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THE EFFECT OF EXCHANGE RATE DEREGULATION ON THE MANUFACTURING OUTPUT IN NIGERIA: AN AUTO-REGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

Godwin Edet Bassey
Department of Economics, Faculty of Social Sciences
University of Uyo, Uyo, Akwa Ibom State, Nigeria
godwinbassey07@yahoo.com

Idaraobong Godwin Bassey
Department of Economics, Faculty of Social Sciences
University of Uyo, Uyo, Akwa Ibom State, Nigeria
idybaz1907@gmail.com

Abstract

This study analyzed the relationship between exchange rate deregulation and manufacturing sector output in Nigeria. The study utilized annual time series data from 1986-2017 using Autoregressive Distributed Lag (ARDL) framework. The ARDL results indicated that exchange rates deregulation related negatively with the manufacturing output in Nigeria but its effect was significant only in the third period lag. The study further found that inflation rate related negatively with the productivity of the manufacturing sector at a 10% significance level in the long run. It showed that increased labour employment increased productivity overtime and that gross capital formation has a significant relationship with manufacturing output while increased capacity utilization of the manufacturing sector improved its productivity. It is suggested that to improve the productivity of the manufacturing sector in order to grow the Nigerian economy, emphasis should be laid on export promoting policies, import substituting policies, capacity utilization building through human capacity development and effective exchange rate management policies.

Keywords: Deregulation, Exchange rates, Manufacturing output, ARDL, Nigeria

INTRODUCTION

Industrialization is generally regarded as a major driving force of the modern economy. It is the process of manufacturing consumer goods and creating social overhead capital. Indeed, industrialization is acknowledged as a prerequisite for economic development and an escape route for unemployment, high poverty level, income inequalities, social imbalances while delivering a higher level of welfare, self- reliance, confidence and social harmony for the country and its citizen (Lawal, 2016). The industrial sector of most modern economies serves as a medium for the improvement in other sectors as it propels the production of goods and services which in turn generates more employment thereby improving the income of its people.

Industrialisation in Less Developed Countries (LDCs) such as Nigeria is observed through the performance of its manufacturing sector, consequently the Nigerian government have employed several strategies which are aimed at enhancing the productivity of the manufacturing sector in order to bring about rapid economic growth and development. These strategies include import substitution, export promotion, fiscal, exchange rate and other commercial policy measures adopted to encourage industrialization within the ambit of available resources.

Simon-Oke and Aribisala (2010) observed that the overall growth performance of the manufacturing sector together with its potential capacity utilization has no longer been encouraging despite the massive funding made in the sector by successive Nigerian Government. Although the percentage of manufacturing, which is a sub-sector of the industrial sector in GDP rose from about 4 percentage in 1977 (at 1984 steady prizes) to a height of 13 percentage in 1982, it fell to much less than 10 percent thereafter. This is because the manufacturing sector of Nigeria is characterized by low foreign funding, low capacity utilization, high dependency on foreign factor input, high cost of production coupled with the lack of advanced technological base, low value added and low returns on investment. The manufacturing sector in Nigerian is susceptible to market vicissitudes and heavily import dependent, contributing less than 1% of foreign exchange earnings and making use of about 64% of foreign exchange earned (Lawal and Omotola 2016).

The low growth and production performance of the manufacturing sector in Nigeria is attributed to a number of factors. According to MAN (2006), the manufacturing sector is bedevilled with myriads of problems which act as clogs in the wheels of progress, among which are:

> *"high production costs caused by energy, high interest and exchange rates, influx of inferior and substandard products from other nations, multiplicity of taxes and levies, poor sales partly as a result of low purchasing power of the consumers, bogged*

down with delay in clearing consignments due to existence of multiple inspection agencies at the ports, etc."

In an effort to improve the productivity of the manufacturing sector of Nigeria and also deal with other inhibiting factors that influence its activities, the Structural Adjustment Programme (SAP) was introduced in 1986. A critical component of SAP was the exchange rate deregulation which was intended to make foreign exchange more accessible for production thereby increasing manufacturing output and employment while reducing inflation (CBN 2003). The programme envisaged improving the performance of the manufacturing sector by reducing import dependence and promoting manufacturing for export. A critical component of the reform was exchange rate deregulation which allowed exchange rate determination to be market driven. These exchange rate policies, it was assumed, would enhance increased access to foreign exchange for production thereby increasing manufacturing output and employment while reducing inflation.

