate on growth (Arratibel, Furceri, Martin & Zdzienicka, 2009 cited in Ilechukwu & Nwokoye, 2015). A devaluation/depreciation of the nation's currency may increase economic activity via initial rise in the price of foreign goods relative to domestic goods.

By raising the foreign competitiveness of nation's industries, depreciation in the exchange rate would divert expenditure from international goods to nation's goods (Kandil, 2004). Hence, exchange rate depreciation allows the level of national output to increase as it promotes expenditures for domestic products. According to Marshall Lerner condition, exchange rate depreciation or devaluation improves trade balance if the demand elasticity of the devaluing country for imports in addition to the foreign demand elasticity for the country's exports is greater than one. If this condition does not hold, it implies that exchange rate depreciation produces contradictory results. Thus, Hirschman (1949) cited in Ilechukwu and Nwokoye (2015) revealed that depreciation of currency from an initial deficit of trade decreases real national output or real national income and hence, leads to a decrease in aggregate demand. Consequently, the outcome of currency exchange depreciation include: one, in the commodity market, an unexpected domestic currency depreciation which makes exports cheaper than imports, thereby increasing domestic products' demand that in turn raise national output level and price. Second, for the money market, it results to an unexpected exchange rate depreciation relative to its expected future value, making prompts agents to hold more nation currency and raises interest rate; hence, affects investment expenditures negatively as well as the aggregate demand which results to rises in the price level. Third, for the supply side, exchange rate changes, whether expected and unexpected make the

imports of intermediate goods costly. Firms are inclined to a fall in imports of intermediate goods, falling national output and raising production costs; thus, the aggregate price level (Kandil, 2004).

2.2. Theoretical Framework

Traditional flow model and monetary theory are adopted as the theoretical framework for this study. The traditional flow model is basically anchored on the principle of the interaction between demand and supply. According to the model, market forces of demand and supply interact to determine the rate of exchange in the foreign exchange market. Thus, when there is expectation or speculation of changes in the rate of exchange, it leads to disequilibrium even when there is no any change in the initial determined factors. The model emphasized that exchange rate can affect the ability to import adversely and hence, the manufacturing sector output. Exchange rate fluctuations cause purchasing power instability as well as negative effect on the investment relative to import of inputs of manufacturing sector. However, the influence of exchange rate fluctuations on the output of manufacturing sector and total income level also affects investment in the import of inputs and the exchange rate as well. This can happen because; among the determinant factors of exchange rate include the supply of foreign exchange effect by the level of productivity, and demand for foreign exchange in an economy. On the other hand, the monetary theory to exchange rate determination opines that the relative supply of money to meet its demand between two nations is the major factor that determines the rate of exchange. The theory postulated that rise in supply money leads to inflation, which in turn result to exchange rate depreciation. The theory therefore, expressed that a falling prices with a given nominal money supply cause depreciation in exchange rate (Ilechukwu & Nwokoye, 2015).

Eme (2011) viewed exchange rate fluctuation as the inability of country to sustain the fixed exchange system that attempt to fix the values of exchange currencies. The author stated that the important feature of fixed exchange rate between two nations is that it tries to stabilize the rate exchange while floating exchange rate deals with a system in which the forces of demand and supply freely determines the rate of currency exchange between the two countries. The floating exchange rate policy allows changes in currency price to help correct deficit balance of payments in the nation's balance of payments. The value of currency increase of a country and the higher currency prices leads to falls in import and rise in export which invariably affects the manufacturing sector' productivity level. In Nigeria, Asher (2015), expressed that the policy trusts are designed to correct exchange rate instability in the country; hence, exchange rate surfaces in a free floating exchange rate environment. This deals with a situation in which rates of currencies are determined through market mechanism (forces of demand and supply) in the absence of government interventions.

