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MACROEONOMIC DETERMINANTS OF CAPACITY UTILIZATION IN THE NIGERIAN MANUFACTURING SECTOR

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ABSTRACT: ***Manufacturing sector plays a decisive role in the economic growth and development of nations. The sector is one of the key drivers of the Nigerian economy. This study is an attempt to empirically examine if there is any link between selected macroeconomic variables and manufacturing sector capacity utilization in Nigeria. The study covered the period from 1981-2017. The study utilized secondary data which were subjected to rigorous diagnostic tests and certified fit for empirical use. Data analysis was done using Autoregressive Distributed Lag (ARDL). In the model formulation, the macroeconomic variables were introduced to measure both their individual and joint effects on capacity utilization of the manufacturing sector. The choice of the ARDL model lies in its flexibility that it can be applied when the variables are of a different order of integration. The overall regression result as depicted by the F- statistic and the attendant probability values proved that the macroeconomic variables exerted significant influence on the manufacturing capacity utilization in Nigeria. Among other things, the study recommended that the government should consciously deploy polices that will drive down the consumer price index, interest rate and exchange rate to tolerable levels to ensure better utilization of resources for enhanced capital formation and economic development in Nigeria.***

Keywords*: Manufacturing capacity utilization, Macroeconomic variables, Nigeria*

INTRODUCTION

The performance of many manufacturing companies no doubt is a major source of concern to both researchers and managers of the economy. The manufacturing sub-sector in Nigeria has remained largely underdeveloped and has therefore not effectively delivered on its growth and development functions in spite of various government policy initiatives aimed at promoting its performance. Government efforts at revamping the manufacturing sub-sector and re-position it as the bedrock of industrial development through policy initiatives like the establishment of the Bank of Industry (BOI), Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), etc. and even the recent establishment of intervention funds like the N200 billion Small and Medium Scale Enterprises Credit Guarantee Scheme (SMECGS) in 20 I 0, the N200 billion Restructuring/Refinancing Facility (RRF) to the manufacturing sub-sector also in 20 I 0, etc. have not impacted significantly on capacity utilization in the sub-sector (Okoye, Modebe, Okoh & Ahmed, 2018).

The Manufacturing sector is regarded as a very important sector in an economy because of its capacity to foster wide and efficient backward and forward linkages among different sectors of the economy. Capacity utilization is an important determinant of economic development and growth and a priori reason for its analysis in a developing economy becomes evident. In most developing economies, the economic resources (especially capital and skilled labour) which are needed for rapid economic development are both scarce and expensive and cannot easily be augmented of financial resources, technical know-how and element of time factor.

Maffioli, & Salazar (2017), argued a causal effect of industrial policies on employment and industrial output in any sector, industry and ultimately the economy at large. The authors argued that the falling performance of the manufacturing sector was adjudged to have led to the closure of many manufacturing companies. The development has contributed immensely to the high unemployment rate in Nigeria through retrenchments and contraction of job openings to job seekers. Low manufacturing performance has equally contributed to the slow development of the agricultural sector of the country because the manufacturing sector lacks the requisite capacity to utilize agricultural products as inputs. The result is that potential income to farmers from manufacturing sector demand for farm produce is highly restricted. Based on the fact that Nigeria's agricultural sector accounts for the greatest share of employment, it is evident that the poor linkage between it and the manufacturing sector fuels unemployment and increases the incidence of poverty.

A growing manufacturing sector reduces poverty, disease and ignorance through wealth creation and employment generation. Despite this potential, the performance Nigeria's manufacturing sector has been declining over the years. This downward trend has been noticeable since the early period of the 1980s. According to Onodje (2014), the share of manufacturing sector contribution to the Gross Domestic Product (GDP) fell from 11.0% in 1980 to 4% in 1998, stagnating around 4% up to 2012. The reasons advanced for the unsatisfactory performance of Nigeria's manufacturing sector can be grouped broadly under internal and external factors.

Doing Business captures several important dimensions of the regulatory environment and provides quantitative indicators on regulation for starting a business, dealing with

construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. A robust manufacturing sector is the engine of growth in both developed and developing economies.

The broad objective of this study is to examine the influence of the selected macroeconomic variables on manufacturing capacity utilization in Nigeria. The rest of the paper is organized as follows: section two is on literature review. This is followed by the research methodology and data analysis in section three and four respectively. Section five concludes the paper with some policy recommendations.

