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Determinants of Manufacturing Growth in Nigeria

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Abstract
The manufacturing sector is seen as major catalyst to development due to the ripple effect of industrial growth on every part of a country's economy. However, the structure of the manufacturing sector in developing economies like Nigeria has undermined its ability to make meaningful contribution to industrial development. This has shrouded the understanding of factors propelling growth in the manufacturing sector. This study examines the determinants of manufacturing sector growth in Nigeria from 1980-2018 with the aid of dynamic ordinary least square (DOLS) method of econometric analysis which has the potential to generate reliable estimates than the static OLS. In particular, DOLS accounts for endogeneity problem by adding leads and lags. Results of the study indicate that the main determinants of Nigeria's manufacturing growth are foreign direct investment (FDI), interest rate, labour force, inflation and exchange rate. We therefore recommend a robust regulation of foreign capital importation and local content policies to stem capital flight and spur manufacturing growth in the country. Also, the interest rate regime should be made to favour domestic capital utilization. This should involve laying emphasis on single-digit interest rate in order to lower the cost of production and boost activities in the manufacturing sector.

JEL Classification Codes: F63, L20, L25, L60, O10, O14
Keywords*: Manufacturing, Industrial development, Economic growth and development, Government Policy, Nigeria.*

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I. Introduction

The importance of the manufacturing sector to developing economies like Nigeria has long been recognised in the economic literature. Theoretical and empirical arguments have been offered on the necessity for a growing manufacturing sector to energise economic growth, although there has been somewhat inconclusiveness in the explanations offered. Theoretically, three attributes of the manufacturing sector have been identified as its contribution to a country's growth process (Szirmai, 2012; Lavojia and Szirmai, 2014; Dan and Yang, 2016): First, manufacturing enhances rapid technological changes, providing the channel through which developing economies absorb knowledge and science from abroad (Rodrick, 2007). Second, manufacturing improves economies of scale through creating strong externalities of knowledge flow to other sectors with the spill over effect culminating into aggregate increased output level. Third, manufacturing improves the ease of a country's integration into the global production network. Through its technology transfer capacity, the manufacturing sector is in better position to utilize domestic human capital resources and economic institutions to produce appreciable level of output (Barro, 2001).

Despite the widely recognised importance of manufacturing to the growth process, empirical evidence suggests that its inherent potential has not been sufficiently harnessed for the development of the Nigerian economy. The performance of the Nigerian manufacturing sector has been weak over the years as revealed from available statistical data. Whereas Nigeria's total real Gross Domestic Product (GDP) has been rising steadily over the years, the manufacturing sector component fell steadily on the average from 11.8 percent in 1982 to 7.4 percent in 1997, stagnating at around 6 percent from 1998 to 2010. It then rose marginally to 10 percent in 2011 before falling to 9.5 percent in 2015. The value averaged 8.7 percent from 2016-2019. This trend is also apparent with manufacturing sector average capacity utilization rate which fell steadily from 70.1 percent in 1980 to 30.4 percent in 1997, rising thereafter to 56.5 percent in 2003 and then stagnating in over a decade at around 55 percent between 2004 and 2015. Also, average manufacturing capacity utilization averaged 56.7 percent between 2016- 2019. The consequences of this weak performance of the manufacturing sector in Nigeria include heavy reliance on imported products amidst collapsed domestic production, crowding out of many manufacturing companies some of which have either closed operations or relocated to neighbouring countries with perceived better operating environment, poor agricultural-manufacturing linkage despite the advantage of concessional arrangement on agricultural exports available in several international or regional trade blocks, among others.

