Trade Openness, Manufacturing Capacity Utilization Rate and Output Expansion Nexus in Nigeria

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Abstract. The paper examined the nexus among trade openness, manufacturing capacity utilization rate, exchange rate, investment and output expansion in Nigeria using the annual time series data spanning from 1981 to 2019 by using the Autoregressive Distributed Lags Model application to co-integration and Error Correction Model techniques. The stationarity of the variables in the study was determined by using Philip-Perron unit root test. The study finds evidence that trade openness, exchange rate, investment and manufacturing capacity utilization rate have a significant impact on output expansion in Nigeria. In same vein, the paper also finds evidence that there is long run relationship among trade openness, manufacturing capacity utilization rate, exchange rate, investment and output expansion in Nigeria. These findings are imperative in formulating macroeconomic policies and framework in explaining the relationship among trade openness, manufacturing capacity utilization rate, exchange rate, investment and output expansion in Nigeria. Based on the findings of the study, it is hereby concluded that policy makers and economic planners should take cognizance of trade openness, manufacturing capacity utilization rate, exchange rate and investment as the key macroeconomic variables influencing output expansion in Nigeria.

Keywords: Trade openness, Exchange rate, Investment, Manufacturing capacity utilization rate, Output expansion

JEL Classification: E5, E52, E58, E62, E63

1. Introduction

Trade openness has to do with removal of trade obstacles or blockades which has been observed as an efficient strategy employed by many countries. The utmost aim of trade openness is to promote and facilitate free trade. This approach is expected to facilitate and enhance the growth of the economy from trade via an efficient and effective allocation of resources, healthy competition among countries and increase in investment (Ejike, Anah, & Onwuchekwa, 2015). Furthermore, trade openness allows a nation to make efficient use of her resources by encouraging importation of goods and services at a lower cost than they could be produced locally as it enables developing countries to import capital equipment and intermediate inputs that are crucial and fundamental in facilitating growth in the long run which will be expensive to produce locally among other benefits associated with trade openness (Ude & Agodi, 2015). Trade openness allows exchange of goods and services across borders in terms of free movement of capital, labor and funds among countries (Igudia, 2004). Tybout (1992) states that higher productivity is associated with liberalization as it reduces the unit costs of production which indicates an efficiency in production process.

Trade liberalization opens up new markets beyond national frontiers as this gesture enables firms to enjoy the advantage of large-scale production. Trade openness also known as economic liberalization promotes the setting up of export-oriented industries to facilitate the foreign exchange earning capacity of the economy as it leads to the enhancement of technology acquisition (Okoye, Nwakoby, & Okorie, 2016). In the same vein, Grossman and Helpman (1991) argue that economic openness can lead to technological change by making production more efficient and enhancing productivity. In view of the above, what is the impact of trade openness, exchange rate, investment, manufacturing capacity utilization rate on output

expansion in Nigeria? Is there any dynamic and significant nexus among trade openness, exchange rate, investment, manufacturing capacity utilization rate and output expansion in Nigeria?

In an attempt to answer the aforementioned questions, the aims and purpose of the study are; to investigate into the impact of trade openness, exchange rate, investment and manufacturing capacity utilization rate on output expansion in Nigeria and investigate the significant and dynamic relationship among trade openness, exchange rate, investment, manufacturing capacity utilization rate and output expansion in Nigeria. Without mincing words, the remaining part of the paper is structured as follows: Section 2 reviews relevant literature, Section 3 covers the methodology, Section 4 deals with the data analysis and results and discussion of empirical results, while Section 5 concludes the paper.

2. Literature Review

Theoretical Literature
1. Heckscher-Ohlin model

This model was established by Eli Heckscher and Bertil Ohlin as it emphasized the need for trade between two countries hinged on the fact that there is a relative abundance of resources among the countries. The Model encourages specialization between countries by concentrating on the production of those goods in which it has abundant resources and importing those goods it has limited resources to produce (Tebekew, 2014).
2. Export-led growth theory

Export-led growth theory is premised on the fact that the expansion of export is one the major driving force and impetus which promotes growth in an economy. This theory establishes that there is a strong nexus between the economic performance of a country and her level of export. This theory establishes the fact that the general growth difference does not only rely on the abundance of labor and capital but also on the expansion of export (Feder, 1983, Helpman & Krugman, 1985).

