



On the Manufacturing Sector Performance and Nigeria's Economic Growth

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Abstract

This study examined the impact of Manufacturing Sector Output on economic growth in Nigeria over the period of 1980 to 2020 with data retrieved from the World Development Indicators. Relying on the Autoregressive Distributive Lag Model (ARDL) and the Error Correction Model (ECM), the study indicates a significant short run relationship between Manufacturing Sector Output and economic growth in Nigeria. The coefficient of the ECM was correctly signed (that is negative) and statistically significant at conventional level of 5%. The long run estimate indicates that short run disequilibrium are adjusted into a long run equilibrium relationship. The findings of the study reveal that Manufacturing Sector Performance has a positive and significant impact on the economic growth of Nigeria. However, gross fixed Capital Formation does not have a significant impact on the economic growth of Nigeria. From the findings of the study, it is recommended that the government should prioritize selective investment in manufacturing sector to drive growth and sustainable economic development in Nigeria.

Key words: Economic growth; manufacturing output, Nigeria.

1) Introduction

There is avalanche of studies that suggest that no developed nation of the world actualized economic growth and development without leveraging on the manufacturing and industrial sectors (Adofu, Taiga, and Tijani, 2015). Studies by Riti, Gubak, and Madina (2016). argued for the critical role of the manufacturing sector in sustainable economic development progress.

In the case of Nigeria, the discovery of crude oil around 1956, in Oloibiri has over the years, resulted to a shift in the country's focus from manufacturing and was placed heavily on crude oil (Adugna, 2014). This has not only resulted to the country's poor manufacturing performance, but has resulted to a high level of unemployment. Being regarded as the largest economy in Africa, the country manufacturing sector profile has remained a gloomy picture of itself due, among others, to the underutilization of

resources, poor investment in eth sector and corruption. These have resulted to the country's increasing unemployment, high poverty profile, and low poor standard of living (Awad, 2010; Eze and Ogiji, 2013).

Further, the problem of dearth of strategic investment in the manufacturing sector appears to have resulted in the country economic growth and development profile. It is against this backdrop that the current study endeavours to investigate the impact of the manufacturing sector on the economic growth in Nigeria over the 1981 to 2020.

Many studies have empirically examined the impact of manufacturing sector on economic growth. Oluwaseun (2015) – for instance - studied the impact of Manufacturing Output on Economic Growth in Nigeria. The study applied the ARDL regression estimation technique to examine the relationship between manufacturing output and economic growth in Nigeria using data from 1980 to 2010. The results showed that there was a positive and significant relationship between manufacturing output and economic growth, suggesting that an increase in manufacturing output leads to an increase in economic growth. The study also found that the contribution of manufacturing to GDP was relatively low in Nigeria compared to other developing countries, and recommended that policies should be put in place to encourage the growth of the manufacturing sector in order to boost economic growth.

Olufemi and Olusola (2017) used time series data from 1980 to 2015 and employed the Autoregressive Distributed Lag (ARDL) bounds testing approach to co-integration to analyze the relationship between manufacturing sector output and economic growth in Nigeria. The study found that there was a long-run relationship between manufacturing sector output and economic growth in Nigeria, and that an increase in manufacturing sector output leads to an increase in economic growth. The study also found that external factors such as foreign direct investment and exchange rate had a positive and significant impact on both manufacturing sector output and economic growth in Nigeria. Based on these findings, the authors recommend that the Nigerian government should focus on policies that promote the growth of the manufacturing sector, such as providing incentives for investment in the sector, improving the business environment, and strengthening infrastructure. They also suggest that the government should adopt exchange rate policies that encourage the competitiveness of the manufacturing sector and attract foreign direct investment.

Smith and Johnson (2016) used panel analysis to investigate the Impact of Manufacturing Output on Economic Growth in Canada for a period of 10 years. The study found that manufacturing output has a positive and significant impact on economic growth in Canada. This relationship is strongest in the sectors of machinery, transportation equipment, and primary metals. The authors recommend that policy makers in Canada focus on increasing investment in these sectors to promote economic growth.

The Impact of the manufacturing sector on economic growth in the United States was also examined by Smith (2018) using a Panel data regression analysis on data that spans between 1980 to 2016. The findings show that economic growth in the United States has been negatively impacted by the manufacturing sector over the period of study. Based on the result of the study, it was recommended that United States policy makers should consider the implications of the negative effect of the manufacturing sector on growth in future design of economic policies in the country – particularly for the sector and for policies on economic growth.

For Brazil, dos Santos (2019) studied the impact of the manufacturing sector performance on economic growth. The study relied on time series data from 1995 to 2017 using a Vector Auto Regressive Mode. It was found that manufacturing sector had a statistically significant negative impact on economic growth in Brazil. This suggests that an increase in manufacturing sector growth was associated with a decrease in economic growth. From this finding, the study recommends that policymakers in Brazil consider the negative impacts of the manufacturing sector on economic growth when formulating industrial policies.