Cross-country and country-specific studies provide mixed evidence on the determinants of manufacturing growth (Fredrick, 2000; Aregbeyen, 2012; Aiyedogbon and Anyanwu, 2015; Sokunle and Harper, 2018; Kenny, 2019). More importantly, only few studies have focused on analysing the factors that spur manufacturing growth in the Nigerian context. Yet, an analysis of the determinants of Nigerian manufacturing growth is desirable for many reasons. First, it would provide better understanding of the basic factors driving the growth of the manufacturing sector in Nigeria. This becomes essential to guide policy prescription for strengthening the sector. Second, the use of robust estimation techniques such as the dynamic ordinary least square method (DOLS) provides more reliable estimates from which constructive inferences can be made. This bridges the methodology gap that constitutes a deficiency in previous studies on the determinants of the manufacturing sector growth in Nigeria.

Following the introductory section, stylized facts about the manufacturing sector in Nigeria is discussed in section two. Section three presents the review of relevant literature on the determinants of manufacturing growth, while section four presents the methodology adopted in the study. The empirical results of the models employed for the study and discussions of findings are presented in section five. The last section (six) presents the conclusion and policy recommendations.

II. Stylized Facts about the Manufacturing Sector in Nigeria

This section provides some stylized facts about the manufacturing sector in Nigeria. This includes features, policies and challenges of the Nigerian manufacturing sector. This is considered essential to provide the necessary background predicating the level of its performance**.**

2.1 Features of the Nigerian Manufacturing Sector

The manufacturing sector in Nigeria is composed of about 13 manufacturing activities, including food, beverage and tobacco, cement, textile, apparel and footwear, wood and wood products, pulp, paper and paper products, chemical and pharmaceutical products. A study by Adenikinju and Chete (2002) reveals that the manufacturing sector is characterised by assembly-based activities, domestic production of basic commodities, and importation of intermediary inputs. The assembly plants have only little backward linkages in the economy, since most of the inputs are imported. Also, they note that the poor funding of science and technology education manifest in low poor production technology and labour-intensive manufacturing sector. Equally, most of the manufacturing companies are not competitive and export orientated. A few key subsectors, such as beverage, textile, cement and tobacco, operate below installed capacity.

Another attribute of the Nigerian manufacturing sector is the existence of production sub-contracting partnerships at the early years of manufacturing activities in Nigeria. This was done to reduce cost of production or raise technical expertise as Ajayi (2007) notes that production sub-contracting partnerships is believed by industrialists to be very important means of reducing the cost of production. He reports marked variation in the adoption of production sub-contracting by manufacturing subsectors over the years indicating that the number of sub-contractors engaged in sub-contracting activities varied markedly especially in food, beverage and tobacco, chemical, pharmaceutical, textile wearing apparel and leather industry groups. The spatial distribution of production sub-contracting activities is significantly explained by the pre-existing characteristics of locations where sub-contractors are found.

One other feature of the manufacturing sector is its inability to modernise production in line with international best practices. Most manufacturing companies still use out-dated mode of production and management practices (Ekpo, 2014). This is due mainly to the lack of appropriate research and innovation, coupled with inability to acquire modern technologies from the mostly uncooperative multinational companies. Unfortunately, public companies set up by the government to lead the way and support private sector manufacturing companies in this regard failed to achieve this because of corruption, bureaucratic bottlenecks and the general public perception that public enterprises are extension of the state rather than independent business entities (Adenikinju and Chete, 2002).

The Nigeria economic recovery and growth plan 2017-2020 document observes that the structure of the economy remains highly import dependent, consumption driven and undiversified. In particular, the document notes that Nigeria's manufacturing sector has been particularly vulnerable to the stagnant economic conditions of the country, contracting by 4.38 per cent in the third quarter of 2016, largely due to the difficulty of accessing foreign exchange to import intermediate goods and raw materials, and falling consumer demand. This contraction is also as a result of infrastructural bottlenecks and an uncompetitive business environment.