LITERATURE REVIEW

According to Adeyemi and Olufemi (2016), **c**apacity utilization is a concept in economics, which refers to the extent to which an enterprises or a nation actually uses its installed productive capacity. Thus, it refers to the relationship between actual output produced and potential output that could be produced with installed equipment if capacity was fully used. Capacity utilization in industry is described as "the level of utilization of an industry's installed productive capacity" . An industry would be said to be performing optimally when its installed production capacity is fully utilized.

Empirical Studies

Anjola et al (2018) examined the macro-economic determinants of industrial output in relation to exchange rate and employment in Nigeria. The study employed the Autoregressive Distribution Lag (ARDL) econometric approach to co-integration using time series data for the period of 30 years (1986 - 2016) to examine the long-run relationship between industrial performance and some macroeconomic variables in Nigeria to gain insights into the industrial paradox of high inflation and low employment rate alongside rising interest rate, incessant power outage and political treat in the economy. Results obtained from the ARDL econometric approach showed that in the longrun increase in employment rate and political stability has the potential of enhancing industrial output by 83.07% and 15.2% respectively; while ineffective exchange rate, high inflation rate and incessant power outage in Nigeria reduces industrial performance by 8.15%, 19.0%.

Onakoya (2018), studied the dynamics of macroeconomic variables and the output in the industrial sector in Nigeria. The study adopted data from 1981 to 2015 while using descriptive statistics and stationary evaluation for its analysis. While understanding the impact of changes in macroeconomic factors on industrial sector's output, study revealed that there exists no short run relationship between output and exchange rate and unemployment amongst other variables considered. The study recommended the unification of both monetary and fiscal policies on which economy stability is possible. However, the study didn't reveal whether there exists a long run impact of these variables on industrial output.

Lee (2018), while studying industrial output fluctuations in developing countries, empirically showed that income levels and trade openness are important factors in determining shocks in industrial output especially in agricultural productivity.The study

maintained that a negative shock to agricultural productivity likely increases food prices and labour which enables capital movement from industrial output in Nigeria.

Nwokoro (2017) investigated the impact of foreign exchange and interest rates variations on the Nigeria's manufacturing Output during the period 1983 to 2014. The study employed the Ordinary Least Square (OLS), stationarity, co-integration, together with Error Correction Modelling, to know the significance and relationship between Foreign Exchange Rate, Interest Rate, Capacity Utilization, Government Expenditure on Manufacturing Sector, Investment in Industrial production and Manufacturing Output in Nigeria within the period under review. The result shows that all the regressors appeared in their right signs according to apriori expectation being that Foreign Exchange Rate (FREX) and Interest Rates (INTR) have negative but significant relationship with manufacturing Output (MANO). The study recommended that the exchange rate policy should be reviewed to cub the international currency depreciation and that more realizable monetary and fiscal policies that will be targeted at reducing interest rate on loans to the manufacturing sector should be implemented.

Adeyemi and Olufemi (2016) investigated the determinants of capacity utilization in the manufacturing sector between 1975 and 2008. The variables considered were Real Manufacturing Output Growth Rate (MGDP), Real Interest Rate (INTR), Consumer's Price Index (CPI), Fixed Capital Formation in Manufacturing Sector (CPF) and Electricity Generation on Rate (ELEGR) (Proxy for energy) were used as independent variables. Co-integration and Error Correction Model (ECM) were employed as the estimation techniques so as to study the time series properties of the variables and to ascertain the existence of long-run relationship between capacity utilization and its determinant indicators. Structured questionnaire was administered to assess the operational materials and the performance of the selected firms. The findings of the study revealed that there is positive relationship between consumer's price index, fixed capital formation in manufacturing sector and capacity utilization. The study also showed that there is negative relationship between electricity generation, real manufacturing output growth rate and capacity utilization which resulted in low manufacturing productivity growth rate in Nigeria

Nwandu (2016) examined the implication of the rising interest rate on the performances of the Nigerian manufacturing sector. The study utilized data that spans thirty five (35) years covering 1981 to 2015. The models were analyzed using the ordinary least squares. Findings from the study showed that rising interest rate in Nigeria has a negative effect on the contribution of the manufacturing sector to GDP as well as on the average capacity utilization of the Nigerian manufacturing sector. This implies that the rising interest rate in Nigeria impedes the activities and the performances of the Nigerian manufacturing sector. Given these findings, the study recommends that aside from trying to manage interest rate for enhanced economic growth, the Nigerian Government should strive to provide infrastructural facilities particularly power and transportation to reduce the high cost of production.

