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Is Trade Openness Suitable for Growth of the Nigerian Manufacturing Sector? An Autoregressive Distributed Lag Approach

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Abstract *The paper investigates the relationship between trade openness and manufacturing sector output in Nigeria from 1980–2016 using secondary data collected from the Central Bank of Nigeria (CBN) statistical bulletin (2016) and the National Bureau of Statistics (various issues). Trend analysis, descriptive statistics and unit root test were carried out for the study. For estimation analysis, we employed the Bounds (ARDL) test, Pairwise Granger Causality test, ECM test and stability test. The result conformed to economic theory and suggests that trade openness and foreign direct investments have positive and significant relationship with manufacturing sector output for the period under review. However, exchange rate did not conform to economic theory by appearing with a negative sign and it was not statistically significant for the period under review. The independent variables explained 86% of the total variation in manufacturing sector output in Nigeria. The Bounds test indicates that a long run relationship exist between trade openness, foreign direct investment, exchange rate and manufacturing sector output. Pairwise Causality test shows a bi-directional causation between trade openness and manufacturing sector output with the causation effect running from trade openness to manufacturing sector output and from manufacturing sector output to trade openness. Thus, the paper recommends that Nigeria's manufactured products should be of top notch quality so that they can compete favourably with other manufactured goods produced by other countries in the international market. In addition, effort should be made in formulating policies that will improve both domestic and foreign trade as the economy strives to achieve growth through trade. Thus, there should be macroeconomic stability through the use of suitable trade, fiscal and monetary policies which if properly harmonized would be jointly reinforcing in achieving common macroeconomic objective of favourable balance of trade, price stability and economic growth. Finally, government should consider a set of reliable economic policies that will strengthen bilateral and multilateral trade agreements; this will go a long way in restoring the confidence of trade partners, thus increasing the rate of multilateral trade partners to Nigeria.*

Key words Trade openness, manufacturing sector output, Foreign Direct Investment, exchange rate, balance of trade

JEL Codes: F13, F14, L60

1. Introduction

No economy can possibly grow as well as attain development without high level of technology, manufacturing and trade. The significance of the manufacturing sector cannot be overemphasized. Some of the benefits of this sector includes: increase in export earnings, increase in government revenues, provision of employment opportunities, improvement in the standard of living, reduction in importation, saving of foreign exchange and diversification of the economy. The manufacturing sector provides majority of the goods in developed nations. This is due to the fact that this sector is extremely mechanized and adapts to technological changes without difficulty. For the manufacturing sector to advance rapidly, it needs an efficient trading system where goods produced from this sector can be sold quickly, easily and without trade restrictions. Trade has been significant to the growth of the manufacturing sector in both developed and developing countries. Manufacturing and trade liberalization have been employed as strategies for faster economic growth and development in developing countries that aims to increase output, income and employment (Ghatak, 1995).

Nigeria's trade liberalization policy was adopted to improve the balance of payments position as a result of the oil glut in the international market in the early 1980s. This policy had a modest effect on the Nigeria economy with the country's Gross Domestic Product increasing progressively and steadily, but the irony is that the growth in the agricultural and manufacturing sector declined (Iyoha and Oriakhi, 2002).

The history of Nigeria's manufacturing sector growth and development is an obvious illustration of how a country can neglect a key sector through inconsistencies in macroeconomic policies and distractions as a result of crude oil discovery (Adeola, 2005). Since the introduction of trade liberalization, the output of Nigeria's manufacturing sector with respect to its GDP contribution has been fluctuating. For instance, from a 4.8% in 1960, the share of this sector's output to GDP rose to 7.2% in 1970 and rose further to 7.4% in 1975. In 1980, it fell to 5.4% then later rose to record high of 10.7% in 1985. By 1990, the share of manufacturing output to GDP stood at 8.1% but declined to 7.9% in 1992, 6.7% in 1995, 6.3% in 1997

and fell drastically to 3.4% in 2001. However, it increased to 4.23% in 2013 (CBN, 2013). Many factors are accountable for these fluctuations, a lot of which illustrates both the susceptibility of the manufacturing sector to global economic pressures as well as the effect that changes in macroeconomic policies can have in reforming the sector.

Since Nigeria is completely integrated into the global economic system, she is a member as well as signatory to a lot of multilateral and regional trade agreements. Embarking on outward oriented trade policies and removal of trade barriers has been the policy response of such economic partnership agreements on trade policy. With the trade liberalization policy, it was anticipated that Nigeria's GDP would increase from exports of non-oil products; specifically, much was expected from the manufacturing sector by means of fulfilling the vast and rising domestic demand for manufactures as well as filling up the gap in the ECOWAS sub-region in the aspect of manufactures. The rising domestic demand was as a result of the increasing fortunes of the country in the area of oil trade while filling the gap in ECOWAS sub-region was as a result of improved implementation of the ECOWAS concept, which opened up more space for intraregional trade and the fact that none of the integrating countries was industrialized. Instead of these requirements to be met, the manufacturing sector recorded a negative growth of -3.4% in 2008 which nonetheless rose considerably to 5.6% in 2010. Thereafter, it fell such that by 2012, its growth was only by 1.12% (CBN, 2013).