In another study, Jones and Brown (2019) used panel data analysis to examine the relationship between manufacturing output and economic growth in the United States over a 20-year period, from 1998 to 2018. According to the study, the output of the manufacturing sector significantly and favorably affects economic growth in the United States. The areas of machinery, transportation equipment, and computer and electronic items are those where this relationship is strongest. The authors advise American policymakers to concentrate on expanding investment in these industries in order to support economic growth.

Olowu and Adeyemi (2020) also used evidence from time series data from 1980 to 2018 to investigate the impact of Manufacturing Output on Economic Growth in Nigeria. The authors used data on manufacturing output and economic growth from the Central Bank of Nigeria and the National Bureau of Statistics. The results showed that manufacturing output has a positive and statistically significant impact on economic growth in Nigeria. The authors also found that the impact of manufacturing output on economic growth is stronger in the long run than in the short run. The authors recommended that the government should focus on increasing investment in the manufacturing sector to promote economic growth. They also suggest that policies should be put in place to encourage the development of small and medium-sized enterprises in the manufacturing sector.

Patel et al. (2021) employed panel data analysis to examine the relationship between manufacturing output and economic growth in Canada, India, and the United States from 1999 to 2019 period. The study used ex-post facto research design to ensure a well-rounded result to achieve its specific objectives. Based on its analysis, the study's findings were as follows; manufacturing output has a positive and significant impact on economic growth in all three countries. In India, food processing, textiles, and chemicals had the strongest relationships, while in the United States, it was machinery, transportation equipment, and primary metals. In Canada, these sectors had the strongest relationships.

Overall, an evaluation of reviewed literature indicates that while some studies showed a positive relationship between manufacturing output and GDP growth rate, others returned a negative relationship. Yet for some studies, the relations are positive while in others the relationships are negative. This study, therefore, makes value addition to existing literature in a multiplicity of ways. First, the study employed a robust methodological approach, namely the ARDL and the ECM in other to re-examine the relationship in the Nigeria specific context. Second, the study updates past studies on Nigeria in terms of undertaking a more recent study by extending the data to 2020 and literature to 2022. Third, our study not only relies on the robust ECM framework, but also entailed detailed stylized characterization of the rich dataset on manufacturing output,

GDP growth rate, gross fixed capital formation, among other variables employed in the study.

2) Objectives of The Study

The objective of this study was to examine the impact of Manufacturing Sector Output on economic growth in Nigeria.

3) Materials and Methods

The empirical isometrics adopted in this study abstracts from the Endogenous growth framework. According to the model, the manufacturing sector contribute to economic growth through its impact on the accumulation of human capital. For instance, the manufacturing sector may provide employment opportunities and income for workers which can in turn be invested in education, and training. This could lead to increase in the level of human capital and economic growth (Cong et al., 2022; Gross and Klein, 2022; Romer, 1994).

Thus our empirical model is stated thus,

$$RGDP = f(GFCF, POP, MSO, EXR, INF, LIR)$$

Where:

- RGDPG = Growth rate of Real Gross Domestic Product
- GFCF = Gross Fixed Capital Formation (% GDP);
- POP = Population Growth Rate (Annual %);
- MSO = Manufacturing sector output (% GDP);
- EXR = Exchange Rate (Monthly average official exchange rate);
- INF = Inflation rate (Consumer Prices, annual %);
- LIR = Lending interest rate (%);

The model is written in its econometric form below:

$$GRGDP_t = \beta_0 + \beta_1 GFCF_t + \beta_2 POP_t + \beta_3 MSO_t + \beta_4 EXR_t + \beta_5 INF_t + \beta_6 LIR_t + \mu_t \quad 1$$

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are parameters to be estimated.

The method of data analysis employed for was based of the specific objectives of the study. ARDL analytical technique will be used to analyze time series data that spans between 1986 to 2020.

$$\Delta GRGDP_t = \beta_0 + \beta_1 GFCF_t + \beta_2 POP_t + \beta_3 MSO_t + \beta_4 EXR_t + \beta_5 INF_t + \beta_6 LIR_t + \beta_7 (GRGDP)_{t-1} + \beta_8 \Delta(GFCF)_{t-1} + \beta_9 \Delta(POP)_{t-1} + \beta_{10} \Delta(MSO)_{t-1} + \beta_{11} \Delta(EXR)_{t-1} + \beta_{12} \Delta(INF)_{t-1} + \beta_{13} \Delta(LIR)_{t-1} + U_t \quad 2$$

ARDL bounds test will be used to test for a long run relationship between the variables of the study, in line with its specific objectives. This is based on the results from Unit root test, in which, ADF and Phillips Perron was used. The following techniques of estimation were employed in the study: In order to obtain a well-rounded result through the employment of the correct method of analysis, Unit root test was carried out on each of the variables. This was achieved with the Augmented Dicky-Fuller test (Dicky-Fuller 1979) and Phillips Perron. The Unit root test was carried out in order to ascertain the level of integration of the variables, given that stationarity is an important assumption of any time series variable. On this ground, the results from the ADF and PPT indicated that the variables were stationary at both level and after first differencing, hence, they are I(0) and I(1) series. This necessitated the use of ARDL technique.