2.2 Challenges Facing the Nigerian Manufacturing Sector

The Nigerian manufacturing sector faces numerous and ongoing challenges, staring one in the face. In particular, lack of access to credit, inadequate basic infrastructure, socio-cultural problems, strategic planning problems, location problems, lack of trained manpower and management skills, lack of adequate data for

effective policy intervention in the sector, attitudinal problems, negative government policies etc., are some of the issues thrown up in the empirical literature. According to the Financial Vanguard of 19 June, 2017, Nigerian manufacturing companies face several crippling funding gaps occasioned by their inability to raise longer term and cheaper capital from the capital market, resulting in adverse impact on the bottom line of the companies. It also stated that the manufacturing sector was severely hit by the restriction around valid-for-forex items and inability to secure forex at predictable rates for raw materials critical for its manufacturing processes. Additionally, 15 manufacturing companies paid a total interest of N127.253 billion to the banks in 2016, representing a 44 per cent increase from N88.403 billion recorded in the corresponding period of 2015. The interest payments also represent 47.4 per cent of the total profit recorded in 2016. The earnings report from the companies indicates that most of them were constrained by increasing interest expenses on loans, leading to steep declines in profits. The Management of these companies had stated that their inability to source new equity capital had forced them to continue relying on high-interest bank loans. High cost of funds was the major factor that wiped off positive trading and operating profit performance of many manufacturing companies.

In the area of government policies, Enebong (2003) opines that many of the policies implemented by the government in the late 1990s acted as barriers to manufacturing sector growth. He lists these policies to include multiple taxation, high tariffs, licenses and other measures that resulted in scarcity of needed raw materials. In this regard, Dipak and Ata (2003) state that the negative effects of trade restrictions are clearly observed in the form of decline in the real output of the manufacturing sector from 1982 to 1986. They note that, although the Nigerian manufacturing sector experienced appreciable growth between 1977 and 1981, the government trade restriction measures resulted in sharp decline in the growth rate of the sector in succeeding years. The share of the manufacturing sector in the total GDP of the country also clearly declined during the succeeding years. Supporting this view, Adenikinju and Chete (2002) point to the fact that import duties, licenses and tariffs, and some quantitative restrictions badly affected the manufacturing sector because the manufacturers faced multiple problems when importing raw materials and spare parts for their products and processes. As a result of massive cutbacks in raw materials and spare parts, many of the country's industries shut down. Hence, Dipak and Ata (2003) conclude that scarcity of raw materials and spare parts were among the major factors that contributed towards the decline in the growth rate of the manufacturing sector, especially after 1981. They also identify macroeconomic shock occasioned by the mono-cultural nature of Nigeria's exports as the reason behind the policies that ultimately resulted in the decline of manufacturing sector growth. Agreeing with this view, Ku, Mustapha and Goh (2010) assert that from the end of the 1980s, manufacturing problems included the country's dependence on oil for income, weak infrastructure, shortage of skilled labour, lack of adequate financial resources, and lack of proper planning and management.

Linking up with the issue of lack of proper planning and management, Meagher (2006) views the problem of the Nigerian manufacturing sector from the perspective of inadequate academic research and development support for the Nigerian universities and other like institutions. He recommends that Nigerian research institutions should be adequately funded by the Nigerian government and private entrepreneurs with support from multinational organizations. This is to enable these institutions engage in purposeful researches that would help revive the manufacturing sector. He also suggests that manufacturing firms should set up or upgrade their research and development departments so that new technologies and local raw materials could be discovered, tested and used. In line with this view, Okejiri (2003) reveals that one of the largest constraints to high productivity of the Nigeria's manufacturing sector is the low level of technology arising from the lack of innovation and research. Equally, Ayeni (2003) explains that the Nigerian manufacturing sector is performing poorly because of over-emphasis on short-term policies and strategies that are not well researched and thought out. He points out that manufactured products that do not pass through the crucible of research and innovation will not satisfy the needs of domestic consumers. Thus, the demand for locally manufactured products would remain low.