A lot of effort has been put into finding out the causes for the poor performance of Nigeria's manufacturing sector. Many of such causes have been recognized to include unfavourable investment climate, inadequate funds, inadequate product and process innovation, currency instability, depleted infrastructures, inadequate power supply, inability of the sector to compete with their foreign counterpart in the international market (Sola et al, 2013). In the light of contradictory results gotten from these efforts, it remains unclear what role trade liberalization really plays in the performance of the sector, particularly in the short to medium period and which period has not gotten the much needed attention. In the light of the foregoing, this focus of this paper is to assess the effect of trade liberalization on Nigeria's manufacturing sector output and how manufacturing sector output in Nigeria can be increased as trade is been liberalized.

2. Literature review

Several arguments have been examined in the empirical literature with respect to the impact that trade liberalisation has on manufacturing sector output. The argument that trade liberalisation affects the growth of the manufacturing sector negatively; in the sense that industries facing considerable degrees of high import competition due to trade liberalisation experiences a fall in industrial output has gotten support from the works of Amjad (1977) for Pakistan, Katrak (1980) for India, Haddad *et al.* (1996) for Morocco and Foroutan (1996) for Turkey. Furthermore, Semenick and Morrison (2000) opined that reducing trade protectionism could lead to a reduction in industrial output as increased competition might compel producers to exit the market rather than expanding.

The argument that trade liberalisation has a positive effect on manufacturing productivity growth has obtained support from the works of (Weiss and Jayanthakumaran 1995) for Sri-Lanka, (Urata and Yokota, 1994) for Thailand, (Kim, 2000; Dongsuk 1992) for South Korea, (Kristiono, 1997; Sjoholm, 1997) for Indonesia, (Weiss, 1992; Tybout and Westbrook, 1995) for Mexico, (Rodrigo,1995) for Chile, (Harrison, 1994) for Cote d'ivoire and (Soo, 2008; Madheswaran *et al*., 2007; Krishna and Mitra, 1997; Goldar and Kumari 2003). Tybout (2000) and Epifani (2003) studied the likely impact of trade policies on manufacturing firms in developing economies. They tried to find out if internal economies of scale accounts for correlation between trade liberalisation and productivity. Their conclusion implies that the gains for internal economies of scale are minor and are not correlated with trade liberalisation.

Sharma *et al.* (2000), from their investigation of Nepalese manufacturing firms, asserted that while exchange rate and trade policy reforms might be a necessary condition for increasing productivity growth in least developed countries, they are not sufficient conditions. Other factors such as: unfavourable investment policies, inadequate human capital and poor physical infrastructures need to be tackled if potential increase in productivity is to be realized. Jenkins (1995) did not gather enough evidence from the Bolivian case and concluded that trade liberalisation is neither a necessary nor sufficient condition for increasing productivity growth. Bolivia experienced inadequate investment, a high real interest rate and inefficient organisational change during this phase. Consequently, increased productivity through these factors was irrelevant.

Bacchetta and Van Wincoop (2003) linked growth in countries' per capital output to changes in the trade-GDP ratio. Of the 68 countries tested, 24 are trade open countries and 44 are trade restricted countries. They discovered that an improvement in integration with the global economy have been considerable among the trade open countries and they obtained huge change in trade volumes between the 1970s and 1990s; a doubling of trade to GDP on average of 16% to 33% of the GDP, but among the trade restricted countries, trade in fact dropped as a share of GDP from 60% to 40% of GDP.

Romer (1993) examined the robustness of openness growth relationship by employing different indicators. He employed nine different openness indexes to investigate the link between trade policy and productivity growth during 1980-1990. Three of these indexes appropriately measure openness; while the other six measures the degree of which trade policy brings about distortions. His findings from the weighted least square regression of total factor productivity growth on the nine openness indicators showed that six of them were significant and all but one met the apriori expectation. On the other hand, Ben-David (1993) employed a different method in examining the effect of openness on economic growth. He measured the impact of trade policies on income by enquiring if trade liberalization brings about a decrease in the spread of income levels amongst liberalizing countries (that is if it adds to what has been called convergence). He illustrated that open economies converge and that the European Union trade agreements have caused convergence of its members to a higher degree of income. In general, growth from 1945 to 1994 of European countries (ECs) such as Germany, France, Belgium and the Netherlands was 3.45%, compared to 1.2%, between 1900 and 1939 and 1.16% from 1870 to 1899. Though, Ben-David's study illustrated that the only countries that converge were those that were integrated in the global economy due to trade.