Prior to the introduction of the SAP, the Central Bank of Nigeria operated a fixed exchange rate regime. The fixed exchange rate regime was in vogue between 1962 and 1986. At the preliminary stage, the Naira currency was pegged at par with pound sterling. However in 1973, when the British pound was devalued, Nigeria government chose to peg the Naira currency to the dollar currency at an overvalued rate so as to make imports low-priced for the import substituting industries. The management of exchange rate after 1986 became more market oriented. This started by introducing the Second Tier Foreign Exchange Rate Market (SFEM) followed by other exchange rate policies which involved the depreciation of the Naira to ensure efficient allocation of resources. The depreciation of the Naira currency was expected to increase local sourcing of raw materials for production while discouraging the high demands of factor imports for production as was the case in the fixed exchange rate regime, thereby improving the production at the least possible cost.

However, despite the continuous depreciation of the exchange rate value, the manufacturing sector is yet to experience a tremendous increase in its output. This is indicated by the continuous decline in its contribution to GDP. Thus this study is aimed at finding out if exchange rate deregulation has any effect on the output of the manufacturing sector in Nigeria.

The rest of the paper is organized into four sections. Section two reviews relevant theoretical and empirical literatures while section three explains the methodology employed in the analysis. Data presentation, analysis and interpretations are discussed in section four. The fifth section summarizes the findings, makes conclusions and policy recommendations.

LITERATURE REVIEW

Theoretical Framework

Although there are several theories on the nexus between exchange rates deregulation and economic growth, five of these theories are reviewed in this study and are briefly discussed in this section.

Optimal Currency Area (OCA) Theory

The Optimal Currency Area (OCA) theory was developed by Mundell (1961) and McKinnon (1963) and it has served as the theoretical foundation for the choice of exchange rate regimes in different countries. This theory involves business cycle stabilization and trade. It uses the concept of trade openness, labor market mobility and symmetry of shock to determine the exchange rate. According to the theory, trade and output can increase by reducing the uncertainty of exchange rates. It opined that in a fixed exchange rate regim,' the cost of hedging is reduced and investment is encouraged through the lowering of currency premium from interest rates. However, due to the delay in the adjustment of necessary relative prices, trade can reduce and output growth can be stopped, delayed or slowed.

Purchasing Power Parity

The Purchasing Power Parity (PPP) concept is traced back to the Salamanca School in the 16th-century Spain. It illustrates the relationship between prices and exchange rates. The Purchasing Power Parity (PPP) concept was used for the first time as a theory of exchange rate determination by Gustav Cassel (1918) in his work "Abnormal deviations in international exchanges". He recommended the adoption of PPP as a tool for amending the exchange rates parities that existed before World War1 for countries which decided to return to the gold standard system after the war ended (Bordo and Schwartz, 2009). Modification to the exchange rate parities that existed before the war was necessary as extensive inflation was experienced by the countries that left the gold standard system during and after the war. The Absolute PPP by the principle of exchange rate determination is the easiest and most powerful form of PPP. The absolute PPP is based on the law of one price, international multi-good.

In the Absolute PPP, exchange rate is expected to adjust to equate with the prices of national baskets of goods and services between two countries because of market forces driven by arbitrage. Obaseki (1997) asserted that the PPP theory is simply an application of the law of one price to national price levels rather than to individual prices. This implies that under the PPP theory, exchange rates between any two countries are adjusted to reflect changes in the price levels of the two countries.

The Monetary Model of Exchange Rates

The Monetary Approach determines exchange rate using the monetary policies of two countries. A change in the domestic money supply leads to a change in the level of prices and a change in the level of prices leads to a change in the exchange rate (Stockman, 1983). Exchange rates according to this theory are determined by equating the total demand and supply of money in each nation. According to the monetary approach, the nominal demand for money in the long run is stable and positively related to the level of nominal national income but it is inversely related to interest rate. The nation's money supply is equal to its monetary base times the multiplier. The domestic credit created by its monetary authorities plus its international reserve makes up the nation's monetary base. It opines that, there would be an outflow of reserve or deficit in the balance of payments in a nation with excess supply of money under fixed exchange rates except it is satisfied domestically but in a flexible exchange rate regime excess supply of money in a nation will lead to a depreciation of the nation's currency (without any international flow of reserves). The opposite takes place with an excess demand for money in the nation (Johnson, 1977).

The Portfolio Balance Approach

The portfolio balance approach is also known as the asset market approach. This approach of determining exchange rate differs from the monetary approach in that, domestic and foreign bonds are assumed to be imperfect substitutes. It postulates that Exchange rates are determined by equilibrating or balancing the total demand and supply of financial assets (of which money is just a part) in each country. Being an extension of the monetary approach, the portfolio balance approach focuses on the role of bonds in determining exchange rates. According to this approach, the demand and supply for domestic and foreign bonds is affected directly by any change in the economic conditions of a country. This effect on the demand and supply for bonds will in turn affect the exchange rates between the domestic and foreign economies. The determination of exchange rates using the portfolio balance approach is regarded to be a more pragmatic and reasonable version of the monetary approach. In the portfolio balance model, individual and firms hold their financial wealth in some combination of domestic money, domestic bond, and a foreign bond denominated in foreign currency (Thomas, 1985).