III. Review of Empirical Literature

The empirical literature documents various studies on determinants of manufacturing performance. Most of the studies have differences in focus, possibly because of differences in their assumption as to what constitutes manufacturing performance. The regional study carried out by Sokunle and Harper (2018) for Sub-Saharan African countries and the one by Adenikinuju and Olofin, (2007) for Africa as a whole focused on the determinants of manufacturing growth. The focus on determinants of manufacturing growth is also evident in country studies for Malaysia (Rina, et al, 2010) and Nigeria (Sangosanya, 2011; and Aregbeyen, 2012). Another area of interest in the reviewed studies is the determinants of private investment in the manufacturing sector. To this end the regional study by Green and Villanneva (2010) looked at the determinants of private investment in developing countries, while the country-specific study by Fredrick (2000) was interested in the determinants and constraints to manufacturing investment in Kenya.

Other studies looked at the manufacturing performance problem from the perspective of determining manufacturing productivity growth (Odior, 2013) and manufacturing contribution to Gross Domestic Product (Kenny, 2019). In the study by Odior, (2013), the focus was on determining the impact of macroeconomic factors on manufacturing productivity in Nigeria. That of Kenny, (2019) was to investigate determinants of manufacturing contribution to GDP in Nigeria. Of the various factors influencing manufacturing performance in the literature the most common variables indentified were interest rate, inflation, exchange rate by Green and Villanneva (2010) for developing countries; Sokunle and Harper (2018) for Sub-Saharan Africa; Fredrick (2000) for Kenya; and Kenny (2019) and Aiyedogbon and Anyanwu (2015) for Nigeria. However, it is worthy of note that the study by Kenny (2019) for Nigeria excludes inflation rate. Only the study by Aiyedogbon and Anyanwu (2015) gives full details on the impact of the important macroeconomic variables of interest, inflation and exchange rates on manufacturing performance. Their findings reveal that interest, inflation and exchange rates are negatively related to manufacturing performance in Nigeria.

Other explanatory variables that have been found to impact manufacturing performance in Nigeria include government incentives, human capital, competitiveness index, terms of trade, trade liberalization policy, and labour costs (Sokunle and Harper, 2018; Adenikinuju and Olofin, 2007), foreign direct investment (Fredrick, 2000; Sokunle and Harper, 2018), monetary policies (Rina, et al, 2010; Aiyedogbon and Anyanwu, 2015)), government capital expenditure (Kenny (2019), and access to credit finance mix, average capacity utilization, size, age, capital intensity, financial constraints, management efficiency, and the extent of vertical integration ((Odior, 2013; Aregbeyen, 2012). However, the evidence gleaned from the empirical literature is scarce on the specific direction of influence of these variables on manufacturing performance in Nigeria, especially the influences of labour, capacity utilization, imports and exports, foreign direct investment, and government capital expenditure.

The paucity of the study for Nigeria suggests that further evidence is required on the factors influencing manufacturing performance. Therefore, the focus of the study is to investigate the determinants of manufacturing growth in Nigeria with a view to understanding the main drivers of Nigeria's manufacturing performance and providing tools for planning, management and policy intervention in the sector.

IV. Methodology and Data

This section presents the analytical approach to estimating the determinants of manufacturing growth in Nigeria. The analysis takes its cue from the basic theory of the firm in which the growth rate of a firm is maximized subject to its binding constraints.

This study employs annual time series data for Nigeria from 1980-2018. The data were sourced from the Central Bank of Nigeria Statistical Bulletin (2019) and World Development Indicators Database (2019). The selected factors influencing manufacturing growth are based on the consideration of results of previous studies that have been reviewed in the empirical literature and the availability of data.

The reviewed empirical literature informed the choice of depended and explanatory variables used for the study (e.g. Sokunle and Harper, 2018; Adenikinuju and Olofin, 2007; Rina, et al, 2010; Sangosanya, 2011; and Aregbeyen (2012). Manufacturing growth, as the dependent variable, is measured by the growth in manufacturing value added. The explanatory variables include direct investment, government capital expenditure, manufacturing capacity utilization and other control variables of labour force, inflation rate, interest rate, exchange rate, and import and exports of manufactured goods.