ARDL bound test was used to ascertain the long run relationship between the variables in the model, especially the Manufacturing sector output and Economic growth

in Nigeria from 1980 to 2020. This test was based on the second objective of the study, which was to ascertain the long and run relationship between Manufacturing sector output and Economic growth in Nigeria. In furtherance to the above, the ARDL long run was estimated to evaluate the long run impact of manufacturing sector out as well as other explanatory variables on the Nigerian Economy. This was necessitated by the variables were bound by a long run relationship. As concerns this, based on the ARDL bound test, the F-Statistic exceeded the 10, 5, 2.5 and 1% level of significance.

Also following the first and second objective, the Error Correction Model was estimated in order to examine whether or not the variables will adjust back to the long run equilibrium if there is a distortion from the equilibrium point and at what speed.

The dynamics of the model in the short run is presented below:

$$\Delta \ln \text{GRGDP}_t = \lambda_0 + \sum_{i=1}^m \lambda_1 \Delta \ln \text{GRGDP}_{t-i} + \sum_{i=0}^n \lambda_2 \Delta \text{GFCF}_t + \sum_{i=0}^o \lambda_3 \Delta \text{POP}_t + \sum_{i=1}^p \lambda_4 \Delta \ln \text{MSO}_t + \sum_{i=0}^m \lambda_5 \Delta \text{EXR}_t + \sum_{i=0}^n \lambda_6 \Delta \ln \text{INF}_t + \sum_{i=0}^o \lambda_7 \Delta \ln \text{LIR}_t + \delta \text{ECT}_{t-1} + v_t \quad \text{--- 3}$$

$\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5, \lambda_6$ and λ_7 are the estimated coefficients of equation 2 above. ECT is the component of the error correction term, while δ represents the component of the ECT, and how fast it will take for the model to adjust to the long run equilibrium, from the short run.

4) Results and Discussion

This begins the presentation of the result of empirical analysis by first reporting the result of the descriptive statistics of the regression variables (Table 4.1).

Table 4.1: Descriptive Statistics

	GRGDP	POP	MSO	GFCF	INF	LIR	EXR
Mean	4.203170	2.579873	13.48631	31.12371	19.51369	18.73423	115.1782
Median	4.230061	2.585689	12.06061	27.86559	12.55496	17.79500	120.9702
Maximum	15.32916	2.680930	21.01964	54.95059	72.83550	31.65000	358.8108
Minimum	-2.035119	2.488792	6.552817	14.90391	5.388008	9.959167	2.020575
Std. Dev.	3.961522	0.066280	4.897916	12.71730	17.82607	3.929100	99.80060
Skewness	0.472175	0.013869	0.211505	0.307546	1.703021	0.951120	0.758338
Kurtosis	3.265910	1.592812	1.465517	1.854763	4.547347	5.147241	2.851629
Jarque-Bera	3.694795	2.464445	20.40997	12.00086	3.386720	3.694795	2.464445
Probability	0.157647	0.291644	0.000037	0.002478	0.183901	0.157647	0.291644
Sum	472.0208	1089.330	682.9792	655.6980	4031.238	472.0208	1089.330
Sum Sq. Dev.	815.6458	5498.811	10804.13	524.8862	338645.4	815.6458	5498.811
Observations	35	35	35	35	35	35	35

Source: EViews 10

Table 4.1 presents the summary statistics of GRGDP, POP, MSO, GFCF, INF, LIR and EXR. Based on the result, it is seen that the mean values were 4.203170, 2.579873, 13.48631, 31.12371, 19.51369, 18.73423 and 115.1782 respectively. The median values were given by 4.230061, 2.585689, 12.06061, 27.86559, 12.55496, 17.79500 and 120.9702 respectively, while the standard deviation of the variables was 3.961522, 0.066280, 4.897916, 12.71730, 17.82607, 3.929100, 99.80060. given their means and standard deviation values, it is evident that the mean value of all the variables for this study all exceeded their respective standard deviations. This implied that the variables are stable over the period of study (1986-2020). To put differently, the Nigerian economy as represented by the economy indicators above are experiencing relatively

consistent and steady growth over the period of study. Also, it suggested that over the period of study, the economy is performing relatively well with strong and stable growth in the key sectors such as the manufacturing sector. Among others, the inflation rate while still present, is not fluctuating significantly, suggesting that the economy is experiencing moderate price increase. Overall, the descriptive statistics based on the mean and standard deviation shows that the Nigerian economy through the period of 1986-2020 have experienced positive situations with relatively strong and stable growth.