Uncovered Interest Rate Parity (UIP)

This theory states that an appreciation or depreciation of one currency against another might be neutralized by a change in the interest rate differential between the two countries. In other

words, UIP states that the expected rate of depreciation of one currency against another is equal to the interest rate differential between the two currencies (Pilbeam, 2006). This can be expressed as:

UIP = r*- r

Where r* = foreign interest rate and

r = domestic interest rate

This theory holds under the crucial assumptions that there is perfect capital mobility among countries and that asset of equal maturity and risk are perfect substitutes.

Theories of Exchange Rate and Productivity

The Costs of Innovation and Technology

This class of theories focuses on the direct factor cost effect of an exchange rate change on the profit maximizing level of productivity-improving investments. It hypothesized that exchange rate could affect the relative price of labour and capital and if those prices change, then there are changes in the substitution of capital for labour in the production process. According to Harris (2001) an increase in the cost of new imported capital goods reduces the rate at which new technology is installed or investments in innovation occur while exchange rate uncertainty can increase the cost of capital by raising the option value of 'waiting' for an irreversible capital installation. Temporary exchange rate depreciation may have an inter-temporal substitution effect on a profit maximizing firm which reduces the return on productivity enhancing activities and raises the return on short-run output increases. That is, if exchange rate depreciates the price of capital goods increases, firms use more labour to capital, the capital/labour ratio increases at a slower pace, and labour productivity increases gradually.

Industry Dynamics

Many studies have identified firm level heterogeneity, entry and exit as major sources of productivity growth (40 to 50%) of all productivity growth in some industries, as summarized in Foster et. al. (1998). Large and unanticipated exchange rate depreciation can have consequences for both entry and exit of firms via a variety of channels:

a) It can impact the relative profitability of old versus new firms; old firms have sunk costs and exchange rate depreciation will tend to reduce their rate of exit while at same time it raises the cost of entry (due to investments in technology required). This can slow the overall rate of industry productivity growth.

b) Grubel (1999) has noted that previously marginal entrants in industries with low entry costs may now find it profitable to enter bringing down productivity growth in the industry as a whole as the output share of the low productivity group increases.

c) Entrepreneurship and the supply of human capital will respond to the depreciation. A real depreciation can reduce the returns to skilled labour via Stolper Samuelson effects if the tradable sector is human capital intensive, and it can induce entrepreneurial and skilled labour out-migration in response to exchange rate induced real income decreases (Harris, 2001).

Managerial Theories of the Firm

These are classes of theories of the firm based on imperfect monitoring and principal-agent problems that managerial discretion will lead to management utility maximization rather than profit maximization. In this case managers may be less motivated to reduce costs, innovate, and restructure if exchange rate depreciations provide cost sheltering effects. The exchange rate sheltering hypothesis argued that lower exchange rate increases cost competitiveness, reduces the need for business to stay competitive and therefore, less effort is made to improve productivity. This is also known as the 'lazy manufacturer's hypothesis' (Laidler and Aba, 2002).

Empirical Literature

The Manufacturing sector in Nigeria is highly dependent on import for production especially for capital goods and considering the role of exchange rate management in the performance of the manufacturing sector, a number of writers have expressed their interest and position on this issue. Shehu (2009) using a quarterly data from 1986Q1 to 2007Q4, examined the impact of oil price shock and real exchange rate volatility on real economic growth in Nigeria. Results from Granger pair wise causality test revealed unidirectional causality from oil prices to real GDP and bidirectional causality from real exchange rate to real GDP and vice versa. Further findings indicated that oil price shock and appreciation in the level of exchange rate has positive impact on real economic growth in Nigeria. The paper recommended diversification of the Nigerian economy by making investment into key sectors of the economy that are promising to guard against the repercussion of oil price shock and exchange rate volatility.

Opaluwa, Umeh and Abu (2010), in their study examined the effect of exchange rate fluctuations on the manufacturing sector in Nigerian for the period 1986 – 2005. The result of the analysis showed that there is a significant negative effect of exchange rate fluctuations on the economic activities of the Nigerian manufacturing sector. It was noticed that the manufacturing sector performances are influence by other factors asides exchange rates such the availability of financial capital, poor technological development, poor socio-economic infrastructure and shortage of technical manpower. They noted that exchange rate devaluation has not performed optimally in promoting the manufacturing sector due to the aforementioned factors. Thus the result of the analysis indicated an inverse relationship to exist between exchange rate fluctuations and the manufacturing sector performances.