.4.1 Model Specification

Given the chosen variables, the model for estimating the determinants of manufacturing growth in Nigeria can be implicitly specified as follows:

$$MVA = f(FDI, INR, LF, X) \quad \text{..... (1)}$$

Where:
MVA is manufacturing value added which is a proxy of manufacturing growth, FDI is the natural logarithm of foreign direct investment, INR is the interest rate which is proxy for the rental cost of capital, LF is the labour force expressed in terms of its natural logarithm and X is a vector of other control variables such as inflation rate, exchange rate, import and exports respectively.
Restating the model in an estimable form and incorporating a time subscript, the following equation ensues:

$$MVAt = \gamma_0 + \gamma_1 LnFDIt + \gamma_2 INTt + \gamma_3 LnLFt + \gamma_4 X_t + \varepsilon_t \quad (2)$$

Where γ_0 is a constant which shows the level of manufacturing growth without the influence of any of the determinants listed, $\gamma_{i,\ i=1\text{-}4}$ are the coefficients of the variables measuring the basic determinants of

manufacturing growth, and ε_t is an error term assumed to be normally distributed with zero mean and constant variance. The a priori expectations of the signs of the coefficients are as follows:
$0 \succ \gamma_1$ and $\gamma_2 \succ 0$, $\gamma_3 > 0$ and $\gamma_4 >$ or < 0

4.2 Estimation Technique

This study employed the dynamic ordinary least square (DOLS) proposed by Stock and Watson (1993). This estimation technique is essential to avoid the limitations of the static ordinary least square (OLS) method. Basically, the OLS requires that all variables must be I(0); i.e., all variables must be stationary. But, in reality, macroeconomic variables are not always stationary at level. Most of the time, they have to be first differenced. The DOLS is superior to the OLS for many reasons. First, though OLS estimates are consistent, the t-statistic gotten without stationary or I(0) terms are only approximately normal. In the presence of a large finite sample bias, convergence of OLS can be low in finite samples. Second, OLS estimates may suffer from serial correlation and heteroskedasticity. Since the omitted dynamics are captured by the residual, inference using the normal tables will not be valid even asymptotically. Thus, the "t" statistics for the OLS estimates may not be useful for inference. Third, DOLS take cares of endogeneity by adding the leads and lags. In addition, white heteroskedastic standard errors are used (Masih and Masih, 1996).

Following the estimation approaches adopted by Stock and Watson (1993), Fowowe and Abidoye (2013) and Rafiu, (2019), the DOLS framework for the study can be specified as follows:

$$mva_t = \varphi + \varphi_{fdi} FDI_t + \varphi_{gce} GCE_t + \varphi_{gfcf} GFCF_t + \varphi_{mcu} MCU_t + \varphi_X X_t + d_{fdi}(L)\Delta FDI_t + d_{gce}(L)\Delta GCE_t + d_{gfcf}(L)\Delta GFCF_t + d_{mcu}(L)\Delta MCU_t + d_x(L)\Delta X_t + \varepsilon_t \quad \text{..... (3)}$$

All the definitions about the variables remain the same for equation (3).

The first step in the estimation involves testing the order of integration of the individual series under consideration to ascertain whether they are stationary. Variables that are not stationary can be differenced in order to make them stationary (Brooks, 2008). Thus, the Augmented Dickey-Fuller (1979, 1981) and Phillip-Perron (1987, 1988) unit root tests are carried out. Augmented Dickey-Fuller and the PP test relies on rejecting a null hypothesis of unit root (i.e. the series are non-stationary) in favour of the alternative hypotheses of stationarity. After establishing that variables are stationary, it is necessary to determine whether or not there is long-run relationship between them. Co-integration regressions measure the long-term relationship between the variables whose existence guarantees that the variables demonstrate no inherent tendency to drift apart. The study employs Johansen co-integration test where it is expected the lag length of the VAR must be small enough to allow estimation and high enough to ensure that errors are approximately white noise. In determining the number of cointegrating vectors, trace test and maximum eigenvalue test using the recent critical values of Mackinon-Haug-Michelis (1999) are applied. The assumption of no deterministic trend and restricted constant are also applied to all the variables and the choice tested using AIC and SIC.

