

**NEXUS BETWEEN MANUFACTURING SECTOR VALUE ADDED AND EXTERNAL SECTOR VARIABLES**

**BY**

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**Abstract**

*This study was prompted due to the low performance of manufacturing sector in Nigeria coupled with fluctuating exchange rate, increasing import, debt. The objective of the study is to examine the nexus between external variables and manufacturing sector performance using data from 1981 to 2021. The result of the study after employing Autoregressive Distributed Lag (ARDL) shows that in the long run, debt, import, FDI and GFCF all have negative impact on the sectors performance while export and external reserve have positive effect on the sectors performance. In the long run negative effect was still maintained with the exception of GFCF. The study therefore recommends that external fund through debt and FDI should be directed towards the development of the sector, import of manufactured goods should be minimized while export should be encouraged.*

**Keywords: Manufacturing sector, External variable, Debt, Import and Export**

**Introduction**

Manufacturing sector is the engine of growth for every economy and also creates employment through backward and forward linkages with other sectors of the economy. In this way, the sector generates substantial backward and forward linkages with other sectors in the economy (Tybout, 2000). The sector is further recognised as a driver of the economy and a great provider of employment. It ranges from small, micro, medium producers to large and multinational producers (Anyanwu, 2004; Alao, 2010; Isa, 2018). Higher productivity among manufacturing firms is a sure means of boosting economic growth, enhancing firm growth and increasing standard of living of the people through large supplies of both consumer and capital goods at a lower costs and prices (Anyanwu, 2004). As a result of its vast potentials as a tool for wealth creation, employment generation, contribution to the country’s gross domestic product as well as poverty alleviation among the citizenry (Olorunfemi, et al., 2013; Umofia, 2018), most countries that are major players in the global economy have transformed the structures of their economies by developing a strong manufacturing sector. In the 19th century, Europe developed the foundation of a strong manufacturing base while Asian countries were also recognized for the development of their manufacturing sector in the middle of the 20th century. China is currently the second largest economy in the world due to the growth of its manufacturing sector (Oyati, 2010). All these countries were able to improve the standard of living of their citizens and also achieve increase in economic growth rate.

The growth in Nigeria’s manufacturing sector has been fluctuation over the years while its contribution to GDP is also declining. From 1981 to 1997, the highest contribution of the sector to GDP is 21% while the lowest contribution is 17%. It dropped to 16% in 1998. From 1999 to date which corresponds to the era of democracy, the highest contribution of the sector to GDP is 13.9% (1n 1999 and 2000) while the lowest contribution is 6.6% in 2009. Table 1 below shows the contribution of manufacturing sector to GDP and its percentage growth for 5 years gap within the study period. It shows there is drastic decline in the performance of the sector.

**Table 1: Nigeria’s % increase in value added and % contribution to GDP**

Year	1981	1985	1990	1995	2000	2005	2010	2015	2020	2021
% GDP	20.3	21.2	19.5	19.10	13.9	8.9	7.2	8.7	12.7	14.6
%GROWTH	14.6	-9.16	8.9	3.2	2.3	0.8	17.8	-4.3	-2.8	3.3

**SOURCE: World Bank 2021 and CBN 2021**

Due to the low performance of the Nigeria manufacturing sector, various policies were employed to ensure growth of the sector by successive governments from 1960 to date. All these policies aimed at controlling internal and external variables that affect manufacturing sector performance. The Nigerian manufacturing sector

is classified into oil and non-oil manufacturing which are further divided into sub-sectors (CBN, 2020). Despite these sectors importance and policies introduced for their development, productivity and contribution to economic growth is still affected by many factors. These factors can be internal or external and affect it adversely or positively. The external variables can be observed under the external sector. It reflects the economic transactions between an economy and the rest of the world. The prime function of the external sector is to ensure growth and stability of every globalized economy.

