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Impact of Foreign Direct Investment on Manufacturing Output in Nigeria - An ARDL Approach

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Abstract

The study examined the impact of foreign direct investment on manufacturing output in Nigeria from 1981 to 2016 using Auto Regressive Distributed Lag Approach (ARDL). The Cointegration test using bound test reveals that the variables under study are integrated into the long run. In the short run, FDI, exchange rate and interest rate relate negatively, while trade openness positively with the manufacturing output in Nigeria. In the long run, on the other hand, FDI and Exchange rates relate negatively but trade openness and interest rate positively with the manufacturing output. The study, therefore, recommends that FDI should be geared towards the real sector that will, in turn, boost the performance of the manufacturing sector. Also, Sound economic policies should be ensured that will enhance foreign direct investment inflows to boost local production. Furthermore, there should be free movement of capital inputs required by the manufacturing sector in the country and finally, there is the need for appropriate monetary policy measures that will have good synergy with manufacturing sector in Nigeria.

Key words: Manufacturing Output, Interest Rates, ARDL test, Foreign Direct Investment, Trade Openness, exchange rate.

JEL Classifications: E23, F41, F43, G11, H32.

1.0 Introduction

The investigation of the relationship between foreign direct investment (*FDI*) and manufacturing sector represents a main interest of the growing empirical literature for the past three decades due to the debate between policymakers and academicians in both developed and underdeveloped countries. For example, Africa strives to attract *FDI* into the manufacturing sector because of its acknowledged advantages as a tool for economic development. Africa and Nigeria in particular joined the rest of the world to seek *FDI* as supported by the formation of New Partnership for Africa's Development (NEPAD), which has the attraction of *FDI* to Africa as a major constituent, required to enhance macroeconomic performance and to accomplish the minimum growth rate essential to meet the millennium development goals set by the United Nations (UN). An increase in investment is crucial to the achievement of sustained growth and development in Nigeria and Africa at large. This necessitates the mobilization of domestic and international investment. In addition, the low share of the country in world trade, the high volatility of short-term capital flows, and the low savings rate in the country, unpredictable of aid flows, the desired increase in investment has to be achieved through increase in *FDI* inflows, at least in the short run (De Gregorio, 2003).

Unfortunately, the efforts of most countries in Africa to attract *FDI* have been unsuccessful in spite of their perceived and noticeable need for *FDI* in the region. The development is discouraging, transfer little or no hope of economic growth and

development for these countries (Oladipo, 2013). The investment is poor and risky due to some unhealthy policies, volatile security situation, and massive infrastructure shortfall in Nigeria in particular and the continent at large. This also explains why they receive the only fragment of global *FDI*. For example, the records world inflows of *FDI*, which increases by an average of 13% a year from 1990-1997, followed by an average increase of nearly 50% from 1998-2000, driven by large cross-border merger and acquisitions. Global *FDI* inflows reach high records of USD1.5 trillion in 2000 and decrease to USD0.7 trillion in 2001, as a result of the sharp decline in cross-border mergers and acquisitions among industrial countries. Inflows of *FDI* into developing countries grew by an average of 23% from 1990-2000 but declined by 13% to USD215 billion in 2001. Out of the estimated USD651 billion global *FDI* in 2002, Africa received only USD11 billion which represents only 1.7% of the total share of *FDI* (World Investment Report, 2003). Although UNTAD's world investment report 2004, reported that Africa's outlook for *FDI* is promising, the expected surge is yet to be clear. *FDI* is still concentrated in only a few countries for many reasons such as the negative image of the region, poor infrastructure, corruption, and unfriendly macroeconomic policy environment among others.

Nigeria is one of the few countries that have consistently benefitted from the *FDI* inflow to Africa. Nigeria share of *FDI* inflow to Africa averaged around 10 percent from 24.19 % in 1970 to a level of 5.88 % in 2001 up to 11.65 % in 2002. United Nations Trade and Development (UNTAD, 2003) indicated that Nigeria as a continent second top of *FDI* recipient after Angola in 2001 and 2002. The details of the *FDI* inflows into Nigeria range between USD128.6 million in 1970 to USD434.1 million in 1985 to USD115.95 billion in 2000 to USD9,088.82 and USD17,633.01 billion in 2015 respectively.