V. Empirical Results

5.1 Results of Preliminary Estimations

The summary statistics for the variables used for the study is presented in Table 1. The mean value for manufacturing value added (*mva*) is 6.410% with the minimum and maximum value of 2.410% and 10.437%. To show the deviation of observations are from the sample averages, the standard deviation of manufacturing value added is 2.593%.

Table 1: The Results of the Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
mva	39	6.410	2.593	2.410	10.437
lnfdi	39	4.705	1.284	2.422	6.133
inr	39	17.518	5.006	8.430	31.650
exr	39	86.287	87.129	.550	306.080
lnlf	39	1.572	.207	1.301	1.929
cpi	39	19.096	17.088	5.380	72.840
lnimp	39	11.721	1.186	9.706	13.135
lnexp	39	11.883	1.174	9.925	13.358

Source: Author's Calculation

The table further shows that the mean value of foreign direct investment (*lnfdi*) is 4.505% with the standard deviation of 1.284%. The distribution also shows the difference between the minimum and the maximum value of foreign direct investment to be 2.422% and 6.133% respectively.The mean value of interest rate is 17.518% with a standard deviation of 5.006% as well as the minimum value of 8.430% and maximum value of 31.650%. Furthermore, the mean valuesof labour force (*lnlf*) is 1.572% while the standard deviation is .207% with the minimum values of 1.301%, and maximum values of 1.929% respectively.

Table 1 also presents the summary statistics for the control variables. Furthermore, the mean valuesof exchange rate (*exr*) is 86.287% while the standard deviation is 87.129% with the minimum values of .550%, and maximum values of 306.080%respectively. Finally, the mean values of inflation (*cpi*), import (*lnimp*) and export (*lnexp*) are 19.096%, 11.721% and 11.883% with the standard deviations of 17.088%, 1.186% and 1.174% respectively. The minimum valuesare5.380%, 9.706% and 9.925% while the maximum values are of 72.840%, 13.135% and 13.358% respectively. Essentially, the descriptive statistics show that the variables used in this study are normally distributed with the potentials to generate reliable estimates in an empirical analysis.

5.2 Unit Root Test Results

The stationarity tests on the variables were carried out using the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests. The unit root tests result for stationarity based on ADF and PP at different levels are presented in Table 2.

Table 2: Unit Root Test Results for Stationarity (ADF and PP at various levels)

Augmented Dickey Fuller (ADF)			Phillip-Perron (PP)			Order of Integration
Variables	ADF (t-Statistics)	P-values	Variable	PP (t-Statistics)	P-values	
mva	-2.931119	0.0006	mva	-5.055129	0.0000	I~I(1)
lnfdi	-2.582041	0.0000	lnfdi	-2.769985	0.0000	I~I(1)
inr	-3.498439	0.0001	inr	-3.495677	0.0005	I~I(0)**
exr	-2.582678	0.0005	exr	-2.582041	0.0007	I~I(1)
lnlf	-3.451184	0.0000	lnlf	-2.887665	0.0001	I~I(1)
cpi	-3.150986	0.0002	cpi	-2.580778	0.0000	I~I(0)**
lnimp	-3.498439	0.0001	lnimp	-3.495677	0.0005	I~I(1)
lnexp	-2.582678	0.0005	lnexp	-2.582041	0.0007	I~I(1)

Source: Author's Calculation

Key: MacKinnon (1996) one-sided p-values; *Significant at 1%; **Significant at 5%; ***Significant at 10%

The results indicate that two variables are stationary at 5 per cent level of significance in their level form, that is, integrated of order I (0). The remaining variables are stationary at first difference, that is, integrated of order one I(1). After establishing stationarity, next is the examination of the co-integration relationship among the variables.