Empirical Literature

Research globally has been geared towards the impact of trade openness on growth. The outcomes of those scholarly studies have resulted in various results and findings. A study carried out on the impact of trade of liberalization on economic growth in Nigeria by Alwell, Mansi and Vincent (2017) revealed that trade openness has a significant and positive impact on economic growth in the short-run and long-run. From another perspective, Joaquin, Raghavan and Majumder (2019) examine the role of trade openness in influencing the nexus between oil abundance and economic growth and find that trade openness is a variable that can mitigate the resource curse as it has the capacity to allow countries to obtain competitive prices for their resources in the international market and it enables countries to access advanced technologies to extract resources more efficiently. In the same vein, Muhammad, Rauf and Kalsoom (2013) conducted a research to ascertain the impact of openness and inflation on economic growth in Pakistan and their study showed the existence of the inverse relationship between inflation and openness thus validating the Romer (1993) hypothesis. In addition, their study revealed that inflation and openness have a positive impact on the economic growth of Pakistan. Nevertheless, Masoud and Khalid (2017) investigated into the relationship between trade openness and economic growth of China. Their study showed evidence of a positive relationship in the long run between trade openness and economic growth. In fact, Ojeyinka and Adegboye (2017) in their study revealed that trade openness has a positive and significant effect on the output of the agricultural export as a significant and negative relationship exists between trade openness and manufacturing output in Nigeria. Their study also revealed that

the exchange rate has a positive but not significant impact on agricultural output while the exchange rate and inflation have a negative and significant impact on the manufacturing sector in Nigeria.

Jin (2000) examined the nexus between trade openness and economic growth and his results revealed that trade openness does not enhance growth while fiscal policy and foreign policy have positive impact on economic growth. On the other hand, Elijah and Musa (2019) examined the impact of trade openness on economic growth in Nigeria and the result revealed that trade openness has negative impact in the short and long run on economic growth. In addition, Ude and Agodi (2015) examined if trade openness makes sense, employing Nigerian trade policy as parameter and the results of the study revealed that trade openness has a significant impact on economic growth which implies that trade openness makes sense in Nigeria. The control variables which were interest rate and exchange rate also have significant positive effect on economic growth in Nigeria.

Solomon and Tukur (2019) examined the effect of trade openness on Economic growth in Nigeria and the result revealed that trade openness has a positive and significant impact on economic growth while the error correction modelling further revealed that inflation has a significant negative impact on economic growth as exchange rate has a positive but not significant impact on economic growth in Nigeria.

Okoye, Nwakoby and Okorie (2016) investigated into the impact of the economic liberalization policy on the performance of the industrial sector in Nigeria by taking a cursory look at some key economic indicators such as: exchange rate, financial deepening, trade openness and lending rate account for the trend in output performance of Nigeria's industrial sector in the post reform period. The study indicates that rate of change in exchange rate, trade openness and lending rate have significant negative effect on industrial output.

Oyovwi and Eshenake (2013) studied the effect of financial liberalization on economic growth in Nigeria and found that financial depth has a significant positive impact on economic growth while trade openness and investment-GDP ratio have significant effect on growth but in the opposite (negative) direction. In addition, Afaha and Njogo (2012) examined the impact of trade openness on the Nigerian economy and the study found a strong positive impact of trade openness on growth. Udegbunam (2002) studied the effect of trade openness on industrial output growth in Nigeria and observed that trade openness is a major determinant of industrial output growth in Nigeria. In the same vein, Umoru and Eborieme (2013) examined the effect of trade liberalization on industrial growth in Nigeria as they adopted the co-integration and error correction analytical techniques and found a significant positive effect of trade liberalization on industrial output growth in Nigeria. Adegbemi, Ismail and Muhibat (2012) investigated into the impact of trade openness on manufacturing sector performance in Nigeria and the analysis revealed that trade openness has a positive impact on the manufacturing sector performance while exchange rate and inflation rate have negative impact on the sector performance.