Further, given the economy's weak technological and industrial base, industrial activities were organized to depend largely on imported inputs and Nigeria has employed a number of strategies intended at attracting *FDI* inflows and to enhance the performance of the manufacturing productivity, in order to revamp economic growth and development. However, as a result of the collapse in global oil price in the early 1980s which is the major source of the country's foreign earning, there is a drastic decrease in the earning from oil exports revenue. As a consequence, the import-dependent industrial structure that emerged, could not be sustained as earning from exports became inadequate to pay for the huge import bills. All the policy measures adopted to improve the situation such as the stabilization measure of 1982, as well as the restrictive monetary policy and a stringent measure of 1984, however, failed. This led to the introduction of the Structural Adjustment Program (SAP) in 1986 whose main aim is to reduce the high dependency of the economy on crude petroleum as a major foreign exchange earner by promoting non-oil exports particularly manufacturing goods. Although these went a long way in attracting *FDI* flows into the economy, as the country becomes the second largest recipient of *FDI* flows among low-income countries (CBN Statistical Bulletin 2010).

1. 1 Statement of the problems

Records showed that beginning from 1970 the value of *FDI* into the Nigerian economy was USD205 million; in 1975 it has risen to USD470 million in 1989 it reaches USD1 billion and has continued to grow with a positive impact on the economy. But the Nigerian manufacturing sector is still behind other sectors, the manufacturing output to gross domestic product (*GDP*) performance has been declining till date. 1970 to 1979 was 7.1 percent, 1980-1989 it increases to 8.9 %, while from 1990-1999 it fell to 5.5%, in 2000-2009 it further decrease to 3.1%. The

economy experience a little increase to 6.55% in 2010. When compare 7.79% in 2011, and 9.03% in 2012 respectively. Moreso, in 2013 reached an all-time high of 24.60% in the fourth quarter of 2014 and a record low of -0.70% in the second quarter of 2015 respectively (World Development Indicators 2016). Despite the increase in a number of *FDI* inflow to the country but the manufacturing sector output is still lacking behind to improve the growth. The question is, where are the *FDI* inflows channel into? The manufacturing sector or not. Therefore, the study is meant to find out whether there is a positive relationship between manufacturing output and *FDI* inflows into Nigeria through the use of recent econometrics analysis.

1. 2 Objective of the Study

The main objective of the study is to investigate the impact of *FDI* on Manufacturing output in Nigeria from 1981 to 2015.

2.0 EMPIRICAL LITERATURE

Most of the available literature focuses on the relationship between *FDI* and economic growth across the globe. This study investigates the relationship between *FDI* and manufacturing output in order to identify the gab from different kinds of literature. Jayawickrama and Thangavelu (2010) examine the influence of *FDI* on manufacturing growth of Singapore in a panel data sample of 14 manufacturing industries over 30 years stretching from 1975 to 2004. By controlling for unobserved industry characteristics and time effects, the study finds a positive contemporaneous effect of *FDI* on the output growth of Singapore manufacturing industries. Tajul and Hassan (2016) employed OLS and GMM methodologies to examine the implication of inflows of *FDI* in real estate and *FDI* in the

manufacturing sector on economic growth in the selected developing countries for the period between 2003 and 2008. They analyze the model by using both static and dynamic approaches, and that there is the positive impact of *FDI* on both manufacturing and real estate, however, the results signify the superiority of GMM approach over OLS.

Chandran *et al.* (2008) examine the short and long run dynamics of *FDI* over the manufacturing growth of Malaysia for the period of 1970-2003. They used new cointegration method of bounds test and the autoregressive distributed lag (ARDL) approach to estimate the short and long run production elasticity of *FDI*. Estimated *FDI* elasticity in the short and long run was found to be statistically significant. In contrast, Lean (2008) employed a VAR approach to analyzing the relationship between *FDI* and the economic growth of the manufacturing sector in Malaysia, from 1980 to 2005. The empirical findings suggest that the *FDI* and the growth in the manufacturing sector are independent. However, they acknowledged that *FDI* can achieve growth only if the host country has an established and sufficiently qualified or skilled labor force, the government, therefore, needs to focus attention on the detailed potential roles which *FDI* can interact with human capital in order to substantially influence the positive future development of the manufacturing sector in Malaysia.