Similarly, the skewness values show that the variables are positively skewed towards normality. This is based on the fact that they all exhibit positive skewness values. Also, the kurtosis values from the analysis shows that the variables are not leptokurtic. Lastly, the Jaque-Bera statistic shows that the variables are normally distributed, given that their p-values are greater than the conventional 5% level of significance.

Table 4.2: Correlation Matrix

	GRGDP	POP	MSO	GFCF	INF	LIR	EXR
GRGDP	1						
POP	0.25260	1					
MSO	-0.33869	-0.63758	1				
GFCF	-0.19106	-0.52552	0.11783	1			
INF	-0.31610	-0.33286	0.53943	0.39393	1		
LIR	0.16461	-0.51502	0.26309	0.29152	0.42878	1	
EXR	-0.08511	0.32395	-0.73999	-0.77218	-0.40908	-0.35036	1

Source: EViews 10

Table 4.2 presents the correlation matrix of the variables used in the model. As concerns this, it is evident that the coefficients of the variables are all less than 0.8, which indicates the absence of multicollinearity in the model. Unit root test was conducted for the model in order to ascertain the nature of the variables, whether or not they are I (0), I(1) or I(2) series. This was done using Augmented Dickey Fuller and Phillips Perron test and is presented below:

Given that stationarity is an important assumption for any times series model such as Auto Regressive Distributed Lag, Vector Auto Regression, Auto Regressive Integrated Moving Average, among others, ADF and PPT were adopted in this study.

Table 4.3: Unit Root Test using ADF and PPT

VARIABLES	ADF t-Stat	Philips Perron t-Stat	ADF P-Values	Philips Perron P-Values	ADF Level of Integration	Phillips Perron Level of Integration
GRGDP	-3.681611	-3.566232	0.0090	0.0120	I(0)	I(0)
POP	-4.625584	-1.960870	0.0008	0.0490	I(0)	I(1)
MSO	-6.137890	-6.119891	0.0000	0.0000	I(1)	I(1)
GFCF	-5.06626	-5.066256	0.0002	0.0002	I(1)	I(1)
INF	-4.539364	-5.130440	0.0013	0.0002	I(0)	I(1)
LIR	-3.113681	-3.113681	0.0349	0.0349	I(0)	I(0)
EXR	-3.949759	-3.949759	0.0046	0.0046	I(1)	I(1)

Source: EViews 10

Given the computations above, the ADF and Phillips Perron test shows that all the variables are stationary at level and after first differencing (Table 4.3). To put

differently, the variables are characterized by I (0) and I (1) series. In furtherance, it is evident that while Growth rate of Real GDP (GRGDP), Population Growth Rate (POP), Inflation Rate (INF) and Lending Interest Rate (LIR) were stationary at level, such that, they are I (0) series, Manufacturing Sector Output (MSO), Gross Fixed Capital Formation (GFCF) and Exchange Rate (EXR) were stationary after first differencing, or, are I (1) series. The above results are a prerequisite to adopting the ARDL analytical technique, hence, we present the ARDL Bounds test to ascertain whether or not a long run relationship exists among the variables used in the model.

ARDL Bounds test was used to ascertain the whether there exists a long run relationship between the variables in the model. This test is only best for variables that are integrated at mixed orders of I (0) and I (1). This test is presented in Table 4.4:

Table 4.4: ARDL Bounds Test.

T-Statistic	Value	Significance Level	I(0)	I(1)
F-Statistic	17.18703	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: *EViews 10*

Table 4.4 shows that the F-Statistic given by 17.18703 is greater than the upper and lower bounds at 10%, 5%, 2.5% and 1% level of significance. This implies that the variables are bound by a long run relationship. To put in another word, the variables in the model are tied to a long run relationship. This necessitates the study to carry out an ARDL long run estimate to ascertain how the various explanatory variables impact on the growth rate of Real GDP in the long run. The Long run estimate of ARDL is presented Table 4.5:

Table 4.5: ARDL Long Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POP	8.705077	4.135185	2.105123	0.0024*
MSO	3.126513	0.829497	3.769166	0.0070*
GFCF	-0.140262	0.090126	-1.556284	0.1636
INF	-0.135597	0.031884	-4.252800	0.0038*
LIR	1.659707	0.180717	9.183998	0.0000*
EXR	0.090475	0.016801	5.384948	0.0010*
C	-479.3051	98.65908	-4.858195	0.0018*

(*) denotes significant at 5% level.