2.3 Empirical Review

Nwokoro (2017), investigated the influence of foreign exchange and interest rates variations on the manufacturing output in Nigeria fro period 1983-2014 through the applications Ordinary Least Square (OLS), co-integration and its associated Error Correction Modeling. The variables employed in the study include manufacturing output, government expenditure on manufacturing sector, capacity utilization, foreign exchange rate, investment in industrial production and interest rate. The results showed that foreign exchange rate (FREX) and interest rates (INTR) have negative and significant influence on manufacturing Output (MANO). Lawal (2016), studied the impact of exchange rate fluctuations on manufacturing sector output in Nigeria for the period 1986-2014 using multiple regression analysis by applying Autoregressive Distribution Lag (ARDL) model. Data used in the investigation were obtained from the bulletin of the Central Bank of Nigeria (CBN) and World Development Indicators (WDI). The variables used in the study involve manufacturing output, government capital expenditure, Consumer Price Index and real effective exchange rate (EXC). The results of the ARDL revealed evidence of long run and short run relationships among the variables under consideration. The result also indicated that exchange rate has positive and signification effect on manufacturing sector output. More so, the results also showed that exchange rate has positive effect on manufacturing sector output. Thus, the study recommended that government should implement the policies on export strategies to encourage exports and discourage imports in order to achieve a favourable balance of payment.

Akinlo and Lawal (2015) examined the effect of exchange rate on the Nigerian industrial production for the period 1986-2010 using Vector Error Correction Model (VECM) approach. The results showed evidence of long run relationship among exchange rate, industrial production index, inflation rate and money supply. The results also indicated that exchange rate depreciation does not have significant effect on industrial production in the short run; however, in the long run, the results showed that exchange rate depreciation had significant impact on the industrial production in Nigeria. Lastly, it was also indicated in the estimation results that money supply affects industrial production significantly in the Nigerian economy. Ilechukwu and Nwokoye (2015), investigated the effect of exchange rate volatility and price shocks on economic growth in Nigeria in an attempt to find the ideal exchange rate required to boost industrial output and industrialization in the country. The study employed ordinary least square (OLS) method to study the effect of exchange rate stability on industrial output

in the economy for the period 1980-2013. The variables used in the investigation include foreign direct investment, domestic capital, population growth rate, inflation, changes in external balance and real exchange rate. The empirical results revealed that foreign direct investment, population growth rate, domestic capital and real exchange rate have significant impacts on the Nigeria industrial output. However, the results showed that inflation and changes in external balance have insignificant influence on industrial output in Nigeria.

Adegbemi (2018) studied the impact of the changes in the macroeconomic factors on the manufacturing sector output in Nigeria for the period 1981-2015. The study conducted preliminary investigation of the time series using both stationarity test and descriptive statistics. The tests revealed that not all the variables are normal. However, the evidence of the same order of integration at first differencing led to the deployment of Johansen cointegration test in the investigation. The results of the cointegration test indicated no evidence of short run relationship among manufacturing output and gross domestic product, broad money supply, exchange rate and unemployment rate. However, the results showed negative relationship among interest rate, inflation rate, broad money supply, exchange rate and manufacturing output. The interest rate and inflation rate were shown to be statistically insignificant, while gross domestic product and unemployment have positive and significant impact manufacturing output in Nigeria. Christopher and Tomilade (2012) examined the effect of exchange rate management on manufacturing sector growth in Nigeria from 1986 to 2010 using Ordinary Least Square (OLS) multiple regression analysis. The results indicated that exchange rate depreciation has insignificant influence on the productivity of manufacturing sector dominated by structural adjustment programme of Nigeria. The results also showed that exchange rate appreciation impact on domestic output in Nigeria while exchange rate appreciation promotes growth in the manufacturing sector in the economy. Similarly, the results indicated that positive relationship exists between the manufacturing gross domestic product and inflation.