Ijirshar (2019) assessed the impact of trade openness on economic growth among ECOWAS countries. The results of the study indicated that trade openness has positive effects on growth in ECOWAS countries in the long-run but mixed effects in the short-run. Iyoha and Okim (2017) examined the impact of trade on economic growth on ECOWAS member countries and they found that exports, exchange rate and investment were significant determinants of per capita real income growth and that exports were positively associated with growth. Ajayi and Araoye (2019) investigated the impact of trade openness on economic growth in Nigeria and they discovered that there is a long-run relationship among all the variables of interest in their study as trade openness and economic growth depicted a positive relationship while an inverse relationship existed between economic growth and exchange.

However, past research woks studies carried out majorly focus on examining the nexus between trade openness and economic growth without considering how manufacturing capacity utilization rate, investment and exchange rate in conjunction with trade openness contribute to economic growth. The relationship among trade openness, exchange rate, manufacturing capacity utilization rate, investment and output expansion is a highly contentious issue in the literature, still it remains unresolved. The available literature has not provided a clear and distinct nature of the nexus existing among trade openness, exchange rate, manufacturing capacity utilization rate, investment and output expansion. This constitutes the sharp departure of this study from past works as it attempted to bridge the identified knowledge gap.

3. Methodology

This study employed annual time series data covering 1981 to 2019. The data was collected from Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS).

Model Specification

Following the model developed by Okoye, Nwakoby and Okorie (2016) and Ojeyinka and Adegboye (2017), it is assumed in this study that output expansion proxied by gross domestic product is a function of trade openness, exchange rate, investment and manufacturing capacity utilization rate. The model is therefore specified in the following functional form:

$$\text{GDP} = f\ (\text{TOP, EXCH, INV, MCU}) \tag{1}$$

Where: GDP = Gross Domestic Product (Proxy for output expansion); TOP = Trade Openness, measured by the ratio of total trade (import plus export) to GDP; EXCH = Real Exchange Rate; INV = Investment; MCU = Manufacturing Capacity Utilization Rate.

In an explicit form, the model becomes

$$\text{GDP}_t = \delta_0 + \delta_1 \text{TOP}_t + \delta_2 \text{EXCH}_t + \delta_3 \text{INV}_t + \delta_4 \text{MCU}_t + ɥ_t \tag{2}$$

Where δ_0 = Intercept, $\delta_1, \delta_2, \delta_3, \delta_4$ = Coefficient/slope of the independent variables, $ɥ$ = White noise error term.

Estimation Techniques

Unit Root Test

The stationarity of the time series will be tested in this study using Phillip-Perron unit root test since most macroeconomic time series variables have unit roots and regressing non stationary variables in the model might lead to spurious regression results (Granger, 1969).

Autoregressive Distributed Lag (ARDL) Approach to Co-integration Test

This study employs the autoregressive distributed lag to co-integration (ARDL) proposed by Peasaran, Shine and Smith (2001) to investigate the linear empirical model specified in equation 2. The use of the ARDL test for equation 2 involves the estimation of the following model:

$$\text{GDP}_t = \delta_0 + \delta_1 \text{TOP}_t + \delta_2 \text{EXCH}_t + \delta_3 \text{INV}_t + \delta_4 \text{MCU}_t + ɥ_t \tag{3}$$

Where $\text{GDP}_t, \text{EXCH}_t, \text{TOP}_t, \text{INV}_t,$ and MCU_t are stationary variables and $ɥ_t$ is a white noise.