Rodriguez and Rodrik (1999) appraised the work of Dollar (1992), Ben-David (1993), Romer (1993), Sarchs and Warner (1995) and discovered not much evidence that open trade policies such as lower tariffs as well as non-tariff barriers to trade are significantly related with economic growth. They made a case that methodological setbacks with empirical strategies used in these studies left the result open to different explanations and, in a lot of cases, the indicator of openness employed by the researchers is a weak measure of trade barrier or is extremely correlated with other causes of poor economic performance. In other cases the means to determine the relationship between trade policy and growth have severe weaknesses. Ogujiuba *et al.* (2004) examined the long–run relationship between trade openness and real economic growth in Nigeria using the method of Johansen co-integration. Their findings illustrated that at 1% significant level, there is co-integration between the variables. Thus, they came to a conclusion that available evidence in Nigeria illustrated that tariff restriction increases economic uncertainties in Nigeria, particularly in the manufacturing and textile firms that are affected negatively by increased import composition from abroad.

Ajakaiye and Soyibo (1999) employed to some extent a different method to analyse the occurrence of trade liberalization using time series data. They recognized four occurrences of trade liberalization between 1970 and 1992 (i.e. 1970-1976, 1986-1987, 1989 and 1992) on the basis of tariff index, tariff intensity measure and policy account. Employing regression techniques, the scholars discovered that only the first occurrence of liberalization (1970-1976) added to real import whereas none of the four occurrences had a significant impact on real GDP. Dorosh and Sahn (1999) investigated the effect of trade and exchange rate liberalization on poverty and income distribution in nations such as Gambia, Niger, Cameroon and Madagascar employing social accounting matrixes (SAMS) for the period 1989-1993. The results from their study illustrated that trade and exchange rate liberalization assists poor households in rural and urban areas.

3. Methodology of research

The research adopted a quasi-experimental design and this illustrates that the study is an empirical analysis on trade liberalization and manufacturing sector output in Nigeria using annual time series data from secondary sources for the period of 1980-2016. In order to achieve this, the study used the descriptive statistics, unit root test, ARDL co-integration test, stability test, error correction test and granger causality test in estimating the relationship between the dependent variable (manufacturing sector output) and the independent variables (trade openness, foreign direct investment and exchange rate). The data used for this study were gotten from secondary sources and were gathered from publications of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS). The data needed were gathered through library research.

3.1 Model Specification

The variables chosen for our model were gotten from our literature. The model follows the argument of Tybout (2000), Epifani (2003) and Ogujiuba *et al.* (2004). Specifically, the study looks at trade openness and manufacturing sector output in Nigeria. In line with the above, the functional relationship between the variables is stated as:

$$MSO = \beta_0 + \beta_1 TO + \beta_2 FDI + \beta_3 EXR + U \quad (1)$$

Where:

MSO = Manufacturing Sector Output; TOP = Trade Openness; FDI = Foreign Direct Investment; EXR = Exchange Rate;

β_0 = the intercept of the model; $\beta_1, \beta_2, \beta_3,$ = coefficient of the independent variables.

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$, U = stochastic or error term.

4. Empirical results and discussions

The various tests carried out are presented and discussed in this section.

4.1. Trend Analysis of the Variables in the Model

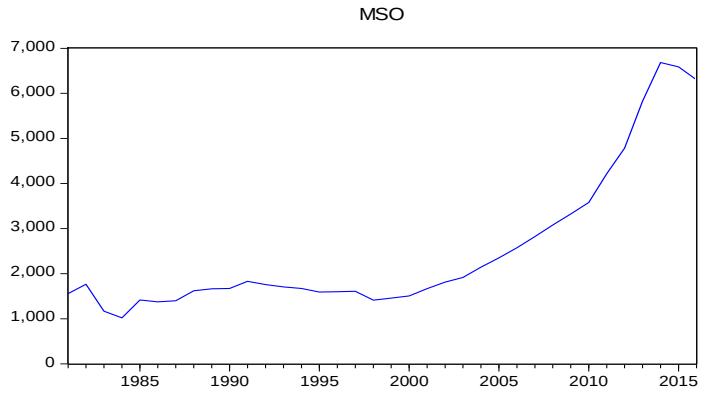

Figure 1. Trend Analysis of Manufacturing Sector Output

Figure 1 shows the trend analysis of Manufacturing Sector Outputs from 1980 to 2016 with the y axis representing the trend value in ₦ billions and the x axis representing the trend in years. It could be observed that the sector have witness a fluctuation in trend value from 1981 to 1998. However, this was followed by a slow increase in output in 1999 which continued at a fluctuating rate (mostly in a decreasing rate) until 2014 when it witness a sharp decrease down to 2016 which can be explained by the economic recession in 2016.