Okonkwo, Egbulonu, and Mmaduabuchi (2015) examined the impact of monetary policy variables on manufacturing in Nigeria from 1981 – 2012. The study employed Johansen co-integration test in order to establish long run equilibrium relationship between the explained and the explanatory variables. The error correction model (ECM) was employed to estimate the

model and the study revealed that money supply and credit to private sector exert tremendous influence on manufacturing in Nigeria.

Otalu and keji (2015) assessed the determinants of industrial sector growth in Nigeria. The paper identified as major determinants of industrial growth in Nigeria; capital (proxy by gross capital formation) labour (proxy by total labour force in the industrial sector) exchange rate, education (proxy by school enrolment, inflation rate, capacity utilization, trade openness and electricity generation. Co-integration and error correction model were adopted and the result showed that all the identified determinants have more of permanent effect on industrial output than transitory effect. Both labour and capital have significant impact, exchange rate showed a positive and significant impact indicating that currency appreciation might be inimical to the growth of the industrial sector.

Agidew (2014) studied the determinants of domestic private investment in East Africa region with the panel data set from the period of 2000- 2012. Based on Econometric findings in which it supports fixed effect model estimation over other methods of procedure confirmed that domestic private investment affected by different parameters: precisely, macroeconomic factors including variations in output and real per capita growth, fiscal and monetary policy and exchange rate movement in the economy are the main factors for the variability of domestic private investments across different times. The estimated result of various macroeconomic variables and other policy related features are estimated and has influenced the performance of domestic private investment in the region. This finding also presents pooled OLS outcomes to see the disparity from FE estimation which is preferred from RE model. Hence, domestic private investment has positively associated with real GDP growth, financial development as availability of credit to the private sector in percentage of GDP creates a favourable environment for investment activity and has a virtuous effect through more investment, more profit and stimulates further investment. opportunities and boost economic growth.

Sheriff and Amoako (2014) examined the macroeconomic determinants of interest rate spread in Ghanaian economy. The study identified four macroeconomic variables on interest rate spread in Ghana which include the rate of inflation, the total banking sector deposits, Treasury bill rates and public sector domestic borrowing decisions (crowd out). Using autoregressive distributed lag (ARDL) co-integration and Vector Error Correction analysis, the result confirmed both short run and long run relationship between identified macroeconomics variables and interest rate spread in Ghana. The study recommended that, government borrowing, interest and inflation rate are kept low while pursuing policies that maximise savings.

Ojo and Ololade (2014) investigated the contribution of the manufacturing sector to the economic growth of the country. The study utilized Ordinary Least Square (OLS) econometric technique on the time series data of the relevant variables of manufacturing output, trade openness and current account balance. The result revealed that though Nigeria manufacturing sector benefited from globalization process, the level of the development in the sector was found to be highly negligible. Thus implying that globalization exerts little impact on economic growth via manufacturing sector of the economy.

Odior (2013) investigates the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011. The analysis starts with examining stochastic characteristics of each time series by testing their stationarity using Augmented Dickey Fuller (ADF) test and estimate error correction mechanism model. The findings were reinforced by the presence of a long-term equilibrium relationship, as evidenced by the co-integrating equation of the VECM. The results showed that credit to the manufacturing sector in the form of loans and advances and foreign direct investment have the capacity to sharply increase the level of manufacturing productivity in Nigeria, while broad money supply has less impact. The study, therefore, recommends that government must create ''enabling environment'' for manufacturers in the area of infrastructure, financial, legal and property rights. High cost of borrowing is due to high interest rate spread. The paper advocated for a cut in margin between lending and deposit rates.

Loto (2012) examined the determinants of output expansion in the Nigerian manufacturing companies between 1980-2010. Ordinary Least Squares method was adopted and important determinants were detected. One of the important findings of the preceding analysis is that inflation rate plays the highest significant role in explaining manufacturing output expansion between 1980 -2010. Any policy measure that can curb inflation will surely increase output. Real GDP and per capita real GDP have positive and significant roles to play in the manufacturing output expansion. The result further revealed an inverse relationship between output expansion and capacity utilization in manufacturing.