The final step is to obtain the error of the short-run dynamic elasticities by estimating an error correction model associated with the long run estimates. This is specified as follows:

$$\Delta GDPt = C + \sum \Pi \Delta GDPt - 1 + \sum ῼ\,\Delta TOPt - 1 + \sum \mu\,\Delta EXCHt - 1 + \sum \phi \Delta INVt - 1 + \sum \delta \Delta MCUt - 1 + \lambda ECM\sum t - 1 \tag{4}$$

The symbols $\Pi, ῼ, \mu, \phi$ and δ the short run dynamic elasticities of the model's convergence to long run equilibrium and λ is the speed of adjustment. Δ represents the first difference operator and ECM_{t-1} is the one period lagged error correction term. $\Delta GDPt$ is the change in current gross domestic product, $\Delta GDPt - 1_{-1}$ is the change in previous GDP, $\Delta TOP\ t - 1$ is the lagged trade openness, EXCH_{t-1} is the lagged exchange rate, $\Delta INVt -$

1 is the lagged investment and ΔMCU_{t-1} is the lagged manufacturing capacity utilization rate.

4. Results and Discussion

Results

Testing the Stationarity of the Series Using Unit Root Test

Table 1. Phillip-Perron unit root test

Series	At Levels		1st Difference		Level of Integration
	Statistics	Probability	Statistics	Probability	
EXCH	0.4519	6.28028	0.0001	91.3274	1(1)
GDP	1.0000	6.28028	0.0288	91.3274	1(1)
INV	0.9999	6.28028	0.0000	91.3274	1(1)
MCU	0.2882	6.28028	0.0034	91.3274	1(1)
TOP	0.3323	6.28028	0.0000	91.3274	1(1)

Source: Author's computation (2022)

The result in Table 1 confirms that GDP, EXCH, TOP, INV and MCU are integrated of order one.

Testing the Long-Run Relationship among the Series

Table 2. Co-integration test based on bound test for GDP

F- Statistic	7.967712	
K	4	
Level of Significance	I(0) Bound	I(1) Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: Author's computation (2022)

This result in Table 2 indicates the rejection of the null hypothesis of no co-integration between the dependent variable GDP and all the explanatory variables in the model implying that the estimated model for output expansion establishes the fact that there is a long-run relationship in the bound test. This is because the F-statistic value of 7.967712 is greater than the critical values at both the lower bound (2.66) and upper bound (3.49) using 5% significant level. Based on this, the study confirms that there is a long-run relationship existing among output expansion (GDP), exchange rate (EXCH), trade openness (TOP), investment (INV) and manufacturing capacity utilization rate (MCU) in Nigeria.

Table 3. Estimated long-run coefficients using ARDL technique

Variable	Coefficient	Std. Error	T-Statistic	Prob.
GDP(-1)	0.433838	0.123632	3.509095	0.0019
EXCH	-8.721203	9.739486	-0.895448	0.3798
INV	4.239094	1.819242	2.330143	0.0289
INV(-1)	2.992031	2.491712	1.200793	0.2421
INV(-2)	6.330593	3.067927	2.063476	0.0505
MCU	-200.5946	78.97416	-2.540002	0.0183

TOP	-7009.324	7395.246	-0.947815	0.3531
TOP(-1)	-4930.818	8289.821	-0.594804	0.5578
TOP(-2)	-821.8724	8388.290	-0.097979	0.9228
TOP(-3)	-1956.863	8457.000	-0.231390	0.8191
TOP(-4)	-15737.12	7639.294	-2.060023	0.0509
R-squared	0.988663	Mean dependent var	29237.65	
Adjusted R-squared	0.986891	S.D. dependent var	42177.87	
S.E. of regression	4829.077	Akaike info criterion	19.94664	
Sum squared resid	7.46E+08	Schwarz criterion	20.20520	
Log likelihood	-372.9861	Hannan-Quinn criter.	20.03863	
Durbin-Watson stat	558.1114	Durbin-Watson stat	2.197728	
Prob(F-statistic)	0.000000			