According to Akidi, Tubotamuno, and Obayori (2018) external sector is one of the most important sectors in the growth and development process of any economy, be it developed or developing. This is because the external sector is a network of economic transactions a country has with other countries. According to Mordi, Englama and Adebusuyi (2010) the major indicators of external sector are trade openness, exchange rate and external debt. Other indicators, Foreign Exchange Earnings, Imports, Foreign Portfolio Investment (FPI) and Foreign Direct Investment (FDI). The theoretical and empirical literature are presented below

### **Theoretical Literature**

This study employs the dependency and liberal economic theories as its theoretical framework to demonstrate how these theories help in the accurate analysis of the dependency of the Nigerian economy on international competitive economic systems over which it has little control. First, dependency theory is founded on the belief that there is a “center” of wealthy nations and a “periphery” of poor and underdeveloped states, (Vincent, 2006). Resources are extracted from the periphery and flow towards the center in order to sustain the economic growth and wealth of the latter, and the poverty of the former. The result is that the development of the poor nation is rendered impossible by the domination of the rich industrialized countries.

Secondly, the major argument of the liberal economic theory is that economic liberalization will help in the increase of flow of foreign investment into developing countries, as a result of the easing of trade and exchange restrictions. In the process the creation of a market society in a global scale becomes within reach (Biersteker, 1993). Again, one of the major objectives of liberalization is to reduce the resource gap in the LDCs, by improving the trade balance and encouraging a net capital inflow. This creates dependency and stifles the infant industry in the periphery to the advantage of the centre. Since they are the primary organizations which formalize and institutionalize market relationships between countries; they lock peripheral states into agreements, which force them to lower their protective barriers thereby preventing development of trade profiles which diverge from the model dictated by the supposed “comparative advantage (Burchill, 1996). From the above explanation it can be observed that with liberalization of Nigerian economy, there is continuous inflow of manufactured goods, foreign investment and increase in debt into the country.

### **Empirical Literature**

Most studies related to this research studied the effect of individual variables on manufacturing sector performance while others studied the effect of fiscal policy instrument or monetary policy instruments on manufacturing sector performance, the empirical review for this work will be on determinants of manufacturing sector and those that looked at macroeconomics variables on the sector’s performance. This is because only few studies have looked at external sector and manufacturing sector performance. Akinlo (2016) examined the effects of macroeconomic factors on productivity in 34 sub-Saharan African countries for the period 1980 to 2002. The result showed that external debt, inflation rate, lending rate among others negatively influenced productivity. Human capital, credit to private sector, foreign direct investment, manufacturing value added as a share of GDP have significant positive influence on productivity.

Anaman and Osei- Amponsab (2009) examined the determinants of the output of the manufacturing industry in Ghana from 1974 to 2006. They employed error correction model analysis to establish the determinants. They showed that the level of output of the manufacturing industry was driven in the long-run period by positive relationship with the level of per capita real GDP, the export-import ratio and political stability in the short run. They suggested that increasing of manufacturing in Ghana would partly depend on the growth of export – based manufacturing level firms. Odior (2013) investigated the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011 using VECM. The result of his findings shows that Exchange rate and Consumer Price Index and Interest rate negatively relate to manufacturing sector productivity (MAP)

while credit to the manufacturing sector and FDI positively relate to the sectors productivity. In the study on influence of finance and macroeconomic variables in Nigeria by Uchenna and Nwakoby (2015), and ECM approach, the result shows that exchange rate, interest rate and export all have positive relationships with manufacturing capacity utilization while inflation, external debt and trade openness have negative effect on the sectors productivity.

Bassey and Agba (2017) in their study on manufacturing industries and export growth in the Nigerian economy using data from 1980 to 2015 while employing ECM found out that there is a positive relationship between export and manufacturing sector performance. David et al (2018) employed OLS in the study of Impact of Selected Macroeconomic Variables on Manufacturing Productivity in Nigeria from 1981-2018. The result shows that, exchange rate, and government capital expenditure has negative impact on manufacturing productivity, while prime lending rate, domestic private investment, consumer price index, credit to manufacturing sector and foreign direct investment has positive impact on Manufacturing productivity. High serial correlation with no diagnostic test. Onakoya (2018) carried out a study on Macroeconomic Dynamics and the Manufacturing Output in Nigeria using data from 1975 to 2015 while employing VECM. Findings revealed that in the short run there was no relationship between exchange rate, broad money supply, GDP, unemployment rate and manufacturing output. Negative relationship exist between inflation rate, interest rate, broad money supply and manufacturing output. The inflation rate and interest rate, were statistically insignificant.