Dada and Oyeranti (2012) analysed the impact of exchange rate on macroeconomic aggregates in Nigeria using annual time series data for the period 1970 to 2009. The research examined the relationship between real exchange rates and GDP growth using a simultaneous equations model and a vector-autoregressive model. The estimated results indicated that there was no direct significant relationship between changes in the exchange rate and GDP growth. The study pointed out that the Nigerian economy is affected directly by fiscal and monetary policies and other economic variables as well as the increase in oil exportation. They concluded that the earlier mentioned factors have contributed to the sustained pattern of the over-valuation of the real exchange rate which is not favourable for growth.

Asher (2012) studied the impact of exchange rate fluctuations on the Nigeria economic growth for period of 1980 – 2010. The result indicated that real exchange rate had a positive effect on the growth of the Nigerian economy. Also, a similar study by Enekwe (2013) confirmed that exchange rate fluctuations have a positive effect on manufacturing sector in Nigeria. However, the study showed that exchange rate fluctuations have an insignificant effect on the production performance of the Nigerian manufacturing sector.

Ayodele (2014), analysed the impact of exchange rate on the economic performance of Nigeria using the Ordinary Least Squares (OLS) method. Covering a period of 13 years from year 2000 to year 2012, the study indicated that exchange rate had a negative relationship with the GDP. King-George (2013) examined the effect of exchange rate fluctuations on the Nigeria manufacturing sector, using annual time series data for the period 1986 to 2010. Employing the Ordinary Least Square (OLS) techniques, the results showed that exchange rate has no significant effect on the growth of the Nigerian economy.

Olufayo and Fagile (2014) examined in their work the impact of the volatility of exchange rate on the Nigeria export sectors (oil and non-oil) performance. Seemingly Unrelated Regression (SUR) was employed in examining the volatility of exchange rate; GARCH (generalized autoregressive conditional heteroscedasticity) was employed in examining the effect of floating exchange rate policy on the volatility of the nominal exchange rate. The result indicated that exchange rate is volatile and has a significantly negative relationship with the oil and non oil export sectors performance.

Azu and Nasiri (2015) researched on exchange rate fluctuations and sustainable economic growth in Nigeria, covering the period 2004 to 2014. Analysing the data using (vector auto regression analysis) VAR technique, the authors found that RER fluctuation was significantly and positively related to real import while maintaining negative relations to real GDP and foreign direct investment.

Lastly, Nsofor, Takon and Ugwuegbe (2017) investigated the effect of exchange rate volatility on economic growth in Nigeria using the Generalized Autoregressive Conditional Hetroscedasticity (GARCH) technique. The result showed that exchange rate volatility has a negative but significant impact on economic growth in Nigeria.

RESEARCH METHODOLOGY

Sources of Data and Rationale Data Selection

The study employs time series secondary data for the period (1986-2017) for its econometric analysis. The data used for this research work are time series secondary data comprising Manufacturing Output/GDP ratio, Exchange Rate, Inflation Rate, Gross Fixed Capital Formation, Capacity Utilization and Labour Employment in the Manufacturing sector. These data and other relevant information used in this study were sourced from the CBN Statistical Bulletin, World Development Indicators and National Bureau of Statistics.

The rationale for the choice of the variables used in our model is the Cost of Innovation and Technology theory (earlier reviewed), proposed by Harris (2001).This theory hypothesized that exchange rate could affect the relative price of labour and capital and if those prices change, then there are changes in the substitution of capital for labour in the production process. An increase in the cost of new imported capital goods reduces the rate at which new technology is installed or investments in innovation occur while exchange rate uncertainty can increase the cost of capital by raising the option value of 'waiting' for an irreversible capital installation. Hence we include Fixed Capital Formation as a proxy for investment and labour employment in the manufacturing sector, being important components of the neo-classical production function. Capacity Utilization is used to capture production efficiency in the manufacturing sector while other variables are to condition for effect of policy changes.

Specification of the Model

The following ARDL model was specified to test the co-integration relationship between Manufacturing Output, Exchange Rate, Inflation, Government Fixed Capital Expenditure, Capacity Utilization and Labour Employment in the Manufacturing sector. We specified our model below as;

ManGDP = F (EX, INF, GFC, MCU, LEM) - - (1)

This can be stated in econometric form as follows:

$$ManGDP_i = \lambda_0 + \sum_{i=1}^{p} \gamma_i ManGDP_{t-i} + \sum_{i=0}^{q} \theta_i EX_{t-i} + \sum_{i=0}^{q} \beta_i INF_{t-i} + \sum_{i=0}^{q} \alpha_i GFC_{t-i} + \sum_{i=0}^{q} \varphi_i MCU_{t-i} + \sum_{i=0}^{q} \phi_i LEM_{t-i} + \mu_t \quad - \quad - \quad (2)$$

ManGDP = Manufacturing Output as a percentage of Gross Domestic Product (GDP)
EX = Exchange Rate
INF = Inflation Rate
GFC = Gross Fixed Capital Formation
MCU = Capacity Utilization
LEM = Labour Employment in the Manufacturing Sector
p and q = the optimal lag length of the dependent and explanatory variables respectively
γ, β, α, φ, θ and ϕ = coefficients of the variables
λ = constant
i = 1, . . ., k for the dependent variable while for the explanatory variable i = 0, 1, . . ., k
μ= the white noise error term (serially uncorrelated or independent).