Ugwu (2017) studied the impact of exchange rate fluctuation on manufacturing firms' performance in Nigeria by employing profitability of firms as a proxy for manufacturing firms' performance for the period 1986-2016 through the application of multiple regression analysis based on Ordinary Least Squares (OLS) technique. The study conducted stationarity test using Augmented Dickey-Fuller (ADF) test and the results indicated that the variables were integrated of order one. The results of Johansen cointegration test conducted revealed that long run relationship exists between exchange rate fluctuation and the profitability of manufacturing firms in Nigeria. The results also showed that significant relationship exists between exchange rate fluctuations and the profitability of manufacturing firms in Nigeria by applying joint variation of the T and F tests and their associated p-values. Austin (2015) assessed the impact of exchange rate on output level of Nigeria during various exchange rate regimes in the country by applying Ordinary least Square (OLS) technique of multiple regressions in the analysis. The results indicated that the exchange rate regimes in Nigeria have insignificant influence on the level of output.

Anubha (2013) investigated the impact of changes in real exchange rate on the Indian manufacturing firms' performance for the period 2000-2012 using Cobb-Douglas production function equation. The results revealed that changes in real exchange rate movements have significant impact on Indian manufacturing firms' performance via costs and revenue channels. The effects depend upon the share of exports and imports in addition to the degree of market power as shown in the time varying firm level mark up. On the other hand, presence of overvaluation of exchange rate negates the beneficial effects of exchange rate appreciation operating via the lower input cost channel. The same cannot be said about the 'price competitiveness' effect working through the export channel.

Opaluwa, Umeh and Abu (2010) examined the influence of exchange rate fluctuations on manufacturing sector in Nigeria for the period 1986-2005 using multiple regression analysis. The variables employed in the study include manufacturing output, foreign direct investment and employment rate. The results indicated that all the independent variables have positive influence on the dependent variable. Fetene (2017) investigated the impact of real exchange rates on manufacturing exports in 10 East African countries through the application of Autoregressive Distributed Lag (ARDL) model to investigate four classes of manufacturing exports. The results showed that in the short run, real exchange rate depreciation has significant effect on exports of labour intensive, low skill and medium skill technology intensive manufacturing. However, the results also showed that real effective exchange rate depreciation worsened high skill technology intensive exports. The results also showed that exchange rate devaluation improves export performance in Eastern Africa. Jongbo (2014) studied the impact of misalignment of real exchange rate on the Nigerian industrial output through the analysis of the macroeconomic policy measures such as transfer of modern technology, restriction of trade, etc, adopted by the Central Bank of Nigeria (CBN) to reposition the economy on the path of sustainable growth. The results showed that real exchange rate has significant impact on industrial output and that foreign exchange increase via contentious export drive from both oil and non-oil products contributes significantly to industrial output growth. The results also revealed that the capacity utilization ratio is low, partly because of epileptic power supply, lack of adequate and appropriate technology, etc. Paulo and Werner (2014) investigated

the effect of real exchange rate overvaluation or devaluation on manufacturing sectors growth in Latin America in comparison to their counterpart in the industrialized economies for the period 1995-2008 using panel data approach. The results indicated that the import content of exports were the important driver of the sectoral level. At the macro level, the openness and the income per capita of a country are determinant factors.

2.4 Gap in Literature

This study is no doubt an improvement on other studies carried out on the effect of exchange rate on the manufacturing output and other related topics in Nigeria and across the globe. Other studies were reviewed mainly to lay credence to this study. However, of all the scholarly studies reviewed, this study observed that the researchers ignored manufacturing sector capacity utilization which is an important variable in an investigation of this kind. Thus, it is against this established gap and the desire to contribute to knowledge in literature that motivated this study

III. RESEARCH METHODOLOGY

The study examines the effect exchange rate policy on the manufacturing sector output in Nigeria from 1981 to 2016. Augmented Dickey-Fuller (ADF) test, Johansen cointegration test, Vector Error Correction Model (VECM) model and Granger causality test would be applied in the analysis. ADF unit root test would be used to investigate the order of integration among the variables of the study. On the other hand, cointegration test would be applied to examine the long run relationship among the variables while VECM model is used to investigate the long run and short run relationships among the variables under consideration. The variables utilized in the study include manufacturing output (MOP), exchange rate (EXR), manufacturing sector capacity utilization (MCU) and import (IMP). Data for the investigation are obtained from the statistical bulletin of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) of various publications for the period ranging from 1981 to 2016.