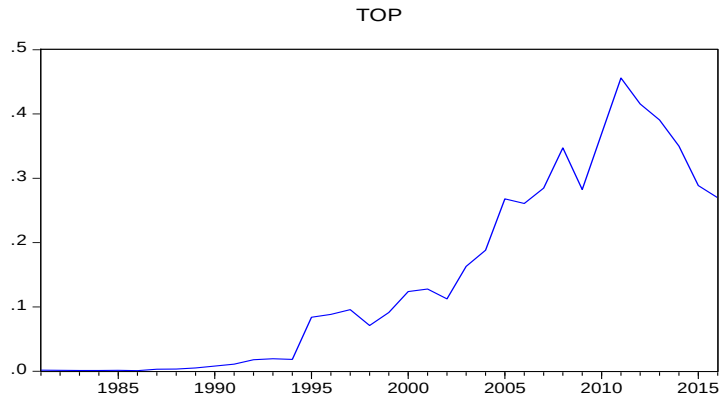

Figure 2. Trend Analysis of Degree of Trade Openness

Figure 3 shows the trend analysis of the degree of trade openness (TOP) in Nigeria from 1980 to 2016 with the y axis representing the degree of openness and the x axis representing the trend in years. It could be observed that TOP also witnessed a fluctuation in trend value from 1980 to 2016. However, it recorded it highest value of 0.4561 in 2011 and it lowest value of 0.0011in 1984. Also, it can be observed that there was a sharp decrease from 2011 to 2016.

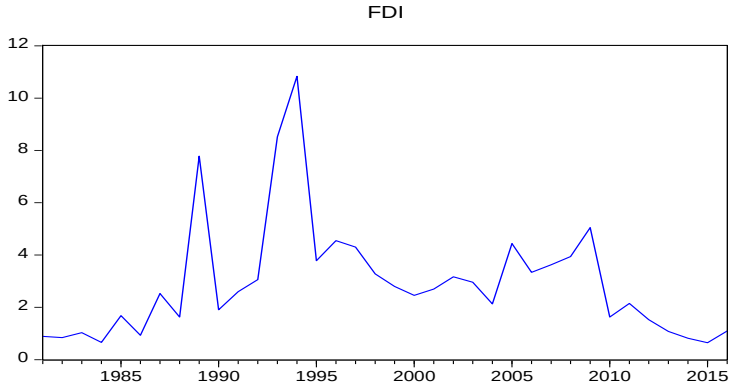

Figure 3. Trend Analysis of Foreign Direct Investment

Figure 3 shows the trend analysis of foreign direct investment (FDI) in percentage of GDP as a proxy of FDI in Nigeria from 1980 to 2016 with the y axis representing the trend value in ₦ billions and the x axis representing the trend in years. It could be observed that FDI witness a fluctuation in trend value from 1981 to 2016. However, it recorded its highest value of 10.83% in 1994 and it lowest value of 0.65% in 2015 as a result of capital fight due to the presence of recession the economy experienced.

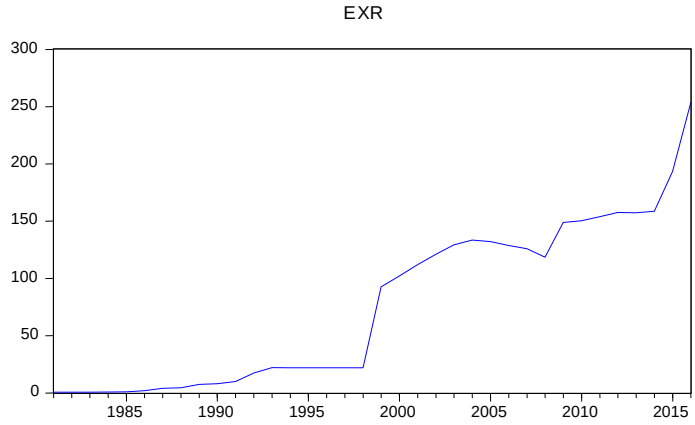

Figure 4. Trend Analysis of Exchange Rate

Figure 4 shows the trend analysis of exchange rate (EXR) in Nigeria from 1980 to 2016 with the y axis representing the rate at which Naira is exchanged for the American dollar and the x axis representing the trend in years. It could be observed that EXCR also witnessed a fluctuation in trend value from 1980 to 2016. However, it recorded it highest value of 253.49 in 2016 and it lowest value of 0.61in 1980.