METHODOLOGY

This study utilized secondary data sourced from Central Bank of Nigeria (CBN) statistical bulletin from 1981 to 2017. The research design was expost facto as historical time series data were used. The manufacturing capacity utilization is the dependent variable, while consumer price index, exchange rate, trade openness, Interest rate, gross fixed capital formation and balance of trade are the independent variables. The time series data generated and subjected to the requisite diagnostic cleaning before they were empirically fit for analysis. In order to empirically analyse the long-run relationships and short-run relationship between the selected macroeconomic variables and manufacturing capacity utilization in Nigeria, this study applied the autoregressive distributed lag (ARDL) cointegration technique as a general vector autoregressive (VAR). The choice of the ARDL model lies in its flexibility that it can be applied when the variables are of a different order of integration. The model for the relationship between Consumer price index and manufacturing capacity utilization in Nigeria covering the period from 1981-2017 is stated as follows:

$$\text{MCU} = \alpha_0 + \alpha_1 \text{CPI\_1} + \alpha_2 \text{EXCH} + \alpha_3 \text{OPEN} + \alpha_4 \text{INTEREST} + \alpha_5 \text{GFCF\_1} + \alpha_6 \text{BOT\_1} + \mu_t$$ **Model specification**

$$\text{MCU} = (\text{CPI\_1}, \text{EXCH}, \text{OPEN}, \text{INTEREST}, \text{GFCF\_1}, \text{BOT\_1})$$

where

MCU =manufacturing capacity utilization

CPI_1 =consumer price index
EXCH = exchange rate
OPEN = trade openness
INTEREST= Interest rate
GFCF_1 = gross fixed capital formation
BOT_1 = balance of trade
Assuming a linear relationship between the dependent variable and independent variables, and using the econometrics model can be specified as follows:

$$MCU = \alpha_0 + \alpha_1 CPI\_1 + \alpha_2 EXCH + \alpha_3 OPEN + \alpha_4 INTEREST + \alpha_5 GFCF\_1 + \alpha_6 BOT\_1 + \mu_t$$

where μ_t = Error term

α_0 = the constant term

α's = the parameters to be estimated

Diagnostic Test

To ensure the goodness of fit of the model, diagnostic and stability tests are conducted. Diagnostic tests examine the model for serial correlation, functional form, non-normality and heteroscedasticity.

Unit root /Staionarity test: .The results of the Augmented Dickey Fuller (ADF) test obtained are as follow:

The Unit root test

Variable	Level difference	Probability	Order of integration	First difference	probability	Order of integration
MCU	1.033989	0.9961	I(0)	-5.800877	0.0000	I(1)
CPI_1	-6.452998	0.0000	I(0)	-2.196437	0.0292	I(1)
EXCH	-0.881013	0.3275	I(0)	-2.869475	0.0054	I(1)
OPEN	1.169961	0.9347	I(0)	-3.050247	0.0033	I(1)
INTEREST	0.844179	0.8887	I(0)	-2.477078	0.0148	I(1)
GFCF_1	0.969200	0.9086	I(0)	-8.346757	0.0000	I(1)
BOT_1	-0.127936	0.6327	I(0)	-4.490089	0.0000	I(1)

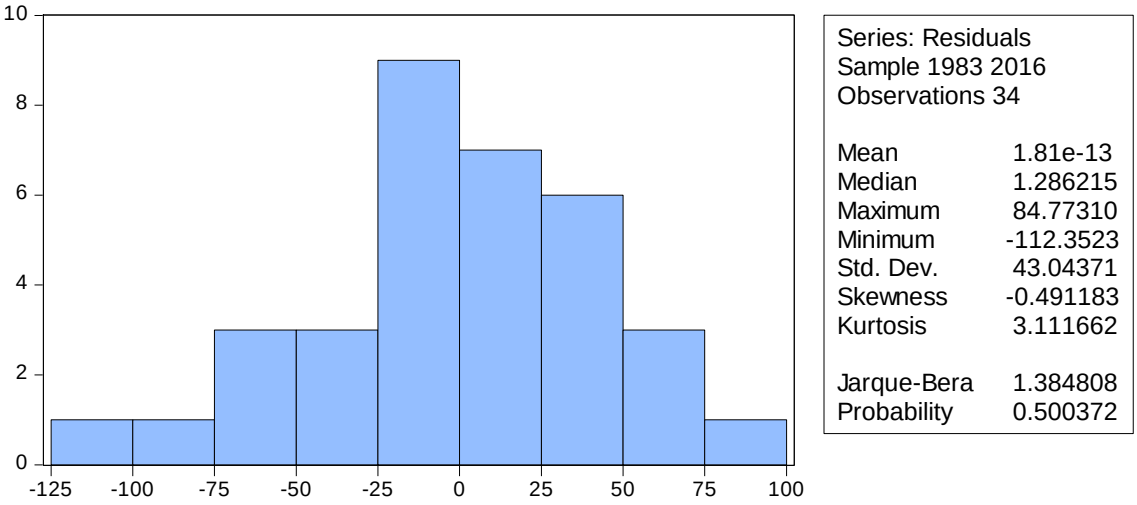
Source: Author's computation from the E-views result (2019)