5.3 Cointegration Test Results

The results of the Johansen Unrestricted Cointegration Rank Test (Trace) is presented in Table 3. Basically, the null hypothesis for the trace statistics holds that there are at most 'r cointegrating relations'against the alternative hypothesis which posits 'm cointegratingrelation' (i.e., the series are stationary;r = 0, 1, and m – 1). Given the results presented in the

Table 3: Johansen Unrestricted Cointegration Rank Test (Trace)

Null	Alternative	Trace Statistic	95% Critical Value	Prob.**
r=0	r≥1	623.6106	285.1425	0.0000
r≤1	r≥2	481.0689	239.2354	0.0000
r≤2	r≥3	368.1262	197.3709	0.0000
r≤3	r≥4	289.7098	159.5297	0.0000
r≤4	r≥5	219.5417	125.6154	0.0000
r≤5	r≥6	163.8237	95.75366	0.0000
r≤6	r≥7	114.4572	69.81889	0.0000
r≤7	r≥8	0.817590	3.841666	0.3659

Trace test indicates 7 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

statistics and they are significant at 5% based on their probability values. This implies that the null hypothesis of no cointegration is rejected and we thus, assert that there exists a long run relationship amongst the variables in the equations that make up the model.

The results of the Johansen Unrestricted Cointegration Rank Test (Maximum Eigenvalue) are presented in Table 4. By rule, the null hypothesis for the maximum eigenvalue statistic test states that there are 'r cointegrating relations' against the alternative that there are (r +1) cointegrating relations. Given the result presented in the table, the cointegration tests reveal that there are seven co-integrating equations by the maximum Eigen-value statistics. This is statistically significant at 5%. Based on the maximum Eigen value, there exists a long run relationship amongst the variables used for the study.

Table 4: Johansen Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Null	Alternative	Max-Eigen Statistic	95% Critical Value	Prob.**
r=0	r≥1	142.5417	70.53513	0.0000
r≤1	r≥2	112.9427	64.50472	0.0000
r≤2	r≥3	78.41639	58.43354	0.0000
r≤3	r≥4	70.16815	52.36261	0.0000
r≤4	r≥5	55.71792	46.23142	0.0000
r≤5	r≥6	49.36657	40.07757	0.0000
r≤6	r≥7	40.09243	33.87687	0.0000
r≤7	r≥8	0.817590	3.841466	0.3659

Max-eigenvalue test indicates 7 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

5.4 Model Results on the Determinants of Manufacturing Growth in Nigeria

This section presents the results of the empirical analysis. Table 5 presents the results of the static OLS and dynamic OLS models. The results in column (1) of the table reveals that foreign direct investment has a negative and significant effect on manufacturing growth. A 1% increase in the level of FDI results to a about 14% decrease the level of manufacturing sector growth. This is a surprising outcome because foreign capital importation is expected to boost the level of domestic investment and, in turn, increase the growth rate of the manufacturing sector in the country. The negative effect of FDI on manufacturing sector growth could be due to poor compliance with local content policies, increased incidence of capital flight which strips the economy off the potential benefits associated with capital importation and the negative effects of dumping. These factors prevent the domestic economy from reaping the benefit of FDI inflow into the country. This result is somewhat similar to that of Sokunle, and Harper (2018) who found that FDI has insignificant effect on manufacturing sector growth in Sub-Sahara African countries, explaining that the insignificant effect FDI was due to diversion of foreign capital investment into less productive sectors.