Table 1. Descriptive statistics based on individual samples

	MSO	TOP	FDI	EXCR
Mean	2513.022	0.145077	2.955000	76.59172
Median	1732.655	0.093591	2.565000	57.37225
Maximum	6684.220	0.456130	10.83000	253.4923
Minimum	1018.910	0.000978	0.650000	0.610000
Std. Dev.	1612.764	0.147073	2.258305	72.03856
Skewness	1.571528	0.620060	1.763888	0.423730
Kurtosis	4.194093	1.973382	6.290488	1.985553
Jarque-Bera	16.95698	3.887763	34.90877	2.620937
Probability	0.000208	0.143147	0.000000	0.269694
Sum	90468.78	5.222758	106.3800	2757.302
Sum Sq. Dev.	91035274	0.757069	178.4979	181634.4
Observations	36	36	36	36

Source: Author's Compilation, 2018

Mean shows the average value of the series and from the above table we see that the mean for MSO, TOP, FDI and EXR are 2513.02, 0.145077, 2.955 and 76.59 respectively. Median is the middle value of the series when the values are arranged in an ascending order and from the table the median for MSO, TOP FDI and EXR are 1732.66, 0.09, 2.57 and 57.37 respectively.

Maximum and minimum are the maximum and minimum values of the series in the current sample. The maximum (minimum) values for MSO, TOP, FDI and EXR are 6684.22, 0.46, 10.83 and 253.49 (1018.91, 0.0010, 0.65 and 0.61) respectively. Standard Deviation measures the spread or dispersion in the series and from the table above the standard deviation for MSO, TOP, FDI and EXR are 1612.76, 0.15, 2.26 and 72.04 respectively.

From the above table we observe that MSO, TOP, FDI and EXR have positive skewness therefore they have long right tails. Furthermore, MSO and FDI exceeds three therefore they are peaked or leptokurtic while TOP and EXR are below three therefore they are flat or platykurtic. The Jarque Bera tests show that the null hypothesis is strongly accepted for MSO and FDI. TOP is normally distributed too but not as strong as MSO and FDI. Hence, MSO and FDI are most normally distributed of the variables.

Table 2. Unit Root Test

Augmented Dickey-Fuller (ADF) Test				Phillip-Perron (PP) Test		
Variables	Level	1st / 2nd Diff	Status	Level	1st /2nd Diff	Status
MSO	0.014111	-3.013906**	I(1)	2.096605	-3.125561**	I(1)
EXCR	1.311052	-3.669283*	I(1)	1.142319	-3.669778*	I(1)
FDI	-3.488200*	-	I(0)	-3.454377*	-	I(0)
TOP	-0.805398	-5.447119*	I(1)	-0.857565	-5.461485*	I(1)

Source: Author's Computation, 2018

Clearly, the combination of both I(0) and I(1) variables would not be possible under the Johansen method. This gives a good reason to use the bounds test approach, or ARDL model, which was proposed by Pesaran, Shin and Smith (2001).

Having analysed the time series features of our data, the next step is to investigate the long-run relationship among the variables. Nevertheless, it is a pre-requisite to choose a suitable lag length before proceeding to the ARDL co-integration test. To test for co-integration, ARDL bounds tests approach was employed. Lag 2 is considered as the appropriate lag length for the series and it is used to compute the F-statistics for co-integration based on the minimum values of FPE, AIC, SC and HQ criterion as shown below.

Table 3. Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-248.4934	NA	1198538.	16.83289	17.01972	16.89266
1	-199.8725	81.03479	50182.91	13.65817	13.89170	13.73288
2	-196.0978*	6.039632*	41805.01*	13.47318*	13.75342*	13.56283*
3	-196.0973	0.000731	44832.93	13.53982	13.86676	13.64441
4	-195.3796	1.052659	45888.52	13.55864	13.93229	13.67817
5	-193.2116	3.035164	42699.14	13.48077	13.90113	13.61525
6	-193.1887	0.030461	45913.71	13.54592	14.01298	13.69533

Source: Author's Compilation, 2018

Endogeneous: MSO
Exogeneous: Constant EXCR FDI TOP
Note: * indicates lag selection by the criteria

4.2. Bound Testing Approach (ARDL)

The bounds technique is employed on the basis of three validations. Firstly, Pesaran *et al.* (2001) supported the use of the ARDL model for the evaluation of level relationships because the model implies that once the order of the ARDL has been identified, the relationship can be estimated by OLS. Secondly, the bounds test allows a combination of I(1) and I(0) explanatory variables, that is, the order of integration of the explanatory variables might not essentially be the same. Thus, the ARDL technique has the benefit of not involving an exact classification of the order of the original data. Thirdly, this method is appropriate for small or finite sample size (Pesaran *et al.,* 2001).