From the table above the results shows that one of the variables (CPI_1) is stationary at level while all the other variables are non-stationary at level. This suggests the need to difference the series to obtain stationarity. At first difference, these variables are integrated of order one at 5% level of significance in ADF test procedure. Therefore a cointegration test is therefore conducted.

Normality tests

This is a test to indicate the normality of the error terms are normally distributed. It goes with the following decision rule: if the JagueBera test is less that the X^2 (chi square) tabulated, then the error term is normally distributed otherwise it is not. The graph below shows the normality result obtained:

Figure1: Normality test result



For the variable under consideration, the *chiy (2)* =- X^2 chi-square calculated = 1.384808 is less than the tabulated X^2 chi square (5.99441).we therefore conclude that that the error term of the variables are normally distributed.

Hetroscedasticity test

Under the heteroscedasticity test, we make the following assumptions: if the chi-square calculated is less than the chi-square tabulated, we accept Ho otherwise we reject. The Heteroscedasticity result obtained is presented below:

F-statistic	0.378453	Prob. F(17,16)	0.9726
Obs*R-squared	9.750778	Prob. Chi-Square(17)	0.9137
Scaled explained SS	2.279900	Prob. Chi-Square(17)	1.0000

For the variables under consideration, chi –square under 17 degrees of freedom chi square (17) = calculated = 9.750778, the chi-square (17) tabulated = 27. 6.

DECISION: Since the X^2 calculated is less than X^2tabulated, we conclude that the error term of the variables under consideration are homoscedastic.

Serial correlation test

Serial Correlation LM Test was conducted by using Breusch-Godfrey Serial Correlation LM Test based on the equation below: This test is to detect whether the variables are serially correlated or not with the number of lag set at 2.

Table 4.6. Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	8.176838	Prob. F(2,14)	0.0044
Obs*R-squared	18.31821	Prob. Chi-Square(2)	0.0001

Source: Author's computation from Eviews result (2018)

Based on the results from the table above, we reject the null hypothesis because the generated Chi square results less than 0.05 significant level. So, there is no autocorrelation in the effect of consumer prices on the manufacturing capacity utilization

DATA ANALYSIS AND RESULTS

Descriptive statistics

The Jarque-Bera (JB) test statistic was used to determine whether or not the variables follow the normal probability distribution. The descriptive statistics for the variables under consideration are therefore presented as follows:

The descriptive statistics

	MCU	CPI_1	EXCH	OPEN	INTEREST	GFCF_1	BOT_1
Mean	427.5090	92.25324	67.46862	71.32816	45.01875	10262.58	1356508.
Median	382.6250	63.49000	21.88610	77.25000	11.75000	12.09000	326454.1
Maximum	1671.055	272.0600	158.5526	158.2420	1247.458	379236.9	4971688.
Minimum	32.03466	0.880000	0.544500	27.80000	3.720000	5.460000	-85562.00
Std. Dev.	439.7803	96.10664	65.08670	23.60764	203.2279	62343.97	1677285.
Skewness	1.669540	0.736890	0.249904	0.721325	5.828154	5.833333	0.772362
Kurtosis	5.499300	2.107251	1.231141	6.541128	34.98855	35.02778	1.993204
Jarque-Bera	26.81876	4.577249	5.208784	22.54044	1787.003	1791.246	5.241371
Probability	0.000002	0.101406	0.073948	0.000013	0.000000	0.000000	0.072753
Sum	15817.83	3413.370	2496.339	2639.142	1665.694	379715.4	50190808
Sum Sq.	6962640.	332513.5	152506.0	20063.55	1486856.	1.40E+11	1.01E+14

Dev.							
Observations	37	37	37	37	37	37	37

Source: Author's computation from the E-views result (2019)