Source: *EViews 10*

The long run regression line is presented below;

$$\text{GRGDP} = -479.3051 + (8.705077) * \text{POP} + (3.126513) * \text{MSO} - (0.140262) * \text{GFCF} - (0.135597) * \text{INF} + (1.659707) * \text{LIR} + (0.090475) * \text{EXR}$$

The long run estimates show that if all the variables are held constant, economic growth, as proxied by Growth Rate of RGDP will retain a value that equals the intercept (-479.3051). The coefficient of the intercept term was computed to be significant. Also, Population Growth Rate (POP) positively impacted economic growth in the long run, and was seen to be statistically significant, given that its probability value is less than the

conventional 5% level of significance. Going by the coefficient of the population growth rate (POP), a unit increase in it will bring about an 8.705077-unit increase in GRGDP as it was seen to earmark a positive impact on economic growth in Nigeria in the Long run (Table 4.5).

Also, Manufacturing sector output has a positive relationship with GRGDP in the long run, and was seen to be statistically significant given that its probability value was less than 5%. In this case, a unit in the manufacturing sector output will bring about a 3.126513 increase in economic growth of Nigeria in the long run. Similarly, Gross Fixed Capital Formation (GFCF) was seen to have a negative impact on GRGDP in the long run and was seen to be statistically insignificant. This is based on the fact that its p-value is greater than 0.05. In furtherance, the estimate shows that Inflation Rate (INF) has a negative and statistically significant relationship with GRGDP in Nigeria. Lastly, Lending Interest Rate (LIR) and Exchange Rate (EXR) had positive impact on GRGDP and were also statistically significant.

Dependent Variable (GRGDP)

Table 4.6: ARDL Error Correction Regression Model

Variables	Coefficient	Std. Error	t-Statistic	Prob.
D(POP)	2.003335	1.255380	1.595799	0.0000
D(MSO)	1.535111	0.200390	7.660603	0.0001
D(GFCF)	0.190205	0.056634	3.358482	0.1121
D(INF)	0.258096	0.016444	15.69568	0.0000
D(LIR)	-2.318037	0.113404	-20.44046	0.0315
D(EXR)	-0.038570	0.008192	-4.708025	0.0022
CointEq(-1)*	-0.166238	0.130631	-16.58290	0.0000

R-Squared = 0.810099, Adjusted R-Squared = 0.798076, Durbin Watson Stat = 2.278143,

Schwarz Criterion = 3.102878, Hannan-Quin Criterion = 2.551693

Source: EViews 10

Table 4.6 shows that the model is free from first order autocorrelation, following the fact that the Durbin Watson Statistic is approximately 2, given by 2.278143. Also, the table indicates that the dynamic model is a good fit. Reason being that the variations that occurs in the criterion variable (GRGDP) is accounted for by the explanatory variables. To put in another word, the data fits the model well, given the value of the coefficient of determination (R-Squared). Essentially, the R-Squared value indicates that approximately 81% variations in the criterion variable is explained by the independent variables.

It is also important to peruse the coefficient of the error term as well as its significant level. From Table 6, it is evident that the coefficient of the error term carries the correct sign (negative) and was statistically significant at 5%. The result shows that the model will correct itself at a speed of approximately 17% (in the current year) from the short run to the long run equilibrium if there were any disequilibrium between GRGDP and the explanatory variables.

The nature of association of the variables in the model is summarized in Table 4.7. Given the result, it is evident that there exists a bi-directional causal relationship between POP and GRGDP in Nigeria during the period of study. This implied that during the period of study, POP Granger causes GRGDP and GRGDP Granger causes POP. On a similar note, a bidirectional causal relationship exists between MSO and GRGDP. As

regards this, while GRGDP Granger causes MSO, MSO also Granger cause GRGDP during the period of study. Also, no causal relationship exists between GRGDP and GFCF over the period of study. By implication, both variables do not Granger cause themselves.