$$\Delta MSO) = \beta_0 + \beta_1\Delta(MSO)_{t-1} + \beta_2\Delta(TOP)_{t-1} + \beta_3\Delta(FDI)_{t-1} + \beta_4\Delta\ (EXR)_{t-1} + \sum_{i=1}^{p}\beta_5\,\Delta(MSO)_{t-i} + \sum_{i=1}^{q}\beta_6\,\Delta(TOP)_{t-i} + \sum_{i=1}^{r}\beta_7\,\Delta(FDI)_{t-i} + \sum_{i=1}^{s}\beta_8\,\Delta(EXR)_{t-i} + \mu \quad (2)$$

Where Δ= is the first-difference operator and μ is a white-noise disturbance term.

We can consider equation (2) as an ARDL of order (p, *q*, *r, s*). It signifies that manufacturing sector output is likely to be explained and affected by its past values. The structural lags are found by employing the minimum Akaike's information criteria (AIC). According to Bardsen (1989), from the evaluation of VECMs, the long-run elasticity are the coefficient of one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of one lagged dependent variable. The short-run effects are portrayed by the coefficients of the first-differenced variables in equation (2).

After regressing equation (2), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the variables of interest. The Wald test can be performed by imposing restrictions on the estimated long-run coefficients of manufacturing sector output, exchange rate, foreign direct investment and trade openness component. The null and alternative hypotheses are as follows:

$H_0 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = 0$ (no long-run relationship)

Against the alternative hypothesis

$H_1 \neq \beta_9 \neq \beta_{10} \neq \beta_{11} \neq \beta_{12} \neq 0$ (a long-run relationship exists)

If there is proof of a long-run relationship (co-integration) of the variables, the short-run dynamics can be obtained by estimating the ECT with the specified lags as thus:

$$\Delta(LMSO)_t = \beta_0 + \sum_{i=1}^{p} \beta_5 \Delta(MSO)_{t-i} + \sum_{i=1}^{q} \beta_6 \Delta(TOP)_{t-i} + \sum_{i=1}^{r} \beta_7 \Delta(FDI)_{t-i} + \sum_{i=1}^{s} \beta_8 \Delta(EXR)_{t-i} + \beta_9 ECT_{t-1} \quad (3)$$

Where ECT is the error correction term defined as:

$$ECT_t = \Delta(MSO)_t - \beta_0 - \sum_{i=1}^{p} \beta_5 \Delta(MSO)_{t-i} - \sum_{i=1}^{q} \beta_6 \Delta(TOP)_{t-i} - \sum_{i=1}^{r} \beta_7 \Delta(FDI)_{t-i} - \sum_{i=1}^{s} \beta_8 \Delta(EXR)_{t-i} \quad (4)$$

β_9 in equation 3 symbolizes the speed of adjustment whereas the other coefficients of the short-run equation are coefficients with regard to the short-run dynamics of the model's convergence to equilibrium. Furthermore, we tested if there is causality running from the independent variable to the dependent variable.

We estimated equation 2 which checked the long-run relationship among the variables. Carrying out the Wald test on the coefficients of unrestricted ECT variables, we got the F-statistics. The calculated F-statistics for the co-integration test is shown in table 4 below.

Table 4. F-statistics of co-integration relationship

Wald Test:

Test Statistic	Value	Df	Probability
F-statistic	3.860082	(4, 20)	0.0175
Chi-square	15.44033	4	0.0039

Source: Author's Computation, (2018)

From table 4 above, the calculated F-statistic of the Wald-test on the level variables is 3.86 and is higher than the lower bound critical value of 3.23 at the 5% level of significance using unrestricted intercept and no trend. This signifies that the null hypothesis of no co-integration is rejected at the 5% level of significance and this confirms the existence of long-run relationship among the variables. In addition, the model is tested for autocorrelation using the Breusch-Godfrey Serial Correlation LM Test which is shown in table 5 below.

Table 5. Auto correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.714062	Prob. F(2,21)	0.5012
Obs*R-squared	2.101294	Prob. Chi-Square(2)	0.3497

Source: Author's Computation, (2018)

Table 5 above presents the result of the Breusch-Godfrey test for autocorrelation. From the value of the prob.Chi-Square of 0.3497, we cannot reject the null-hypothesis of no auto correlation which is desirable in the model. Next, we performed the causality test to check the causality relationship among the variables in the model. This is done with the Granger causality test as shown in table 6.