From the result table, the descriptive statistics indicates that from 1981 to 2017, the growth rate of MCU, CPI_1,EXCH,OPEN INTEREST,GFCF_1 and BOT_1 show an averaged positive mean values from 45.01875 to 1356508. The maximum values of the variables shows values ranging from 1671.055, 272.0600, 158.5526, 158.2420, 1247.458, 379236.9 and 4971688.; while the minimum values ranges from 32.03466, 0.880000, 0.544500, 27.80000, 3.720000 ,5.460000 and -85562.00 respectively. The standard deviation showed that the highest standard deviation of (1677285.) is recorded by the BOT_1 while the least standard deviation of (23.60764) is recorded by OPEN. The JarqueBera test of normality for the variables revealed biasness for all the variables as can be seen with its high probability values. Hence we conclude that the variables are distributed normally.

Correlation

Under the correlation test, we conduct the test to ascertain the degree of relationship that exists between the dependent variable and the independent variables. This is done using the correlation matrix . In the correlation test, we test the variables to ascertain the degree of relationship that exist between the independent variables and the dependent variable. The relationships among the studied variables depicted in the model were tested using correlation matrix and the result presented below:

Correlation matrix

	MCU	CPI_1	EXCH	OPEN	INTEREST	GFCF_1	BOT_1
MCU	1.000000	0.751862	0.621706	0.652698	0.471017	0.473067	0.636659
CPI_1	0.751862	1.000000	0.917163	0.415735	-0.007192	-0.001525	0.845442
EXCH	0.621706	0.917163	1.000000	0.366275	-0.150545	-0.147527	0.776820
OPEN	0.652698	0.415735	0.366275	1.000000	0.630243	0.622014	0.445243
INTEREST	0.471017	-0.007192	-0.150545	0.630243	1.000000	0.999718	0.167443
GFCF_1	0.473067	-0.001525	-0.147527	0.622014	0.999718	1.000000	0.176334
BOT_1	0.636659	0.845442	0.776820	0.445243	0.167443	0.176334	1.000000

Source: Author's computation from e-views (2019)

The correlation result shows that all of the variables have positive relationships with the MCU. The relationships are actually at 75%, 62%,65%, 47%, 47% and63% respectively .This result suggests these variables have positive relationship with the growth of the manufacturing capacity utilization in the Nigerian economy.

Bound Auto Regressive Distributed Lag (ARDL)testing approach

Conducting the ARDL bounds test procedure, it is expected that the variables are I(0) or I(1), otherwise, the variable may be considered spurious. In the conduct of the ARDL test, we adopt the Augmented DickyFuller (ADF) test to determine the difference levels of the variables to find if they are I(0) and I(1) respectively. We therefore compute an F-statistics test procedure to test the long-run relationship in which the maximum lag length p is 3 in the ECM. The results for the bounds F-test is therefore presented as follows:

The ARDL Bound test result

ARDL Bounds Test		
Date: 02/09/19 Time: 10:22		
Sample: 1983 2016		
Included observations: 34		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	17.66838	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Author's computation from the Eviews result (2018)

The Bound test result from the table above indicates that the underling ARDL model can be established to determine the long-run slope-estimated coefficients and the short-run dynamic-estimated coefficients. The ARDL(1, 3) is selected based on Akaike information criterion (AIC) , and the estimated results are shown in Table 2 below:

The ARDL dynamic regression result

Dependent Variable: MCU			
Method: ARDL			
Date: 02/09/19 Time: 10:21			
Sample (adjusted): 1983 2016			
Included observations: 34 after adjustments			
Maximum dependent lags: 3 (Automatic selection)			
Model selection method: Akaike info criterion (AIC)			
Dynamic regressors (3 lags, automatic): CPI_1 EXCH OPEN INTEREST GFCF_1 BOT_1			