Okoli and Ogu (2015) employed OLS methodology to assess the impact of *FDI* inflows on the performance of the manufacturing firms in Nigeria between 1970 and 2013. The result shows that there is a positive impact of *FDI* on manufacturing output but only in the long run. This is inconsistent with findings of Orji *et al.* (2015) where they examined the impact of foreign direct investment on the Nigerian manufacturing sector output over the period of 1970 to 2010. Using OLS techniques the results show that *FDI* impacted negatively on the manufacturing sector. Although, the

paper found that *FDI* is negatively related to manufacturing output in Nigeria. Nevertheless, they noted that this unhealthy relationship can be reversed if the country receives increased *FDI* inflows into critical sectors that support the necessary inputs and raw materials needed by the local industries. Nwokoye *et al.* (2013) utilized the OLS technique to investigate the effect of *FDI* on domestic entrepreneurship in Nigeria's manufacturing sub-sector from 1973- 2010. Results identified positive and highly significant effects of each of human capital and infrastructural development on activities on Nigeria's manufacturing sub-sector while each of manufacturing *FDI*, market size and anti-*FDI* policies has a negative and highly significant effect on activities in Nigeria's manufacturing subsector.

Onyekwena (2012) Investigate the impact of *FDI* on manufacturing firms and banks in Nigeria, between 1992-2009 and 1998-2003 respectively. He used econometric estimations of augmented Cobb-Douglas for manufacturing firms and Dealership models for Banks. The analysis found strong evidence of positive *FDI* impact on manufacturing firms but not in the case of banks David *et al* (2012) examined the effect of *FDI* on the Nigerian manufacturing sector across 1975 – 2008. The methodology adopted for the study is the Vector Auto Regression (VAR), co-integration and error correction techniques to establish the relationship between *FDI* and the growth of the manufacturing sector. The findings show that *FDI* has a negative effect on manufacturing productivity. Adejumo (2013) examined the relationship between *FDI* and the value added to the manufacturing industry in Nigeria, between the period 1970 and 2009. Using the autoregressive lag distribution technique to determine the relationship between *FDI* and manufacturing value added, it was discovered that in the long-run, *FDI* has had a negative effect on the manufacturing sub-sector in Nigeria.

In contrast, Osisanwo (2013) analyze the impact of *FDI* on manufacturing output growth in Nigeria between 1970 and 2011. The ordinary least square (OLS) method is used to estimate the empirical model. The result of analysis revealed that the first lag of real manufacturing output level (MANt-1) and inflation (*INF*) are significant factors influencing the growth rate of Nigerian manufacturing industry, while manufacturing output is insignificantly and inelastic to *FDI* in Nigeria. This can be adduced to low foreign capital flow into the Nigerian manufacturing sector. In addition, Ehijiele *et al.* (2016) investigate the effect of *FDI* on the manufacturing sector in Nigeria from 1981-2012. In analyzing the data, both econometric and statistical methods were used. The econometric regression model of ordinary least square was applied in evaluating the relationship between foreign direct investment and major economic indicators such as manufacturing output, exchange rate, and interest rate. The model revealed a positive relationship between foreign direct investment and each of the variables.

From the reviewed literature it is evident that most of the findings show a contrasting standpoint on the relationship between FDI and manufacturing output in developing countries including Nigeria. For example, researchers like (Jayawickrama and Thangavelu, 2010; Masron and Feredouni, 2016; Chandran *et al.* 2008; Okoli and Ogu,2015; Onyekwena, 2012; Osisanwo, 2013; & Ehijiele *et al.* 2016) found a positive impact of *FDI* on manufacturing output. However, Orji *et al.* (2015), Ebele *et al.* (2013), David *et al* (2012), Adejumo (2013) found a negative impact of *FDI* on manufacturing output. But in the case, Lean (2008) found no relation between *FDI* and manufacturing output in Malaysia. More so, most of the research conducted in Nigeria did not attach more value to trade openness which is also a major determinant of manufacturing output performance.