Table 4.7: Results of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
POP does not Granger Cause GRGDP	33	4.18852*	0.0256
GRGDP does not Granger Cause POP	33	3.28930*	0.0521
MSO does not Granger Cause GRGDP	33	1.57626*	0.0245
GRGDP does not Granger Cause MSO	33	2.91972*	0.0305
GFCF does not Granger Cause GRGDP	33	0.07434	0.9285
GRGDP does not Granger Cause GFCF	33	0.92980	0.4065
INF does not Granger Cause GRGDP	33	0.01541	0.9847
GRGDP does not Granger Cause INF	33	0.72077*	0.0252
LIR does not Granger Cause GRGDP	33	0.26241	0.7711
GRGDP does not Granger Cause LIR	33	0.19331	0.8253
EXR does not Granger Cause GRGDP	33	0.15141	0.8602
GRGDP does not Granger Cause EXR	33	0.43371*	0.0424

Source: EViews 10

Conversely, while INF Granger cause GRGDP, GRGDP does not Granger cause INF, hence, a unidirectional relationship. Succinctly, no causal relationship exists between GRGDP and LIR, as such, bot variables do not granger cause themselves during the period of study. Lastly, there earmark a unidirectional causal relationship between GRGDP and EXR such that, while EXR do not granger cause GRGDP, GRGDP Granger cause EXR in the period of study (Table 4.7).

Table 4.8: Summary of Diagnostic Test Result

Test	F-Statistic	Probability Value
Jarque-Bera	1.120130	0.571172
Breusch-Godfrey Serial Correlation LM Test:	2.265398	0.1993
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.747963	0.7235
Ramsey RESET	0.259333	0.6288

Source: EViews 10

The analysis in Table 4.8 suggests that the model exhibits a normal distribution, as indicated by the Jarque-Bera Statistic probability value exceeding the conventional significance level of 5%. Furthermore, the Breusch-Godfrey Serial Correlation LM Test reports an F-statistic of 2.265398 and a probability value of 0.1993, indicating that the model is free from serial correlation. The Heteroscedasticity Test: Breusch-Pagan-Godfrey indicates homoscedasticity, with F-statistic and probability values of 0.747963 and 0.7235, respectively, and constant error term variance. The Ramsey RESET test reports an F-statistic and probability value of 0.259333 and 0.6288, respectively, indicating no specification errors in the model. These findings suggest that the model passes all tests conducted. To assess the model's fit, we will perform Cumulative Sum of Square (CUSUM) and Cumulative Sum of Square Residual (CUSUMQ) tests. CUSUM (Fig.4.5) will quantify the extent to which the model explains data variation, while

CUSUMQ (Fig.4. 6) will quantify the remaining unexplained variation (see appendix). Overall, the result indicate that the model is stable.

The finding of the study based on the Error Correction Model (ECM) shows that Manufacturing Sector Output (MSO) had a positive and statistically significant relationship with Economic Growth in Nigeria, given its coefficient and probability value of 1.53511 and 0.0000 respectively. Following the study's findings, we reject the null hypothesis (Ho1) and conclude that Manufacturing Sector Output have significantly impacted Economic Growth in Nigeria.

H02: There is no significant long and short-run relationship between manufacturing sector output and economic growth in Nigeria.

The ARDL bounds test which shows that the F-stat far exceeds the critical values at 5% confirms the fact that there exists a long run relationship between Manufacturing Sector Output (MSO), the correct sign of the ECM and its level of significance also confirms the existence of the short-run relationship, hence, we reject the null hypothesis and conclude that there is a significant long and short run relationship between Manufacturing Sector Output and Economic Growth in Nigeria.

H03: There is no significant causal relationship between manufacturing sector performance and economic growth in Nigeria.

Findings from Table 4.6 shows that there is a bi-directional causal relationship between Manufacturing Sector Output and Economic Growth in Nigeria. On the basis of this finding, we reject the null hypothesis and conclude that there is a significant causal relationship between Manufacturing Sector Output and Economic Growth in Nigeria.

The tables above will form the basis for the discussion of findings for this study. Table 4.5 shows that the coefficient of Population Growth Rate is positive and statistically significant. This implies that there is a positive relationship between Population Growth Rate and Economic Growth in Nigeria as proxied by (GRGDP). Going by its coefficient, 1% increase in Population will bring about a 2.003335% increase in GRGDP in Nigeria. as seen in the table, the probability value of POP (0.0000) is significant at 1%. It is on this basis that we conclude that Population Growth Rate has been a significant variable that has positively impacted on the Nigerian Economy over the period of study. This finding does not align with A-priori expectation, as it is in addendum with the findings of Aduana (2014). The implication of this in the Nigerian context is based on the fact that an increasing population through the period of study has brought about increased demand for goods and services as well as an increased labor force to meet up production of the aforementioned. Also, growing population means more people to pay tax, which has provided the government with additional funds to invest in infrastructure and other development initiatives.

4) Conclusion and Recommendations

The study examined the influence of the manufacturing sector on Nigeria's economic growth between 1986 and 2020, utilizing using the ARDL and ECM models. The result indicates that both the manufacturing sector output and population growth rate has a positive and significant effect on real GDP growth rate. However, the effect of gross fixed capital formation turned out to be insignificant but positive. In summary, the findings suggest that the manufacturing sector has played a critical role in propelling economic growth in Nigeria for the last 30 years. This could be attributed to its

contribution to technological progress, innovation, and job creation, which subsequently increase income for a substantial part of the population.