Source: Author's computation (2022)

The estimated long-run coefficients for ARDL model in Table 3 confirms that in the long-run, exchange rate (EXCH) at 3.51 t-statistic value has a negative impact on output expansion (GDP) in Nigeria. Furthermore, investment (INV) at 2.33 t-statistic was found to have a positive and significant impact on output expansion (GDP) in Nigeria at 5% level of significance. In addition, Trade openness (TOP) at 0.95 t-statistic has a negative and significant impact on output expansion (GDP) in Nigeria at 5% level of significance while Manufacturing Capacity Utilization rate (MCU) at 2.54 t-statistic has a negative and significant impact on output expansion (GDP) in Nigeria at 5% level of significance.

The Short-Run Dynamic Relationship among the Series

Table 4. Short-run dynamic relationship among the series using ARDL error correction regression

ARDL Error Correction Regression				
Dependent Variable: D(GDP)				
Selected Model: ARDL(4, 0, 1, 3, 2, 3)				
Sample: 1981-2019				
Included observations: 38				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INV)	4.239094	1.275366	3.323825	0.0030
D(INV(-1))	-6.330593	2.502253	-2.529958	0.0187
D(TOP)	-7009.324	5887.375	-1.190569	0.2460
D(TOP(-1))	18515.85	7051.673	2.625739	0.0151
D(TOP(-2))	17693.98	6148.238	2.877894	0.0085
D(TOP(-3))	15737.12	6324.594	2.488242	0.0205
CointEq(-1)*	-0.566162	0.074214	-7.628823	0.0000
R-squared	0.818790	Mean dependent var	4116.989	
Adjusted R-squared	0.779960	S.D. dependent var	6300.423	
S.E. of regression	2955.431	Akaike info criterion	18.99753	
Sum squared resid	2.45E+08	Schwarz criterion	19.30860	
Log likelihood	-325.4568	Hannan-Quinn criter.	19.10491	
Durbin-Watson stat	2.038666			

Source: Author's computation (2022)

Table 4 confirms the error correction term is well defined since it is negative and statistically significant at 5% significant level which further affirms the presence of long-run relationship between output expansion and all the independent variables in Nigeria. The coefficient is -0.566162 which implies that about 57% of any disequilibrium in GDP is corrected by the explanatory variables within one period (one year). This also shows the speed at which the model converges to equilibrium.