Data Analysis Technique

The Ordinary Least Square method of analysis was employed in this study. The unit root test was carried out to examine the order of integration of the selected variables. This was done to ensure that the selected variables were stationary either at levels or at first difference as the presence of a second difference variable in ARDL model would render the computed F-statistics invalid (Pearson et al. 2001). The Phillip Peron (PP) and Augmented Dickey Fuller (ADF) tests were conducted in order to establish stationarity in the series. In order to investigate the long run relationship and dynamic interactions between manufacturing output and exchange rate fluctuations, the Auto Regressive Distributed Lag (ARDL) co-integration (bound test) as developed by Pesaran et al. (2001) was used to estimate the model.

Measurements and a priori expectation of Variables

Manufacturing Output to GDP Ratio (ManGDP): Man GDP was used here as a proxy for manufacturing sector performance**.** It indicates the contribution of the manufacturing industries to total output (GDP).

Exchange Rate: The exchange rate is the price of a domestic currency in terms of a foreign currency. The effect of Exchange rates on manufacturing output is ambiguous due to its effect on import and export. Depreciation will induce industrial production through export growth as local products are cheaper in the international market and producers increase their production level to meet the demand for their products. An appreciation will reduce industrial production through import growth as importation of foreign products becomes less expensive using the domestic currency making domestic industries to compete with foreign industries for market to sell their product thus reducing their productivity.

Inflation Rate: It is the consistent rise in the general price level of goods and services produced in an economy. According to the Neo-Keynesians, inflation lowers real rate of returns on financial investment and increases investment in physical capital. The resulting increase in capital intensity would increase output and savings (Meier, 1976). Thus, inflation rate influences the manufacturing sector output positively. The monetarists on the other hand argue that inflation impedes financial deepening and therefore retards economic growth through its negative effect on financial development (Bullard and Keating, 1995; king and Levine, 1997; Bruno and Easterly, 1999). In this study, we expect inflation rate to relate negatively with manufacturing output.

Gross Fixed Capital Formation: It is also known as gross domestic investment. It consists of expenditures in procuring fixed assets of the economy like machinery, road constructions, hospitals, industries in addition to the net changes in the level of inventories. The provision of machinery, equipment and productive capital goods is expected to improve the productivity of the manufacturing sector.

Capacity Utilization: This is a measure of the relationship between actual output and potential output that could be produced with installed capacity fully utilized. Capacity Utilization has a positive relationship with manufacturing output.

Labour Employment: this includes forms of man power, expertise, manpower, and service used in the production process of an organisation or industry. It ranges from skilled (trained) and unskilled labour. The availability of labour for the production process of the manufacturing sector is expected to increase its productivity.

ANALYSIS AND RESULTS

Stationarity of Series Test

Table 1: Unit Root Test Results

	Augmented Dickey – Fuller (ADF) Test				
Variables	Level	Probability	First Difference	Probability	Order of Integration
MAN	-2.071054	0.2570	-3.052096**	0.0418	I(1)
MCU	-0.337206	0.9080	-3.292109**	0.0243	I(1)
INF	-1.416130	0.5582	-4.713085***	0.0010	I(1)
EXC	1.801195	0.9996	-3.054882**	0.0412	I(1)
GFC	-1.30367	0.6152	-5.643899***	0.0001	I(1)
LEM	-1.413791	0.5628	-5.685045***	0.0001	I(1)

Phillip-Peron Test Using Adjusted t- Statistic					
Variables	Level	Probability	First Difference	Probability	Order of Integration
MAN	-1.19928	0.6620	-5.51077	0.0001***	I(1)
MCU	-0.240224	0.9228	-3.20116	0.0298***	I(1)
INF	-2.78848	0.0715*	-6.17874	0.0000***	I(0)
EXC	1.440122	0.9987	-3.05488	0.0412**	I(1)
GFC	-1.88893	0.3329	-7.926707	0.0000***	I(1)
LEM	-1.39114	0.5737	-5.68504	0.0001***	I(1)

Source: computed by authors using E-Views 9

*Note: *, **, *** denotes significance at 10%, 5% and 1% respectively.*

The unit root test of the ADF indicates that the variables are stationary at first differencing while the PP stationarity tests indicates that INF is stationary at levels but the rest are stationary at first differencing.