3.0 MATERIALS AND METHOD

3.1 Data

The study employs a time series data for the periods 1981 to 2015 from the Central Bank of Nigeria Statistical Bulletin, (2003, 2011and 2015) and World Bank development indicators (2016). The data includes Manufacturing Value Added (*MVA*) proxy for Manufacturing Output, Total Trade proxy for Trade openness (*TO*), Foreign Direct Investment (*FDI*), Interest Rate (*INTR*), and Exchange Rate (*EXCR*).

3.2 Methodology

The linear relationship among *MVA, TO, FDI, INTR* and *EXCR* is expressed as follows:

$$MVA_t = \alpha + \beta_1 FDI_t + \beta_2 TO_t + \beta_3 INTR_t + \beta_4 EXCR_t + \varepsilon_t$$

The ARDL regression analysis model employed in the study can be expressed as follows:

$$\Delta MVA_t = \alpha_0 + \delta_1 MVA_{t-1} + \delta_2 FDI_{t-1} + \delta_3 TO_{t-1} + \delta_4 INTR_{t-1} + \delta_4 EXCR_{t-1} + \sum_{i=3}^{m} \beta_1 \Delta MVA_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta FDI_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta TO_{t-i} + \sum_{i=0}^{m} \beta_4 \Delta INTR_{t-i} + \sum_{i=1}^{m} \beta_5 \Delta EXCR_{t-i}$$

Where α is the intercept, m is the lag order, and ε_t and Δ are the white noise and the first difference operator. In order to test the long-run equilibrium relationship among *MVA, FDI , TO, INTR* and EXCR, the study employs the "F-test" in the ARDL Bounds test based on the null hypothesis of no co-integration [i.e. H0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$], contrary to the alternative hypothesis of co-integration [i.e. H1: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$]. Accordingly, the computed "F-statistic" is compared to both the upper and lower bounds critical value to either reject or accept the null hypothesis (Pesaran et al., 2001).

4.0 RESULTS AND DISCUSSION

4.1 Unit test

Given that most time series data are non-stationary at the level, it is necessary to conduct unit root test in order to avoid the problem of spurious regression result. Therefore, the Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) tests were employed to test for the presence of unit root.

Table 1
Unit Root Test

	ADF Test			**P-P Test**		
Variable(s)	T-Stat.	Prob.	Order of Integr.	T-Stat.	Prob.	Order of Integr.
MVA	-0.65975	0.9682	*I(0)*	-0.442841	0.9816	*I(0)*
FDI	1.854919	1.0000	*I(0)*	2.377989	1.0000	*I(0)*
TO	-1.671503	0.7419	*I(0)*	-1.772886	0.6956	*I(0)*
EXCR	-2.208178	0.4702	*I(0)*	-2.208178	0.4702	*I(0)*
INTR	-3.074859	0.1283	*I(0)*	-2.969805	0.1550	*I(0)*
ΔMVA	-7.072607	0.0000*	*I(1)*	-7.137138	0.0000*	*I(1)*
ΔFDI	-4.966152	0.0017*	*I(1)*	-4.923495	0.0019*	*I(1)*
ΔTO	-2.917482	0.1714	*I(1)*	-4.340004	0.0083*	*I(1)*
ΔEXCR	-5.268181	0.0008*	*I(1)*	-5.267926	0.0008*	*I(1)*
ΔINTR	-6.342712	0.0001*	*I(1)*	-7.380419	0.0000*	*I(1)*

**Denotes rejection of the null hypothesis at 1% significance level.*
Source: Researchers' computation output using E-views 9.0

Table 1 shows that the data series of variables used for this research were tested for unit root using ADF and PP statistic and they were found to be stationary at level I(0) and others at first difference I(1). That is, stationary at 1% level of significance.