Fixed regressors: C				
Number of models evalulated: 12288				
Selected Model: ARDL(1, 3, 0, 2, 3, 1, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
MCU(-1)	0.414069	0.085842	4.823632	0.0002
CPI_1	-0.875040	1.952638	-0.448132	0.6601
CPI_1(-1)	0.804293	2.774311	0.289907	0.7756
CPI_1(-2)	-12.73010	2.690629	-4.731272	0.0002
CPI_1(-3)	17.08761	1.873923	9.118631	0.0000
EXCH	-0.834007	0.592449	-1.407728	0.1783
OPEN	-0.065699	2.672762	-0.024581	0.9807
OPEN(-1)	0.074339	2.986587	0.024891	0.9804
OPEN(-2)	4.208618	2.191341	1.920567	0.0728
INTEREST	-7.615115	5.569841	-1.367205	0.1905
INTEREST(-1)	1.492925	5.742764	0.259966	0.7982
INTEREST(-2)	-9.534665	4.543542	-2.098509	0.0521
INTEREST(-3)	9.128731	4.242782	2.151591	0.0470
GFCF_1	0.023769	0.017717	1.341630	0.1984
GFCF_1(-1)	-5.353532	3.461264	-1.546698	0.1415
BOT_1	6.84E-06	2.50E-05	0.273997	0.7876
BOT_1(-1)	-6.19E-05	2.87E-05	-2.161331	0.0462
C	40.72359	89.31470	0.455956	0.6545
R-squared	0.990557	Mean dependent var		461.6132
Adjusted R-squared	0.980524	S.D. dependent var		442.9552
S.E. of regression	61.81682	Akaike info criterion		11.39128
Sum squared resid	61141.11	Schwarz criterion		12.19935
Log likelihood	-175.6518	Hannan-Quinn criter.		11.66686
F-statistic	98.73039	Durbin-Watson stat		2.173081
Prob(F-statistic)	0.000000			
***Note: p-values and any subsequent tests do not account for model selection.**				

Source: Author's computation from the E-views result (2019)

From the result above, the coefficient of MCU (-1) is positively signed and statistically significant at 5% critical level; also, the variables, OPEN (-1) and GFCF_1 are positively signed and statistically insignificant at 5% critical level. It implies that, any unit change in the amount of MCU of the previous years will lead to 41% increases in in the current year for the manufacturing capacity utilisation in Nigeria. The coefficient of the variable CPI_1(-2),EXCH and INTEREST are negative. This result indicates that there is a negative relationship between consumer price index, interest rate, exchange rate and manufacturing capacity utilisation in Nigeria during the period under review. Thus unit change in interest rate will lead to a decreases in the current MCU growth rate to the tune of -12.7%. This also implies that a unit change in the interest rate will lead to -9.5% decreases in the current MCU of the economy. Equally, the coefficient of the variable, EXCH shows a negative signs, which imply that the variable contributed negatively to the MCU growth during the period under review and it is statistically insignificant.

ARDL Cointegrating And Long Run Form				
Dependent Variable: MCU				
Selected Model: ARDL(1, 3, 0, 2, 3, 1, 1)				
Date: 02/09/18 Time: 10:20				
Sample: 1981 2017				
Included observations: 34				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI_1)	-0.875040	1.952638	-0.448132	0.6601
D(CPI_1(-1))	12.730099	2.690629	4.731272	0.0002
D(CPI_1(-2))	-17.087614	1.873923	-9.118631	0.0000
D(EXCH)	-0.834007	0.592449	-1.407728	0.1783
D(OPEN)	-0.065699	2.672762	-0.024581	0.9807
D(OPEN(-1))	-4.208618	2.191341	-1.920567	0.0728
D(INTEREST)	-7.615115	5.569841	-1.367205	0.1905
D(INTEREST(-1))	9.534665	4.543542	2.098509	0.0521
D(INTEREST(-2))	-9.128731	4.242782	-2.151591	0.0470
D(GFCF_1)	0.023769	0.01771	1.341630	0.1984

		7		
D(BOT_1)	0.000007	0.000025	0.273997	0.7876
ECM(-1)	-0.585931	0.085842	-6.825720	0.0000
ECM = MCU - (7.3162*CPI_1 -1.4234*EXCH + 7.1975*OPEN -11.1414 *INTEREST -9.0962*GFCF_1 -0.0001*BOT_1 + 69.5023)				

Statistically, the F-statistic is 98.73039, and the probability of the null hypothesis for no significance in that regression is [0.000000]. The R^2 - (R-squared) which measures the overall goodness of fit of the entire regression shows the value as follows: 0.990557 = 99%, while the adjusted R^2 (0.980524)=98%, shows that the independent variables explain the dependent variable to the tune of98%. Also the Durbin Watson (DW) statistics DW = 2.173081 which is greater than the R^2 shows that the overall regression is statistically significant. Furthermore, the t-ratios for those regressors are also meaningful, and their probabilities are below α(0.05). Thus, the null hypothesis βi = 0 is rejected, and those regressors are significant even at a confidence level of 95%.