Co-Integration Test

It had been identified that the series of the variables are integrated of zero *I*(0) and *I*(1).

Table 2: ARDL Bound Test

Test Statistic	Value	K
F-statistic	4.9488	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: computed by authors using E-Views 9

From Table 2, the bound test result indicates that there exists a long run relationship amongst the variables as the F-statistic value of 4.9488 exceeds both the lower and upper bound critical values. Thus we reject the null hypothesis of no long run relationship and accept its alternative.

The Autoregressive Distributive Lag (ARDL) Model

The Akaike info criterion (AIC) was the model selection method adopted. 2048 models were evaluated using ARDL Selected Model (2, 3, 0, 3, 3, 3).

Table 3: ARDL Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
MANGDP(-1)	0.436507	0.220412	1.980417	0.0790*
MANGDP(-2)	0.554066	0.248246	2.231921	0.0525**
EX	0.001557	0.005613	0.277331	0.7878
EX(-1)	-0.007467	0.009337	-0.799703	0.4445
EX(-2)	-0.002919	0.010437	-0.279690	0.7860
EX(-3)	-0.043564	0.014368	-3.031930	0.0142*
INF	-0.029535	0.014165	-2.085049	0.0667*
GFC	-0.158458	0.074480	-2.127521	0.0623*
GFC(-1)	-0.119477	0.055971	-2.134635	0.0616*
GFC(-2)	0.013372	0.047510	0.281457	0.7847
GFC(-3)	0.058987	0.050809	1.160961	0.2755
MCU	0.025925	0.024630	1.052565	0.3200
MCU(-1)	0.050681	0.036376	1.393274	0.1970
MCU(-2)	0.047308	0.055485	0.852641	0.4160
MCU(-3)	0.043103	0.036248	1.189119	0.2648
LEM	1.578348	1.255753	1.256894	0.2404
LEM(-1)	-1.183826	1.517685	-0.780021	0.4554
LEM(-2)	2.492582	1.315538	1.894724	0.0906*
LEM(-3)	1.394686	1.336645	1.043423	0.3240
C	-47.73094	16.78981	-2.842851	0.0193*

R-squared 0.967927 **Durbin-Watson stat 2.445272**

Prob(F-statistic) 0.000151 **F-statistic 14.29534**

Source: computed by authors using E-Views 9

*Note: *, **, *** denotes significance at 10%, 5% and 1% respectively.*

Table 3 presents the ARDL model results using a maximum lag period of 2 for the dependent variable and 3 for the regressors, and indicate that behaviour of the variables in different time periods. It is observed that ManGDP for the previous periods is significant and positively related to the manufacturing output. A 1% increase in the previous year's ManGDP will cause a significant rise in manufacturing output by 0.43%. Exchange rate on the other hand affects negatively the output of the Manufacturing sector in the third lag period at a 1% significance level. The effect of Inflation rate on the Manufacturing Output is negative and significant; this conforms to the a priori expectation. GFC and MUC have no significant effect on the

manufacturing sector at the different lag periods. LEM however, affects significantly the output of the Manufacturing sector in the second lag period.

The R^2 value indicates that 97% of the total variation in the dependent variable (MAN) is explained by the independent variables. The F-statistic is statistically significant at the 1% level indicating the overall model is significant. The Durbin-Watson statistic reveals the absence of serial correlation in the model.

Table 4: ARDL short-run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MANGDP(-1))	0.236584	0.248246	0.953023	0.3655
D(EX)	-0.031612	0.005613	-5.631470	0.0003***
D(EX(-1))	0.002919	0.010437	0.279690	0.7860
D(EX(-2))	0.043564	0.014368	3.031930	0.0142***
D(INF)	-0.029535	0.014165	-2.085049	0.0667*
D(GFC)	-0.158458	0.074480	-2.127521	0.0623*
D(GFC(-1))	-0.013372	0.047510	-0.281457	0.7847
D(GFC(-2))	-0.058987	0.050809	-1.160961	0.2755
D(MCU)	0.025925	0.024630	1.052565	0.3200
D(MCU(-1))	-0.047308	0.055485	-0.852641	0.4160
D(MCU(-2))	-0.043103	0.036248	-1.189119	0.2648
D(LEM)	1.578348	1.255753	1.256894	0.2404
D(LEM(-1))	-2.492582	1.315538	-1.894724	0.0906*
D(LEM(-2))	-1.394686	1.336645	-1.043423	0.3240
ECM(-1)	-2.041328	0.164038	-12.444251	0.0000***
ECM = MANGDP - (-0.0419*EX -0.0145*INF -0.1007*GFC + 0.0818*MCU + 2.0976*LEM -23.3823)				

Source: Computed by authors using E-Views 9

*Note: *, **, *** denotes significance at 10%, 5% and 1% respectively*

Table 4 shows the short run estimates of the model. It is indicated that Exchange rate is significant in both the present period and the third year lag, having a negative and positive relationship respectively with manufacturing output. INF and GFC have a negative and statistically significant effect on ManGDP in their present period. LEM also affects ManGDP significantly but in the previous period The ECM(-1) which is the error correction term has a coefficient estimate which is negative and also significant at 1%. It indicates the model to adjust toward long run equilibrium at speed of 204.1% annually. This speed of adjustment however, indicates over adjustment and may not be practicable.