4. 2. Short Run Coefficient

Table 2
Dependent variable MVA

Variable	**Coefficient**	**t-Statistic**	**Prob.***
MVA(-1)	-0.386214	-2.250496	0.0353
FDI	-0.764307	-2.303142	0.0123
TO	0.021334	2.863763	0.0093
EXCR	-0.007465	-1.219971	0.236
INTR	-0.036932	-0.681173	0.5032

Source: Researchers' computation output using E-views 9.0

Table 2 shows that the speed of adjustment term {MVA (-1) = -0.39, p=0.0353} is negative and significant confirming the expected equilibrium process in the short-run. The speed adjustment shows that almost 39% of the disequilibria of the previous year are corrected in the present year in a subsequent shock in the process of the relationship among the variables. It further indicates that *FDI* relates negatively and statistically significant with manufacturing output, while trade openness is positively and statistically significant with manufacturing output in Nigeria in the short run period, while, exchange rate and the interest rate is negative with the manufacturing output, but statistically insignificant in the short run.

4.3. Bound Co-integration Test

Table 3

Co-integration Test

F Stat.	Significance	I(0) bound	I(1) bound	H_o
4.889413	10%	2.2	3.09	No long-run relationships exist
	5%	2.56	3.49	
	2.50%	2.88	3.87	
	1%*	3.29	4.37	

**Denotes rejection of the null hypothesis at 1% significance level.*

The bound test in table 3 indicates the rejection of the Null hypothesis of no long-run relationship exists at 1% level of significance and concluded that the variables under study are cointegration in the long run.

4.4 Long Run Coefficient

Table 4

Dependent variable MVA

Long Run Coefficients			
Variable	Coefficient	t-Statistic	Prob.
FDI	-0.037143	-2.505437	0.0061
TO	0.031867	2.266356	0.0177
EXCR	-0.063461	-0.96766	0.3442
INTR	0.491217	0.597605	0.5565
C	-5.031885	-2.183154	0.0198

Source: Researchers' computation output using E-views 9.0

The long-run coefficient in Table 4 also indicated that *FDI* is negatively and statistically significant this is consistent with the findings of Javorcik *et al.* (2018), Lu *et al.* (2017). The trade openness reveals positively and statistically significant. The exchange rate is negative with manufacturing output in Nigeria but statistically insignificant. Also, the interest rate is positively but statistically insignificant in explaining manufacturing output in the long run in Nigeria. The findings are in line with that of Orji *et al.* (2015), Nwokoye *et al.* (2013), David *et al* (2012), Adejumo (2013) whose findings show negative impact of *FDI* on manufacturing output in Nigeria but contradict with findings of Okoli and Ogu (2015), Onyekwena (2012), Osisanwo (2013) and Ehijiele *et al.* (2016) who found positive impact of *FDI* on manufacturing output in Nigeria.

4.5. Diagnostics Test

Table 5
Post Estimation Test

Diagnostics check	F-Statistic	Prob.	H_0
Breusch-Godfrey Serial Correlation Test	0.671438	0.5227	No serial correlation
B.-P.-Godfrey Heteroskedasticity Test	0.860766	0.5808	No Heteroskedasticity
Ramsey RESET Specification Test	0.048171	0.8285	No Specification error

Source: Researchers' computation output using E-views 9.0

After estimating the ARDL regression, the next step is to examine the "independence" of the residuals in the ARDL model by employing the "Breusch–Godfrey Serial Correlation LM Test" to test for serial correlation, the "Breusch–Pagan–Godfrey test" to test for heteroskedasticity problems, the "Ramsey Test" to test for misspecification and the "Jarque–Bera Test" to test for normal distribution. Evidence from Table 5 and Figure 1 show that the residuals in the ARDL model have no heteroskedasticity problems, exhibits no serial correlation, no misspecification (i.e. in its functional form), and are normally distributed.