3.1 Model Specification

The model specified in the study in functional form is as follows:

$$MOP = f(EXR, MCU, IMP) \qquad 1$$

Where; MOP is the Manufacturing output; EXR is the Exchange Rate; MCU is the Manufacturing sector capacity utilization and IMP is the Import.

In linear function, the model is specified as:

$$MOP_t = \phi_0 + \phi_1 EXR_t + \phi_2 MCU_t + \phi_3 IMP_t + \mathcal{E}_t$$
$$2$$

Where, MOP is the dependent variable while EXR, MCU and IMP are the explanatory variables. ϕ is the constant term; $\mathcal{E}_t$ is the stochastic error term while ϕ_{is} are the parameters of the regression equation.

3.2 A Priori Expectation

Theoretically, it is expected that exchange rate and imports will have negative relationship with manufacturing output while manufacturing sector capacity utilization is expected to have positive relationship with the manufacturing output in Nigeria.

IV. EMPIRICAL RESULTS AND DISCUSSION

This stage of the study presents the estimation results and as well discusses the results in accordance with the objectives of the study.

4.1 Stationarity Test

Stationarity test is conducted to examine the order of integration among the variables of the study through the application of the Augmented Dickey-Fuller (ADF) unit root test. The results of the ADF test are shown in the table 1 below.

Table 1: ADF Unit Root Test between TIMP and its determinants

Variables		Level			1st Difference		
		Value	Prob.	Remarks	Value	Prob.	Remarks
MOP		-2.456221	1.0000	Not stationary	-3.923156	0.0230	Stationary
MCU		-2.054694	0.5496	Not stationary	-4.167786	0.0131	Stationary
IMP		-0.779934	0.9572	Not stationary	-5.465925	0.0006	Stationary
EXR		-3.704866	0.5041	Not stationary	-5.233945	0.0001	Stationary
Test Critical Values	1%	-4.273277			-4.285680		
	5%	-3.557759			-3.562882		
	10%	-3.212361			-3.215267		

Source: Researcher's compilation from E-view 9

The table 1 above represents the results of the unit root test through the application of ADF unit root test for the test of the individual time series. The ADF test results revealed that none of the included variables was integrated at levels at any of the levels of significance. However, all the time series were integrated of order one at 5% (0.05) level of significance. This explains the fact that ordinary least square regression may not be a proper technique in estimating the parameter estimates. This is because the outcome may produce spurious coefficients, which are misleading. As a corrective measure, the Johansen approach was used to determine the member of co-integration vectors in the equation.

4.2 Johansen Cointegration Test

Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.812041	106.7706	63.87610	0.0000
At most 1 *	0.603541	54.95318	42.91525	0.0021
At most 2 *	0.496767	26.27251	25.87211	0.0446
At most 3	0.148536	4.984753	12.51798	0.5986

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
Source: Researcher's compilation from E-view 9

Table 3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.812041	51.81744	32.11832	0.0001
At most 1 *	0.603541	28.68067	25.82321	0.0205
At most 2 *	0.496767	21.28776	19.38704	0.0262
At most 3	0.148536	4.984753	12.51798	0.5986

Max-eigenvalue test indicates 3 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
Source: Researcher's compilation from E-view 9