Table 5: ARDL Long-run Estimates

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	-0.041915	0.011304	-3.708022	0.0049***
INF	-0.014468	0.007541	-1.918592	0.0873*
GFC	-0.100707	0.040648	-2.477527	0.0351**
MCU	0.081818	0.025277	3.236841	0.0102***
LEM	2.097551	0.725098	2.892781	0.0178**
C	-23.382295	8.137272	-2.873481	0.0184**

Source: computed by authors using E-Views 9

*Note: *, **, *** denotes significance at 10%, 5% and 1% respectively.*

The ARDL Long run estimates reported in Table 5 indicates that all the independent variables employed are statistically significant in the long run. Exchange rate has a significant negative impact on manufacturing output in Nigeria at 1% level of significance. It indicates that a unit increase in exchange rate reduces the index of manufacturing production by 4.2%. This indicates that, in the long run a depreciation of exchange rate (increase in the naira price of dollar) brings about a fall in manufacturing output due to higher cost of importation. Nigerian manufacturers depend largely on imported raw materials for production and a rise in the exchange rate used in the procurement of these imported inputs causes a rise in the cost of production thereby forcing output to fall. Even when depreciation in the exchange rate makes the export market to grow, the nature of goods mainly exported from the Nigerian manufacturing sector are primary products which are characterised by low price elasticity. This hinders the exporters from taking advantage of this depreciation in exchange rate to improve their productivity.

Inflation rate in the Table 5 has a negative impact on the manufacturing sector which is statistically significant at 10%. Thus a unit increase in inflation rate would lead to a decrease in the production level of the manufacturing sector in Nigeria by 1.4%. Gross Fixed Capital Formation is found to relate negatively with the manufacturing sector at 5% level of significance. This is in contrast to the earlier stated expectations of GFC. Labour employment in the manufacturing sector is indicated to have a statistically positive and significant relationship with manufacturing productivity. This finding is in line with our a priori expectation and may suggest that manufacturing output increases by 2.1% whenever labour productivity increases by 1%. Manufacturing capacity utilization has a positive and significant impact on the output of the manufacturing sector in Nigeria. This indicates that a unit increase in capacity utilization would

bring about 8.1% increases in manufacturing production index. This conforms to our a priori expectations that increase in capacity utilization through effective and efficient use of capital resources will improve the production index in the manufacturing sector in Nigeria.

SUMMARY OF THE FINDINGS AND CONCLUSION

This study set to out find the effect of exchange rate deregulation on the Manufacturing Sector output in Nigeria for the period (1986-2016). To investigate this problem, annual time series data on manufacturing output, exchange rate, inflation rate and capacity Utilization for the period under study were subjected to unit root test to find out the levels of stationarity. From the test, the variables were stationary at the orders of zero and one leading to the adoption of ARDL bound test by Pesaran (2001) to determine if these variables were cointegrated. From the result, the variables exhibited a long run relationship as the bound test indicated that F-statistic value exceeded the values of the critical bounds. Using E-views the long run estimates and the short run estimates from which the Error Correction term was obtained were derived and validated by the diagnostic tests.

From the results it was observed that in the long run exchange rate deregulation has a negative and significant effect on the manufacturing output in Nigeria although the magnitude of this effect is small. It was also observed the short run estimate of the exchange rate is also negative and statistically significant. This suggests that the continuous sliding in the value of the Naira due to exchange rate deregulation negatively affects manufacturing output in Nigeria. Apart from exchange rates, the rate of inflation, labour employment, gross fixed capital formation and capacity utilization also have significant effects on the manufacturing output in Nigeria in the long run. It was also observed that the coefficient of Error Correction term was negative and significant at a 5%, where the coefficient signified the gap between the long run equilibrium and the actual value of the dependent variable that has been corrected.