The short run relationship of the effect of macroeconomic variables on the MCU

There is long-run equilibrium relationship among the variables in the regression model; however, it is the short-run that transmit to the long-run. Thus, Error Correction Mechanism(ECM) is therefore used to correct or eliminate the discrepancy that occurs in the short-run. The coefficients of the explanatory variables in the error correction model measure the short-run relationship. The assumption of the ECM states that if two variables are cointegrated, then, there is error correction mechanism to revise instability in short term (Engle and Granger, 1987).ECM is used to see the speed of adjustments of the variables to deviations from their common stochastic trend. ECM corrects the deviations from the longrun equilibrium by short-run adjustments. This shows us that changes in independent variables are a function of changes in explanatory variables and the lagged error term in cointegrated regression. The ECM result is therefore presented below:

The short run error correction dynamics
Source: Author's computation from the E-views result (2019)

In the short run result, the coefficient of the lagged variable of the variable (CPI_1 (-2)shows the value, -17.087614. This implies that which means that a decreases in the comsumer prices of the previous year reduces the growth of the MCU in the short term. The equilibrium error-correction coefficient ECM (−1) is -0.585931 which has the expected negative sign. The error correction term here is negative and significant meaning that there is a long run causality running from independent variables to dependent variable. It also confirms that all the variables are cointegrated or have long run relationship. We can therefore states that 58 percent gap between long run equilibrium value and the actual value of the dependent variable (MCU) has been corrected. It can be also said that the speed of adjustment towards long run

equilibrium is 58percent annually. Its t-ratio is -6.825720, and the probability of the null hypothesis being true for zero is [0.004], which is significant even when $\alpha = 0.05$. Thus, it can also be concluded that the adjustment is quite meaningful in the short-run ARDL relationship.

The long run relationship of the independent variables and the MCU

The long run relationship result

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI_1	7.316160	1.006278	-7.270517	0.0000
EXCH	-1.423387	1.060287	-1.342454	0.1982
OPEN	7.197529	3.785363	1.901410	0.0754
INTEREST	-11.141450	16.026087	-0.695207	0.4969
GFCF_1	-9.096224	5.900188	1.541684	0.1427
BOT_1	-0.000094	0.000032	-2.975735	0.0089
C	69.502320	152.608004	0.455430	0.6549

Source: Author's computation from the Eviews result (2019)

The long-run elasticity of the independent variables CPI_1 contributing to MCU is7.316160from 1981 to the present. Thus, we show that CPI has a negative effect on the manufacturing capacity utilization growth in the long run.

CONCLUSION AND RECOMMENDATIONS

Manufacturing sector plays a decisive role in economic growth and development. The sector is one of the key drivers of the Nigerian economy. Through the Autoregressive-Distributed Lag (ARDL) approach, we find that there is a long- run relationship between manufacturing capacity utilization and macroeconomic variables, namely Consumer price index, Exchange rate, Openness, Interest rate, Gross fixed capital formation and balance of trade from 1981 to 2017. The results of bounds test show that all the variables examined are co-integrated in the long run. The result of ARDL approach shows that an increase in the Consumer price index , exchange rate, interest rate and balance of trade will lead to a decrease in manufacturing capacity utilization in the long run. In other words, there exist a negative long-

run relationship between consumer price index, exchange rate, interest rate and balance of trade variables on one hand and manufacturing capacity utilization. Conversely, the other variables: trade openness and Gross fixed capital formation exert positive significant impact on manufacturing capacity utilization in the long run. Overall, the study concludes that the performance of the manufacturing sector is largely driven by the influence of the selected macroeconomic variables.

Based on the outcomes of this study the following recommendations are made.

- Government should consciously emplace polices that will ensure minimal consumer price index to ensure better utilization of resources for enhanced capital formation since consumer price index signed negative to capacity utilization of Nigerian Manufacturing sector .
- There is need for government to consciously review downward the interest rate on borrowings from banks from the current hostile double digits figure to single digit since interest rate signed negative to manufacturing capacity utilization. This is to further improve the access to cheap funds for the manufacturing sector and boost productivity in the face of the dwindling oil resources in the economy.
- There is need for the government to more than ever proactively manage the monetary policies in order to fight volatile exchange rate in the Nigerian economy, since exchange rate have negative influence on manufacturing capacity utilization in Nigeria over the period of the study.
- Government should impose more import restrictions on products that can be manufactured locally to serve as a cover to local and infant industries in order to improve our trade balances and foreign exchange reserves..

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