Kenny (2019) studied the Determinants of Manufacturing Sector Performance and Its Contribution to Gross Domestic Product in Nigeria using VECM and data from 1981 to 2015. The study found that labour force, and exchange rate have positive long run relationship with the manufacturing value added. Average manufacturing capacity utilisation, gross fixed capital formation, lending interest rate and government expenditure showed a long run negative relationship. Sule (2019) examined the potential of external financing in spurring industrial growth in Nigeria within the period of 1985-2018. The study adopted the Autoregressive Distributive Lagged (ARDL) bound approach as the estimation technique. The finding revealed that, a positive relationship exists between gross fixed capital formation, Industrial Energy Consumption, Contract Intensive Money external loan and industrialization. While foreign direct investment, remittance, official development assistance have negative effect on the sectors performance.

Kpagih, Rose and Nyeche (2022) in their recent study of External Sector and Manufacturing sector performance in Nigeria, employed data from 1981- 2019 and ARDL model. The study reveals that in the short run exchange rate variations have negative, but significant effect on manufacturing sector performance, while trade openness, and FDI have positive but insignificant influence on the manufacturing sector performance in the short run. In the long run, exchange rate level and FDI inflows have positive and significant effect on the manufacturing sector performance, while trade openness has negative and significant effect on the Nigerian manufacturing sector performance. Nteegah and Olubiyi (2022) recently examined External Sector and The Performance of Manufacturing Sector in Nigeria using VECM and data for only three variables from 1980-2020.

### **Research Objectives**

It is in line with these reviews that this study was conducted with the main objective of assessing the relationship and effect of external variables on Nigeria's manufacturing sector performance. It will employ the combination of variables that were not employed in previous studies. The country is presently experiencing exchange rate fluctuation, increasing debt, increasing import, declining external reserve, corruption in the implementation of fund and proceeds from foreign investment and export.

### **Methodology**

Data for this study was obtained from the central Bank of Nigeria Bulletin, Nigeria Bureau of Statistics and World Development indicators between 1981 and 2021 for the purpose of capturing the long-run determinants of manufacturing value added and external sector variables. This study utilizes Autoregressive Distributed Lag (ARDL) approach to cointegration in its analysis. The justification for using the ARDL approach and its preference over the conventional cointegration methods such as the residual-based technique (Engle & Granger, 1987) and the maximum likelihood test (Johansen & Juselius, 1990) has been explained by several authors. This

approach can be applied to assess the existence of cointegration between variables whether the variables are integrated to order zero (i.e. I(0)), order one (i.e. I(1)), or a mixture of the two (i.e. I(0) and I(1)). The ARDL technique can be applied to small sample, which is not possible under the conventional cointegration methods because they require a relatively large sample size to be valid. The ARDL model is represented below

Following the work David et al (2018) the functional form of the determinants of external debt is specified in model 1:

$$LMVAD = f(LIMP, LEXPT, LDEBT, LGFCF, LFDI, LEXTR, EXG) \tag{1}$$

Where LMVAD is the manufacturing value added (dependent variable); LIMP represent log of import; LDEBT is the log of external debt; LGFCF is the log of gross fixed capital formation; LFDI is the log of foreign direct investment; LEXTR is the log of external reserve and EXR is the value of exchange rate.