From the study it is concluded that there is a negative relationship in the long run which has a significant impact on the production level of the manufacturing sector in Nigeria. In the long run producers vary all their factors of production including imported raw material and capital goods and being highly dependent on imported raw materials for production, the cost of producing becomes higher making production to fall. Also, due to production and consumption rigidities in the manufacturing sector, continuous sliding in the value of the Naira as a result of deregulation, increases unit cost and prices of manufactured exports, making them uncompetitive in international market. It is also found that the manufacturing output is influenced significantly by other variables such as inflation rate, labour employment, gross capital formation and the capacity utilization levels both in the long run and short-run.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. There is the need to intensify efforts at local sourcing of raw materials and inputs through strong inter-sectoral linkages with agricultural sector. The government should fashion out a technological policy aimed at developing local engineering industries for local fabrication of inputs. By so doing, overreliance on the international market for raw materials will be reduced thus reducing the demand pressure on foreign exchange and the attendant negative effect of uncertainty in exchange rate on the country's manufacturing output.
2. Government should be very cautious while devaluing the nation's currency to avoid retaliatory effects, and also maintain stability in the exchange rate. Changes in exchange rate management strategy should be allowed to run a reasonable course of time. Jettisoning strategies at will and on frequent basis has implication for exchange rate stability and obviously poses negative consequences for a sector that depends on foreign inputs. The monetary authority should also monitor the unethical practices of some commercial banks which have resulted in much fluctuation in the rate of exchange.
3. Government should place restrictions on trade openness for products that can be produced locally because over importation with a depreciating exchange rate increases production cost which in turn reduces productivity. Restriction such as import tariffs, quotas should be placed on imported goods to reduce importation and tax holidays, subsidies should be given to local industries especially infant industries so as to encourage them take advantage of export market incentives.
4. Capacity utilization and technology have influenced industrial output, the government should provide enabling environment in terms of constant power supply, adequate security of life and property and modern technology for industrial sector to thrive. Firms also have to pay more attention to Research and Development (R&D) activities, while policies that can improve the competitiveness of local substitutes for imported raw materials should be implemented.
5. There is need for training and retraining of manpower in the manufacturing sector to improve labour productivity in the sector.

SCOPE FOR FURTHER STUDIES

This study has focused more on macro analysis of the effect of exchange rate deregulation on the manufacturing output in Nigeria. There is the need for micro analysis of the factors driving the demand and supply of foreign exchange in Nigeria. There may be need also for further studies on the optimal level of exchange rate that is conducive for the growth of the

manufacturing sector in Nigeria. This will assist our policy makers in fashioning out policies to improve the management of exchange rates to boost manufacturing output in Nigeria.

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World development indicators data 2016

APPENDIX

NIGERIA-DATA ON SELECTED MACROECONOMIC VARIABLES 1986-2016

Year	ManGDP	EX	INF	GFC	LEM	CU
1986	9.01470	2.02	5.72	54.948	12.036	38.8
1987	9.15950	4.02	10.76307	50.050	12.04	40.4
1988	9.97874	4.54	43.23124	43.755	12.051	42.4
1989	9.25192	7.39	40.76702	52.487	12.043	43.8
1990	8.65410	8.04	7.221821	53.122	12.008	40.3
1991	8.45362	9.91	11.96029	48.400	12.059	42
1992	8.96326	17.3	37.16889	43.774	12.093	38.1
1993	8.56433	22.05	45.08903	44.476	12.011	37.2
1994	8.36232	21.89	45.02409	42.068	11.869	30.4
1995	7.82469	21.89	54.76151	37.206	12.01	29.29
1996	7.55475	21.89	25.6731	36.582	12.035	32.46
1997	7.38823	21.89	8.175842	38.422	11.99	30.4
1998	6.32449	21.89	9.523385	40.553	11.807	32.4
1999	6.49914	92.69	6.394197	38.278	11.819	34.6
2000	6.35613	102.11	6.715325	34.049	11.993	36.1
2001	6.59537	111.94	18.41612	30.038	11.838	40.03
2002	6.26321	120.97	10.98616	26.769	12.031	54.9
2003	6.04895	129.36	13.12208	28.371	12.01	56.5
2004	6.12054	133.5	13.98571	26.063	11.792	55.7
2005	6.27349	132.15	16.43722	24.966	11.724	54.8
2006	6.43644	128.65	7.9111	26.166	11.567	55.3
2007	6.57821	125.83	5.244103	20.180	11.507	55.38
2008	6.69174	118.57	10.95408	18.860	11.525	53.84
2009	6.26485	148.88	10.92343	21.115	11.394	55.14
2010	6.55281	150.3	12.85154	16.815	11.654	56.22
2011	7.33109	153.86	9.531018	15.676	11.744	57.7
2012	7.31464	157.5	12.2861	14.211	11.764	59.8
2013	9.21619	157.31	8.134061	14.169	11.807	58.2
2014	9.06026	158.55	7.755381	15.084	11.794	59.9
2015	9.54251	193.28	8.629095	14.827	11.683	53.7
2016	9.27736	250.36	15.68	14.725	11.582	48.5
2017	9.182	305.79	16.5	14.716	11.562	85.2

Source: CBN annual statistical bulletin 2017