Johansen co-integration test results contained in table 2 confirmed the existence of long-run relationship between or among the included variables in Nigeria as indicated by the Trace statistics and the Max-Eigen statistics. Both the Trace and Ma-Eigen statistics results revealed that there are three co-integrating equations at 5% critical value. This is indicated by the Trace- statistic values of 106.7706, 54.95318 and 26.27251, which are all greater than corresponding critical values of 63.87610, 42.95318 and 25.87211 at 5% level of significance. This result is further confirmed by the Trace probability values of 0.0000, 0.0021 and 0.446, which are all less than 0.05. Similarly, Max-Eigen statistic also confirmed the existence of three co-integrating equation at 5% level of significance. Max-Eigen values of 51.81744, 28.68068 and 21.28776 were all greater than their corresponding critical values of 32.11832, 25.82321 and 19.38704 at 5% critical value. This result was further confirmed by the Max-Eigen probability values of 0.0001, 0.0205 and 0.0265, which are all less than 5% significance level.

The normalized co-integration equation for one co-integration equation given by the long-run is:

MOP = 5766.98 + 2535.55MCU - 27.08IMP - 333.58EXR
       (1675.61)   (744.64)   (2.83)   (265.19)

The equation above reveals that growth in manufacturing output, MOP was positively related to manufacturing capacity utilization, MCU. The relationship between MOP and each of import, IMP, and exchange rate, EXR, was negative. These findings and relationships are in consonance with theoretical submissions. This positive relationship between MOP and MCU is in line with the endogenous growth model. The negative relationship established between each of IMP and EXR is a demonstration of the Marshall- Lerner theory. From the regression result, a unit increase in manufacturing capacity utilization, MCU, say by 1 percent, resulted in an increase in manufacturing output by ₦2535.55 billion. However, as expenditure on import rose by ₦ 1 million, manufacturing output fell by ₦ 27.08 billion. In the same vein, as exchange rate rose by 1 additional ₦ 1, manufacturing output fell by ₦ 333.58billion. The autonomous component of manufacturing output in Nigeria, in the absence of all of manufacturing output, import and exchange rate was ₦ 5766.98 billion.

4.3 Error Correction Mechanism (VECM)

Table 4: Vector Error Correction Estimates

Dependent Variable: MOP				
	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.322091	0.005319	4.153369	0.0001
D(MCU)	0.005112	0.214124	0.023874	0.9810
D(IMP)	11.63037	19.62162	0.592732	0.5547
D(EXR)	-0.200368	0.117534	-1.704770	0.0913
C	15.69595	6.290813	2.495059	0.0142
R-squared	0.611450	Mean dependent var		278.8103
Adjusted R-squared	0.533740	S.D. dependent var		665.5491
S.E. of regression	454.4583	Akaike info criterion		15.24807
Sum squared resid	5163309	Schwarz criterion		15.52562
Log likelihood	-230.3452	Hannan-Quinn criter.		15.89307
F-statistic	7.868366	Durbin-Watson stat		1.886880
Prob(F-statistic)	0.000000			

Source: Researcher's compilation from E-view 9

The existence of a long run co-integrating equation provides for short run dynamics. When the vector error correction mechanism (VECM) was employed to tie the short-run dynamics of the co-integrating equations to their long-run static dispositions, the short-run dynamics of the relationship was absolved. Comparing the result of the short-run relationship, the autonomous component of manufacturing output was positive in the short-run, and remains so in the log-run. Notably, the VECM revealed that the relationship between manufacturing output and import was negative in the short-run. This situation, however, changed in the long-run, where manufacturing output showed a positive relationship with import growth. In the long-run, an increase in manufacturing capacity utilization by 1 percent would result in an increase in manufacturing output by ₦ 0.005 billion. In the same vein, an increase in import by ₦ 1 billion would bring about an increase in manufacturing output by ₦ 11.63 billion. The relationship between exchange rate and manufacturing output remains the same in the long-run. As exchange rate rises by an extra naira to the dollar, manufacturing output would rise by ₦0.20 billion. The speed of adjustment, (ECM-1), which captures the rate at which the system, MOP, adjusts to the equilibrium state after a shock, is 32.21 percent per year (-0.3221). As expected, this value bears a negative sign, and is less than one, an indication that the model is converging towards equilibrium. Thus, if MOP is above its equilibrium value at time t, it will start falling in the next period to correct the equilibrium error. By the same token, if MOP is below its equilibrium value, it will start to rise in the next period, and equilibrium will be restored.