Table 5: Regression Results Modelling the Determinants of Manufacturing Growth in Nigeria

	(1)		(2)		(3)	
	(OLS)	(DOLS)	(OLS)	(DOLS)	(OLS)	(DOLS)
Regressors						
lnfdi	-6.481***	-14.162***				
	(1.712)	(2.391)				

inr			-0.229**	-0.649**		
			(0.083)	(0.188)		
lnlf					29.528***	50.420***
					(4.246)	(7.165)
exr	0.019**	-0.059***	0.021**	-0.016	-0.001	-0.007
	(0.006)	(0.013)	(0.007)	(0.025)	(0.006)	(0.010)
cpi	0.030	0.042*	0.029	0.173**	-0.003	-0.052
	(0.019)	(0.018)	(0.021)	(0.055)	(0.013)	(0.031)
lnexp	1.500	2.645	-2.822	28.297*	-4.647**	-5.203
	(2.766)	(4.487)	(2.537)	(11.28)	(1.751)	(5.598)
lnimp	3.494	4.168	1.072	-27.276*	-1.098	-3.122
	(2.344)	(3.75)	(2.489)	(10.480)	(1.751)	(5.289)
_cons	-24.120	-86.504**	28.982***	-0.181	28.240***	27.472***
	(16.445)	(41.901)	(5.759)	(12.739)	(3.872)	(5.533)
Obs.	39	39	39	39	39	39
R-squared	0.602	0.976	0.537	0.836	0.769	0.905
DW	1.260		1.423		1.939	

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

Column 2 depicts that the coefficient of interest rate has negative and significant effect on manufacturing growth. Thus, a 1% increase in interest rate cause about 0.226% decrease in manufacturing sector growth. In Column 3, the coefficient of labour force has positive and significant effect on manufacturing growth. Thus, a 1% increase in labour force causes about 50% in the level of manufacturing sector growth in Nigeria. This implies that labour is very critical to manufacturing growth in Nigeria. This result reveals two important features about the Nigerian manufacturing sector. First, the manufacturing sector in the country is highly labour intensive. Second, the level of modern technology utilization and utilisation of capital intensive production is still evolving.

The results of the control variables show mixed results based on the estimation technique used. The static OLS coefficients of exchange rate show positive and significant effect on manufacturing growth while the DOLS coefficients of consumer price index (inflation) and exports have positive and significant effects on manufacturing value added. The coefficient of import has negative and significant effect on manufacturing growth. This confirms that these variables have mixed effects on the growth of the manufacturing sector in Nigeria.

VI. Conclusion and Policy Recommendation

The study examined the determinants of manufacturing sector growth in Nigeria from 1980-2018. To generate robust estimates from the empirical analysis, the study adopted the dynamic ordinary least square (DOLS) method of econometric analysis which has the potential to generate reliable estimates than the static OLS models. Findings revealed that the basic determinants of manufacturing sector growth in Nigeria include foreign direct investment, interest rate and labour force respectively. Other variables such as exchange rate, inflation, import and export had varying effects on manufacturing growth in the country.

Specifically, the results showed that foreign direct investment and interest rate had a negative and significant effect on manufacturing growth while labour force had positive and significant effect on manufacturing growth in Nigeria. The effects of the other control variables such as interest rate, exchange rate, inflation and labour force was moderated by the model used. However, the degree of openness of the Nigerian economy didn't have much effect on the level of growth in the manufacturing sector. This means that the Nigerian manufacturing sector is not well positioned to harness the gains of globalization.

Given the empirical results of this study, we recommend that there should be a strict regulation on foreign capital importation, such as strict compliance with capital flight and local content policies in order to

properly channel FDI to spur the growth of the manufacturing sector in the country. Also, the interest rate regime should be made to favour domestic capital utilization. This should involve laying emphasis on single-digit interest rate in order to lower the cost of production and boost activities in the manufacturing sector. Besides, local content policy should be enforced in procuring foreign capital so as to spur manufacturing growth.

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