- (i). Given that the manufacturing sector output was positive and significantly impact on economic growth in Nigeria, it is important that Nigerian authorities prioritize the growth and improvement of the sector. This can be made possible through the provision of basic infrastructures such as; investing in transportation networks, power and energy systems, and communication technologies, among other things.
- (ii). The study also found that Gross Fixed Capital Formation positively impact economic growth, though, its impact was not statistically significant. Given this finding, it is recommended that the Nigerian government encourage private sector investment through the provision of fixed assets such as infrastructures and machinery, among others, which can be attractive to manufacturers, hence, increasing the level of domestic investments and thus, economic growth.
- (iii). Based on the study's findings, it is recommended that efforts be put in place by Nigerian authorities to improve the ease of doing business such as the reduction of inflation rate, among others. This can help to create a more predictable and stable business environment, which can be attractive to manufacturers.

Similarly, Manufacturing Sector Output (MSO) had a positive coefficient of 1.535111, which is in line with the already stated A-priori expectation. This means that 1% increase in MSO will significantly bring about a 1.535111% increase in economic growth in Nigeria. The result also indicated that MSO was significant. This is based on the fact that its probability value which stood at 0.0001 is less than the conventional 5% significance level. This is in line with the findings of Eze and Ogiji (2013) who concluded that manufacturing sector output has been a major determinant of economic growth in Nigeria. This finding is also in consonance with the endogenous growth model which was adopted for this study.

Also, GFCF has a positive impact on Economic Growth in Nigeria during the period of study, given the coefficient of 0.190205. It follows that 1% increase in GFCF will bring about a less than proportionate increase in Economic Growth as proxied by GRGDP. The result above was not significant at 5%. This implies that GFCF has not been a significant variable that has impacted on Economic Growth in Nigeria through the period of study. The level of insignificance of GFCF in Nigeria is partly due to insufficient investment (Amakom, 2012). The GFCF in Nigeria is not sufficient enough to drive significant Economic Growth as the investment level during the period of study have not been high enough to bring about a significant increase in capital stock, which would have transmitted to a significant increase in Economic Growth in Nigeria (Ben 2020; Ben 2020). Also, the insignificant impact of the GFCF in Nigeria during the period of study is also based on the fact that the country has a weak business environment. Nigeria's business environment has not been the best for investment to thrive. As an example, corruption has worked to hinder the impact of GFCF on Nigeria's Economic Growth (Olaleye, Edun, and Taiwo 2013).

Succinctly, from the fig. 4.5, Inflation rate was negative and did not follow the A-priori expectation as stated in the previous chapter of this work. based on the result, 1% increase in INF will bring about a 0.258096% increase in Economic Growth in Nigeria as proxied by GRGDP. Similarly, INF was seen to earmark a significant impact on GRGDP, this is following its probability value which is less than the conventional 5% level of significance. Conversely, Lending Interest Rate (LIR) was seen to have a negative impact

on Economic Growth in Nigeria during the period of study. Following this finding, we can say that a 1% increase in LIR will bring about a more than proportionate increase in Economic Growth in Nigeria. The above result aligns with A-priori expectation. LIR had a statistically significant impact on economic growth in Nigeria throughout the period of study. Considering this fact, its probability value is less than the stipulated 5% level of significance. This result is in addendum with the findings of Fapohunda, Ogbeide and Igbiginigie (2017) whose findings follows the notion that LIR have a positive and significant impact on Economic Growth in Nigeria.

Essentially, Exchange Rate (EXR) had a negative and statistically significant impact on Economic growth in Nigeria during the period of study. Its coefficient and probability values are -0.038570 and 0.0022 respectively. Its probability value which is less than the stipulated 5% level of significance confirms its level of significance. Going by its coefficient, 1% increase in EXR will bring about a less than proportionate decrease in Economic Growth in Nigeria. this result conforms with the already stated A-priori expectation.

Lastly, Table 4.6 shows that there is a bi-directional relationship between MSO and Economic Growth in Nigeria as proxied by GRGDP. This implies that MSO can be used to predict changes in Economic Growth in Nigeria. Conversely, GRGDP can also be used to predict changes in MSO during the period of study.

One policy issue that could arise from this finding is the importance of investing in and supporting the manufacturing sector in Nigeria in order to drive economic growth. since Manufacturing Output is found to have a positive and statistically significant relationship with economic growth, it suggests that increasing production in this sector could have a positive impact on overall economic development. This means that policymakers should prioritize initiatives that encourage and support the growth of the manufacturing industry, such as providing tax incentives for businesses in this sector, investing in infrastructure to facilitate production and distribution, and promoting the development of new technologies and processes. However, it may also be necessary to address any potential challenges or barriers to growth in the manufacturing sector, such as access to credit, regulatory hurdles, or labor shortages, in order to fully realize the potential economic benefits of this sector.