Table 6. Granger Causality Test

Pairwise Granger Causality Tests

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
TOP does not Granger Cause MSO	34	8.29144	0.0014
MSO does not Granger Cause TOP		3.65611	0.0384
FDI does not Granger Cause MSO	34	0.47813	0.6247
MSO does not Granger Cause FDI		0.79451	0.4614
EXCR does not Granger Cause MSO	34	3.24434	0.0535
MSO does not Granger Cause EXCR		5.83521	0.0074
FDI does not Granger Cause TOP	34	2.06854	0.1446
TOP does not Granger Cause FDI		1.23340	0.3061
EXCR does not Granger Cause TOP	34	2.67408	0.0859
TOP does not Granger Cause EXCR		1.42625	0.2566
EXCR does not Granger Cause FDI	34	0.63983	0.5347
FDI does not Granger Cause EXCR		0.31259	0.7340

Source: Author's Compilation, 2018

The causality test using the pairwise approach shows the causal relationship between trade openness and manufacturing sector output with F-stat of 8.29144 and probability of 0.0014, due to the significance of the F-stat; we hereby conclude that trade openness does granger cause manufacturing sector output for the observed period. In addition, the result shows that manufacturing sector output does granger cause trade openness which implies a bi-directional relationship between trade openness and manufacturing sector output for the observed period. Also, the result shows that exchange rate does not granger cause manufacturing sector output but manufacturing sector output does granger cause exchange rate which implies uni-directional relationship between manufacturing sector output and exchange rate for the observed period. After this, we estimated the ECM short-run dynamics which the result is shown in table 7 below.

Table 7. Short-run Error Correction Model

Dependent Variable: D(MSO)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.19147	69.61205	0.333153	0.7420
D(MSO(-1))	0.495793	0.192711	2.572736	0.0170
D(MSO(-2))	-0.234678	0.270902	-0.866286	0.3953
D(FDI(-1))	11.96294	18.92587	4.632095	0.0003
D(FDI(-2))	8.610398	18.95377	4.454284	0.0004
D(TOP(-1))	6.349123	1486.832	6.315377	0.0001
D(TOP(-2))	5.827692	1392.483	6.430001	0.0000
D(EXCR(-1))	-2.219428	3.192109	-0.695286	0.4938
EXCR(-2)	-1.476343	1.335743	1.105259	0.2805
ECT(-1)	-0.062862	3.085071	-4.738933	0.0002

R-squared 0.859247
F-statistic 65.11602
Adjusted R-squared 0.846051
Durbin-Watson stat 1.899136

Prob(F-statistic) 0.000002

Source: Author's Computation, 2018

The result illustrates that the ECT(-1) is negative and significant. The ECT(-1) of -0.063 is the speed of adjustment from the short-run equilibrium to the long-run equilibrium. This denotes that 6.3% of the error is corrected in each time period. This low speed of adjustment means that it will take just about one year to correct all errors/deviations and bring the economy back to equilibrium.

The relationship between manufacturing sector output, trade openness and foreign direct investment is positive with coefficient values of 6.35 and 11.96 respectively, while the relationship between manufacturing sector output and exchange rate is negative with coefficient value of -2.22. This means that trade openness and foreign direct investment have contributed positively to Nigeria's manufacturing sector output, while exchange rate has contributed negatively to manufacturing sector output in Nigeria. In other words, a 1% rise in trade openness and foreign direct investment increased Nigeria's manufacturing sector output by 6.35% and 11.96% respectively, while an increase in exchange rate decreased Nigeria's manufacturing sector output by 2.22%. The p-value of t-test shows that the co-efficient of trade openness and foreign direct investment are significant at 5% level, while that for exchange rate is not.

The R^2 value of 0.86 indicates that the independent variables: trade openness, foreign direct investment and exchange rate accounts for 86% variation in Nigeria's manufacturing sector output. The remaining 14% are explained by other variables that contributed to Nigeria's manufacturing sector output but not included in the model. At 5% level of significance, the F-statistic of 65.12 showed that the overall model was significant with a P-value of 0.000002.

4.3. Discussion of Findings

The result shows that trade openness and foreign direct investment significantly contributed positively to Nigeria's manufacturing sector output for the period under review. The positive impact of trade openness on Nigeria's manufacturing sector output may be as a result of the federal government's trade liberalization policies embarked on during the SAP era and its subsequent post-SAP consolidation. Examples of such trade liberalization policies during the SAP include the export incentive and miscellaneous provisions decree of 1986, which was promulgated to encourage exports; the Nigerian export credit guarantee and insurance corporation, which was subsequently renamed the Nigerian Export-Import Bank to provide credit and risk bearing facilities to banks, so as to encourage them to support exports; abolition of import and export licensing, which allowed exporters/producers to import raw materials and intermediate products free from import duty and other indirect taxes and charges. Others include the economic stabilization act of April 1982 and customs, excise and tariff consolidation decree of 1988. Examples of post-SAP trade liberalization policies include the global liberalization strategy, import prohibition, duty exemptions and concessions, export diversification and economic growth. This result is supported by the works of Dutta and Ahmed (2001) for Pakistan, Adebiyi and Dauda (2004) for Nigeria and Chandran and Munusamy (2009) for Malaysia.