The econometrics model:

$$LMVAD_t = \beta_0 + \beta_1 LIMP_t + \beta_2 LEXPT_t + \beta_3 LDEBT_t + \beta_4 LGFCF_t + \beta_5 LFDI_t + \beta_6 LEXTR_t + \beta_7 EXG_t + \varepsilon_t \tag{2}$$

The ARDL model to be estimated is specified as follows:

$$\begin{aligned} \Delta LMVAD_t = & \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta LMVAD + \sum_{i=0}^n \beta_{2i} \Delta LIMP_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta LEXPT_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta LDEBT_{t-i} \\ & + \sum_{i=0}^n \beta_{5i} \Delta LGFCF_{t-i} + \sum_{i=0}^n \beta_{6i} \Delta LFDI_{t-i} + \sum_{i=1}^n \beta_{7i} \Delta LEXTR_{t-i} \\ & + \sum_{i=1}^n \beta_{8i} \Delta EXG + \phi_1 LMVAD_{t-1} + \phi_2 LIMP_{t-1} + \phi_3 LEXPT_{t-1} + \phi_4 LDEBT + \phi_5 LGFCF \\ & + \phi_6 LFDI_{t-1} + \phi_7 LEXTR_{t-1} \\ & + \phi_8 EXG_{t-1} \\ & + \varepsilon_{1t} \end{aligned} \tag{3}$$

The error correction model is expressed as follows:

$$\begin{aligned} LMVAD_t = & \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta LMVAD + \sum_{i=0}^n \beta_{2i} \Delta LIMP + \sum_{i=0}^n \beta_{3i} \Delta LEXPT_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta LDEBT \\ & + \sum_{i=0}^n \beta_{5i} \Delta LGFCF_{t-i} + \sum_{i=0}^n \beta_{6i} \Delta LFDI_{t-i} + \sum_{i=1}^n \beta_{7i} \Delta LEXTR_{t-i} \\ & + \sum_{i=1}^n \beta_{8i} \Delta EXG_{t-i} + \theta_1 ECT_{t-1} \\ & + \varepsilon_{1t} \end{aligned} \tag{4}$$

**Results**

**Results of Unit Root Tests**

The results of the ADF and PP unit root test conducted is presented in Table 1 below. It revealed that four of the variables have unit root at their levels, which means they are not stationary. They became stationary after taking their first difference, hence, they are integrated of order one [I(1)]. While four others also have no unit root at level and hence, are stationary at level or integrated of order zero, i.e. [I(0)].

**Table 2: Results of Unit Root Tests**

Variables	ADF		PP		Stationarity Status
	Level	First difference	Level	First difference	
LMVAD	4.29***	5.43	4.32***	5.43	I(0)
LIMP	0.96	7.23***	1.48	7.20***	I(1)
LEXPT	1.06	6.57 ***	0.87	6.63***	I(1)
LDEBT	1.97	4.86***	2.57	4.86***	I(1)
LGFCF	5.69***	5.12	5.71***	5.61	I(0)
LFDI	3.34*	9.16	3.41*	9.30	I(0)
LEXTR	3.58**	7.52	3.74**	7.60	I(0)
EXG	1.03	5.74***	0.88	5.73***	I(1)

Notes: \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% respectively. L denotes logarithm

Source: Author’s computation (2022)

**Results of ARDL bounds tests**

The ARDL bounds testing approach tests the null hypothesis of no cointegration among the variables. This is done by comparing the computed F-statistic with the critical values provided by Pesaran et al. (2001). The decision rule states that, if the computed F-statistic is greater than the upper bound [I(1)], the null hypothesis of no cointegration among the variables is rejected. But if the computed F-statistic is smaller than the lower bound [I(0)], the null hypothesis of no cointegration among the variables cannot be rejected. In the situation where the F-statistic falls between I(0) and I(1), the inference will be inconclusive.

**Table 3 Results of ARDL bounds tests**

Dependent Variable	Function	F-Statistic
LMVAD	f(LIMP,LEXPT,LDEBT,LGFCF,LFDI,LEXTR,EXG)	9.54***
Critical Values Bounds		
10%		5%
I(0)	I(1)	I(0)
1.92	2.89	2.17
		I(1)
		2.43
		2.5%
		I(0)
		2.43
		I(1)
		3.51
		1%
		I(0)
		2.73
		I(1)
		3.9

**Source** Authors’ computation (2022). \*\*\* denotes statistical significance at 1% level.

The bounds testing results reported in Table 2 indicates that the computed F-statistic (9.54) is greater than the I(1) at 1% level. This implies that there is cointegration or long run relationship between the variables. The optimal lag-length of (3,3,3,3,0,0,2,2) suggested by Akaike Information Criterion (AIC) was used. Given the confirmation of a cointegration relationship, we proceeded to estimating the long-run and short-run relationship between the variables.