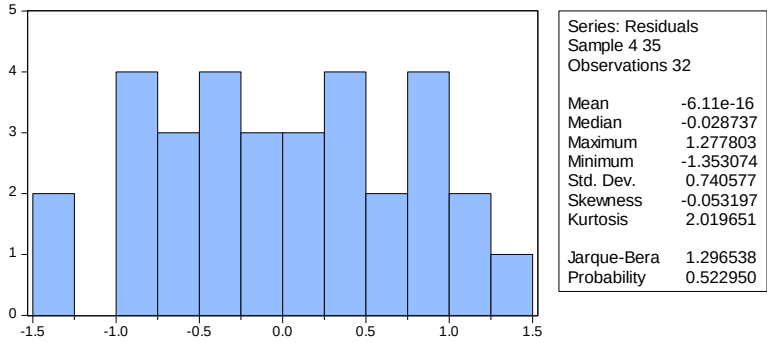

Figure 1
Normality Test
Source: Researchers' computation output using E-views 9.0

4.6. Stability Test

In order to check the stability of the ARDL model, the study examines the "constancy of the cointegration space" using the CUSUM and CUSUM of squares. Evidence from Figure 2 and Figure 3 indicate that the CUSUM and CUSUMQ of squares are within the 5% significance level; thus, the ARDL model is robust and stable in its form.

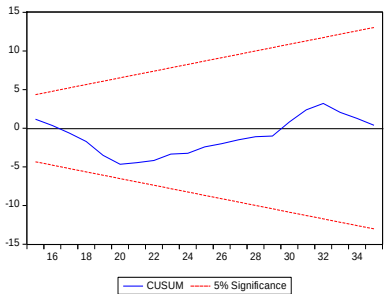

Figure 2
CUSUM Stability Test

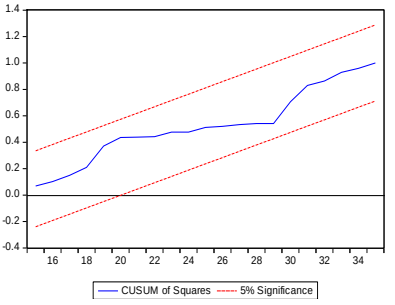

Figure 3
CUSUMQ Stability Test

5.0. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study examined the relationship between manufacturing output and *FDI* in Nigeria from 1981 to 2015. ARDL approach was used as the research methodology. Evidence from ARDL cointegration shows that the speed of adjustment [MVA (-1) = -0.39, p-value = 0.0353] is negative and significant, confirming the expected equilibrium process in the short-run. The speed of adjustment indicates that almost 39% of the disequilibria of the previous year are corrected in the present year in a subsequent shock in the process of the relationship among the variables. In addition, evidence from the short-run shows that on the average, a 1% increase in *FDI* will greatly reduce the manufacturing output by 76.4%. On the other hand, a 1% increase in trade openness will lead to a smaller increase in manufacturing output in Nigeria by 2.1%. Evidence from the long-run shows that a 1% increase in *FDI* will lead to decrease in the manufacturing output by 3.7%, but a 1% increase in trade openness will increase manufacturing output by 3.1% in Nigeria. While the exchange rate relates negatively in both short run and long run but statistically insignificant in influencing manufacturing output. Finally, interest rate, relates negatively in the short run and positively in the long run with manufacturing output but statistically insignificant in both the two periods.

5.2 Recommendations:

Even though *FDI* was found to be inversely related to manufacturing output in Nigeria, this harmful relationship can be reversed if the country receives increased *FDI* inflows into real sector of the economy that supports the necessary inputs and raw materials required by the local industries. That is, *FDI* should be geared towards a real sector that in turn will boost

the performance of the manufacturing sector. In addition, the Nigerian authority should ensure the provision of enabling a macroeconomic environment that involved sound economic policies, stability, and transparency for the enhancement of *FDI* inflows to boost local production. This will bring a positive change in the manufacturing sector in Nigeria.

However, the government should guarantee the enabling competitive policies in terms of trade relation with the global world in order to allow free movement of capital inputs required by the manufacturing sector in Nigeria, while foreign companies that kill our local manufacture should be checked. Likewise, monetary policy variable used in the study failed to have any significant impact on the manufacturing output in Nigeria. Therefore, there is a need for appropriate policy measures that will have good synergy with the manufacturing sector.

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