For foreign direct investment, the influx of capital, transfer of soft skills through training, the availability of more advanced technology and access to research and development resources may have contributed significantly to the increase in Nigeria's manufacturing sector output. Thus, this explains why the Nigerian government over the years have formulated policies that will attract foreign direct investment into the country. For example, UNCTAD data in 2012, shows that between 2002 and 2012, Nigeria's services sector attracted (US)$30 billion or 39% of Nigeria's total FDI stock in that period. This is largely attributable to the liberalization of the telecommunications sector and the expansion of the Nigerian banking sector as a result of the banking consolidation that occurred in the mid-2000s. This result is supported by Anowor *et al.* (2013).

In addition, the result shows that exchange rate contributed negatively to manufacturing sector output in Nigeria and it was not statistically significant for the period under review. This may be attributed to the fact that most goods produced in the manufacturing sector in Nigeria cannot compete with their foreign counterparts in the international market. Thus, despite the increase in the exchange rate of the Nigerian naira to major currencies of the world, especially the American dollars, the demand for the country's manufactured products continues to fall in the international market because of the sub-standard quality of these manufactured products. This result is supported by Kremer (1993), Grossman and Helpman (1991).

4.4 Stability Tests

These results show that the short-run model passed the diagnostic tests. There is no indication of autocorrelation at 5% confidence level and that the model passed the normality test, the error term is also proved to be normally distributed. There is no existence of white heteroscedasticity in the model. To test the stability of the long-run coefficients alone with the short-run dynamics, the cumulative sum (CUSUM) is applied. A graphical illustration of CUSUM is shown below in Fig.5. The plot of the CUSUM is within the boundaries, and, therefore these statistics prove the stability of the long-run coefficients of the regressors (trade openness, foreign direct investment and exchange rate) that have an effect on inclusive growth of manufacturing sector output in Nigeria. The model seems to be stable and appropriately specified given that the test statistics go outside the bounds of the 5 percent level of significance.

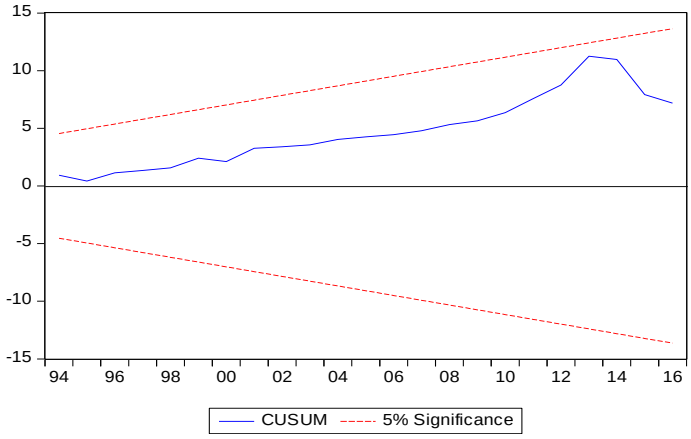

Figure 5. Cumulative Sum (CUSUM)

5. Conclusions and recommendations

The research investigated the relationship between trade openness and Nigeria's manufacturing sector output from 1980 - 2016. The estimated econometric result showed that trade openness and foreign direct investment have a positive and significant relationship with manufacturing sector output in Nigeria, while exchange rate has a negative and insignificant relationship with Nigeria's manufacturing sector output for the period under review. The co-integration test showed a long run relationship between trade openness, foreign direct investment, exchange rate and manufacturing sector output in Nigeria. Based on the findings of this research, the following recommendations were proffered: First, efforts should be made in formulating policies that will improve both domestic and foreign trade as the economy strives to achieve growth through trade. Therefore, there should be macroeconomic stability through the use of suitable trade, fiscal and monetary policies which if properly harmonized would be jointly reinforcing in achieving common macroeconomic objective of favourable balance of trade, price stability and economic growth. In addition, government should consider a set of reliable economic policies that will strengthen bilateral and multilateral trade agreements; this will go a long way in restoring the confidence of trade partners, thus increasing the rate of multilateral trade partners to Nigeria. Finally, Nigeria's manufactured products should be of top notch quality so that they can compete favourably with other manufactured goods produced by other countries in the international market.

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