**Results of the Parsimonious Long-run and Short-run Estimates**

The results of the long-run and short-run of the effect of external variables on manufacturing performance in Nigeria are reported in panel A and panel B respectively in Table 3 below

**Table 4: Long-run and Short-run Estimates**

Panel A: Long-run Coefficients - Dependent variable is LMVAD				
Independent Variable	Coefficient	Standard Error	t-Statistic	Prob.
C	25.349***	4.199	6.038	0.000
LIMP	-0.024	0.024	-0.986	0.341
LEXPT	0.055**	0.021	2.628	0.020
LDEBT	-0.011	0.014	-0.814	0.439
LGFCF	-0.441**	0.198	-2.222	0.043
LFDI	-0.027	0.028	-0.955	0.356
LEXTR	0.025	0.017	1.457	0.167
EXG	0.000***	0.000	3.491	0.004
Panel B: Short-run Coefficients - Dependent variable is ΔLMVAD				
Δ (LIMP)	-0.064	0.018	-3.564	0.003
Δ (LIMP(-1))	-0.041	0.014	-3.034	0.009
Δ (LIMP(-2))	-0.131	0.014	-9.571	0.000
Δ (LFDI)	-0.002	0.006	-0.264	0.796
Δ (LFDI(-1))	-0.011	0.006	-1.775	0.098
Δ (LFDI(-2))	-0.021	0.006	-3.357	0.005
Δ (LEXTR)	-0.054	0.009	-6.262	0.000
	-0.071	0.008	-8.480	0.000

$\Delta$ (LEXTR(-1))				
$\Delta$ (LEXTR(-2))	-0.086	0.010	-8.763	0.000
$\Delta$ (EXG)	-0.001	0.000	-4.716	0.000
$\Delta$ (EXG(-1))	-0.000	0.000	-2.369	0.033
$\Delta$ (LGFCF)	-0.094	0.034	-2.759	0.015
$\Delta$ (LGFCF(-1))	0.239	0.036	6.653	0.000
CointEq(-1)*	-0.407	0.035	-11.615	0.000

Note:  $\Delta$  is the first difference operator. Source: Author’s computation (2022)

**Discussion of Result**

The results of the long-run estimates reported in Table 3 reveals that change in import, debt gross capital fixed formation and foreign direct investment have negative effect on manufacturing sector performance in the long-run and vice versa. Only GFCF is statistically significant. A 1 unit increase in LIMP, LDEBT, LGFCF and LFDI reduces MVAD by 2.4%, 1.1%, 44% and 2.7% in the long-run. Hence, lowering import, debt, capital formation and foreign direct investment is associated with increasing manufacturing performance in Nigeria, and vice versa. This shows that debt capital formation and foreign investment are not properly utilized or not available for the sectors usage. The negative impact of import lends support to the work of (Ngwudiobu & Aidi, 2018; Samuel & Aram, 2016) whose analysis also shows that an increase in import decrease manufacturing sector performance. The negative effect of GFCF can also be seen in the work of Kenny (2019) while negative effect of debt and FDI are supported by the works of (Uchenna & Nwakoby, 2015; Akinlo, 2016) for Debt and (Samuel & Aram, 2016;) for FDI.

Export, external reserve and exchange rate all have positive effect on manufacturing sectors performance in the long run. A 1% increase in these three variables leads to 5.5% and 2.5% increase in manufacturing performance. The p-value of export and exchange rate are statistically significant. Moreover, in the short-run all the variables with the exception of export, debt have significant effect on manufacturing performance. Taking the most significant, it shows that a 1% increase in Import, external reserve, foreign direct investment, exchange rate leads to 13.1%, 2% , 9% and 1% decrease in manufacturing sector performance and vice versa. This shows that import is still affecting the productivity of the sector while funds from FDI and external reserve are not directed towards the development of the sector. Gross fixed capital formation has a positive effect of 24% with MVAD. This implies that capital formation aids in the development of the sector. This finding are in line with the work of (Sule, 2019). The error correction coefficient is correctly signed and significant. The coefficient of 0.41 indicates that a deviation from the long run is corrected within the year.