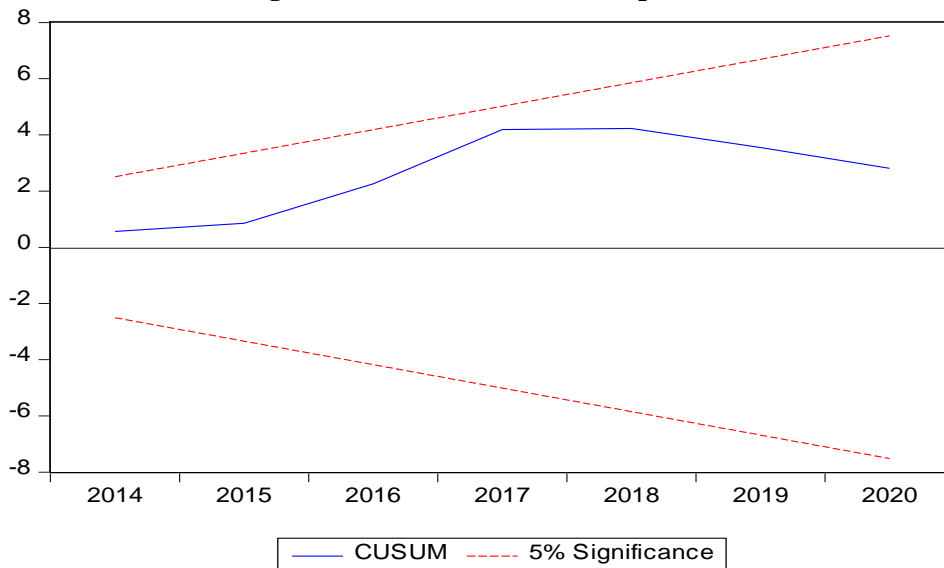
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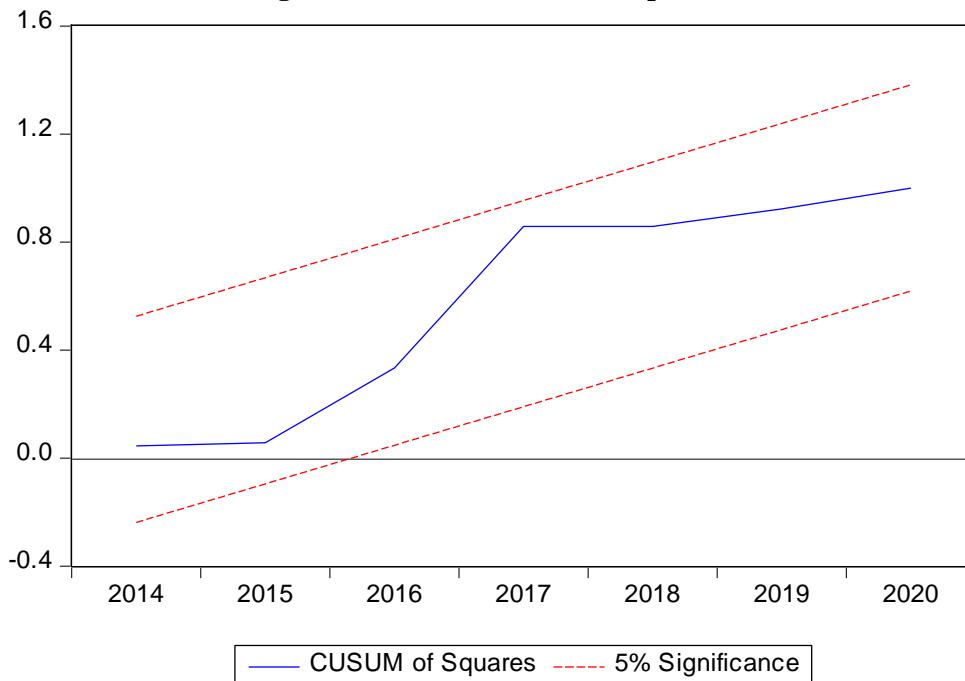
Appendix

Figure 5: Cumulative Sum of Square (CUSUM)



Source: EViews 10

Figure 6: Cumulative Sum of Square Residual



Source: EViews 10

The result of the stability test is presented in Fig. 5 and 6. The Fig. 5 shows that the recursive errors lie in-between the critical line at 5% significance level. This indicates that the residual variance is stable. Succinctly, looking at the CUSUMQ test result, it can be deduced that the recursive error falls in-between the critical line at 5% significance level. This result shows that the model is stable.