4.4. Causality Test

Table 4: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
IMP does not Granger Cause EXR	32	0.01353	0.9082
EXR does not Granger Cause IMP		4.33308	0.0463
MCU does not Granger Cause EXR	32	1.39117	0.2478
EXR does not Granger Cause MCU		16.7980	0.0003
MOP does not Granger Cause EXR	32	0.04155	0.8399
EXR does not Granger Cause MOP		2.11389	0.1567
MOP does not Granger Cause IMP	32	1.4155	0.8399
IMP does not Granger Cause MOP		7.212	0.0119

Source: Researcher's compilation from E-view 9

Based on the Granger causality test results among the variables under consideration, there were unidirectional causality running from EXR to each of IMP and MCU. There was also causality running from IMP to MOP. There was a causal relationship running from EXR to IMP. This was made evident by the probability value of 0.0463 compared to 5% critical value, and the F-statistic value of 4.33 compared to the tabulated value of 2.69. There also existed a unidirectional causality between EXR and MCU; the causality running from EXR to MCU and not the other way round. The probability value of 0.0003 and the F-statistic of 16.80 confirmed the existence of unidirectional causality. There was also a causality running from IMP to MOP. The corresponding probability value for this causality was 0.0119, which is greater than the 0.05 level of significance. The f-statistic was 7.212, which is greater than the critical value of 2.69.

4.5 Implications of the Findings

All along, and even at present, the manufacturing capacity in Nigeria is been greatly under-utilized; the manufacturing sector has performed below optimum and, as expected, output has been low. Going by the dwindling nature of manufacturing activities, where many manufacturing firms are closing down, the situation in the manufacturing sector would get even worse. Falling manufacturing output would only result in, among other things, falling capacity utilization. This, invariably, would result in economic wastage.

Going by the rate at which the Nigerian economy is import dependent, the economic situation, especially in the manufacturing sector will continue to under-perform, and output would remain low. Here, as more of the Nigerian population relies on imports at the expense of locally manufactured products, the manufacturing sector would remain under-performing, and the manufacturing capacity utilization would remain low. So, the poor performance of the manufacturing sector is not unconnected to the public desire for imported products.

Understandably, increasing manufacturing capacity utilization would result in increasing manufacturing output. However, in the long-run, increase in the use of installed capacity would get to a point where further increase would have little or no more incremental effect on the growth of manufactured products. This is made evident by the fact that, in the long-run, the influence of capacity utilization, as an individual exogenous variable, would exert insignificant impact on manufacturing output. This is in line with the marginal productivity analysis. The Nigerian manufacturing sector would continuously under-perform in the face of decreasing naira value to the dollar. Manufacturers and other producers in the country would always find it difficult to fund the importation of manufacturing equipment in the face of depreciation of the naira exchange rate.

V. CONCLUSIONS

The study examined the impact of exchange rate policy on manufacturing output, using evidence from Nigeria. After the necessary integration, co-integration and correcting the error in the estimated equation, a causality analysis among the relevant variables was undertaken in order to verity the relevance of the exchange rate-led hypothesis to manufacturing sector output growth in Nigeria. The results revealed that growth increasing the quantity of naira exchanged for the dollar caused a fall in the manufacturing output in Nigeria. However, this impact was found to be insignificant. Thus, exchange rate volatility does have significant impact on the growth of manufacturing output in Nigeria. Therefore, since exchange rate volatility has significant impact on the growth of manufacturing output in Nigeria, the study recommends that the policy makers should vigorously pursue macroeconomic policies that will keep the exchange rate of the naira at a tolerably stable low rate. This would help in making Nigerian market more attractive to foreign investors.

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