**Results of Residual Diagnostic Tests**

The results of residual diagnostic tests reported in Table 4 show that the model passes all tests including normality, serial correlation, heteroscedasticity and functional form. Hence, the estimated relationship is free from the problems of serial correlation and heteroscedasticity.

**Table 5: ARDL-ECM model diagnostic tests**

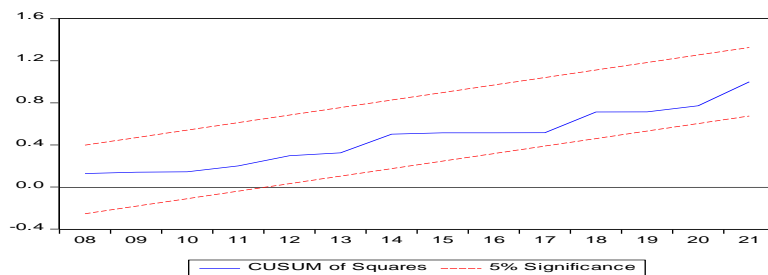
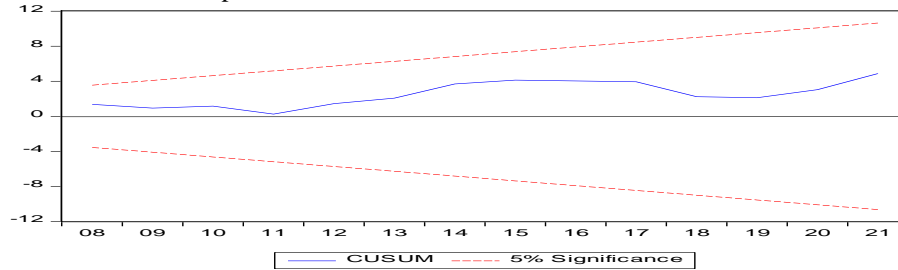
Test Statistic	Results
Normality: Jarque-Bera	1.53[0.47]
Serial Correlation: Prob. F(2, 12)	0.42[0.67]
Heteroscedasticity: Prob. F(23,24)	0.65[0.81]
Functional Form: Reset F-stat(1, 13)	0.37[0.56]

Source: Author’s Computation (2022)

**Results of Model Stability Tests**

. From the figure below it can be clearly seen that the plot of CUSSUM and CUSSUMQ statistics moves

between the critical bounds at 5% levels of significance, this means that the estimated coefficients in the model are stable. The straight lines in the figure represent critical bounds at 5% significance level. A drift from this region of stability will mean an error in model specification but the result has stated otherwise, hence this report could be relied on up for further reference.



**Conclusion**

This paper employs the ARDL and ECM technique to investigate the nexus between external variables and manufacturing sector performance in Nigeria from 1981 to 2021. The bound test cointegration result shows that there is a long-run relationship between industrial output and other variables employed in the study. The results of estimation shows positive association between manufacturing sector performance, export, external reserve in the short run. This suggests that more export should be encouraged from the sector while money from external reserve should be used in infrastructural development of the sector. External debt, import, FDI and Gross fixed capital formation all execute negative impact on the sectors performance. This shows that funds from FDI, external debt are not directed towards the sectors development while GFCF in the sector is not sufficient. Increasing importation is still on the increase therefore affecting the turnover of the sector. The result further shows that in long run import, exchange rate, external reserve negatively on the sectors performance while GFCF has positive effect on the sectors performance. All these affect the performance and contribution of the sector to economic growth and welfare development.

**Recommendations**

The following suggestions are recommended for the study

1. Funds from FDI, external reserve and debt should be directed towards development of the manufacturing sector. This will improve productivity and contribution to economic growth
2. Import and debt should be curtailed appropriately and only dwelled into when necessary
3. Government should introduce policies that will strengthen the local currency and should invest capital for the infrastructural development of the sector. This will help in boosting production and meet the increasing needs of consumers.

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