Testing for Structural Stability

The recursive test and cumulative sum of the recursive residuals (CUSUM) were employed for stability test in the study. The test finds parameters instability if the plots of the Recursive test and cumulative sum of the recursive residuals (CUSUM) go outside the area between the two critical lines. The plots are shown in Figures 1 and 2 below.
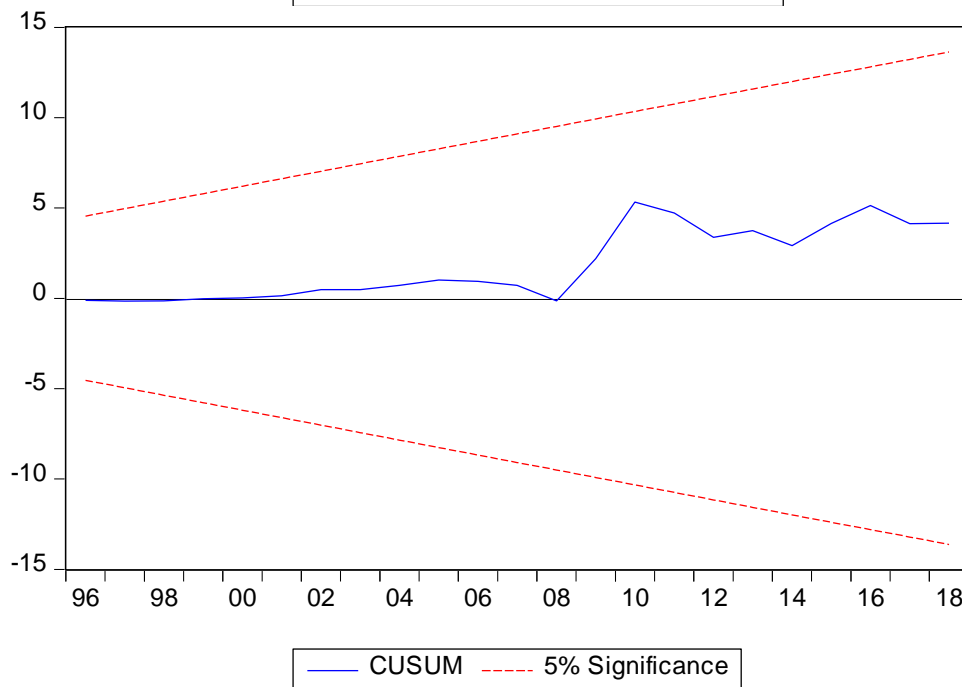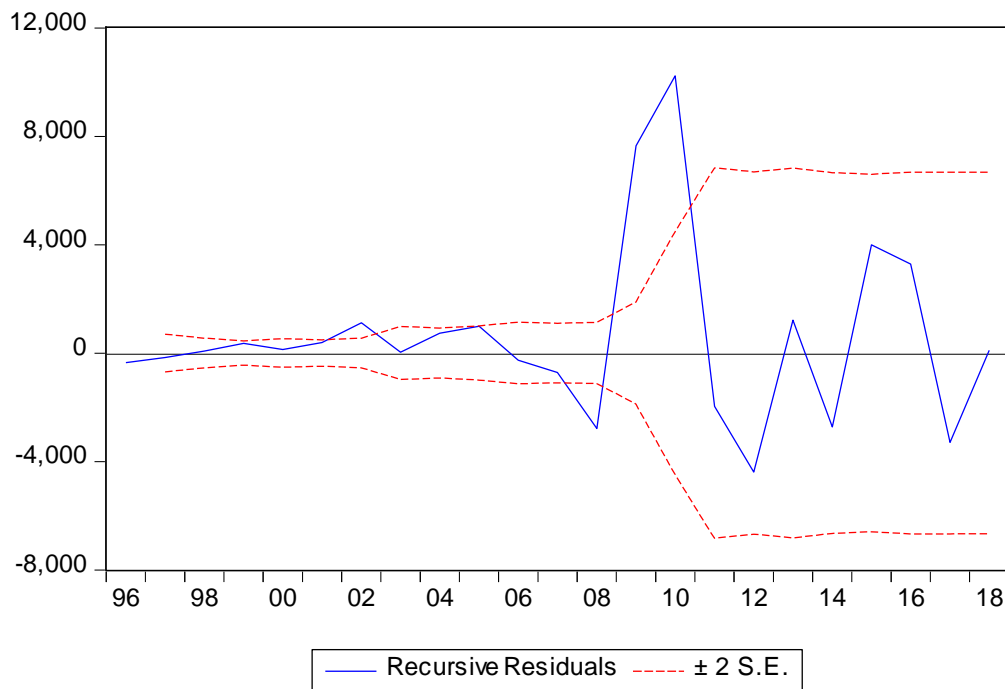
Figure 1 and Figure 2 results are suggestive of coefficient stability since the plots did not move outside the 5% critical bound. This affirms the existence of coefficient stability for the estimated parameters for the short run dynamics and long run of the model over the sample periods as the results reveal tendency of further coefficients stability. One can conclude that the model is well estimated and the observed data fit the model specification adequately, hence the coefficients are valid for policy discussions in Nigeria.

Discussion of Findings

Exchange rate has a significant and dynamic impact on output expansion in Nigeria. This is in line with Ajayi and Araoye (2019) who observed that trade openness and economic growth indicated a positive relationship but a negative relationship existed between economic growth and exchange rate. In the same vein, trade openness has a significant impact on output expansion in Nigeria. This result is in congruence with Hlalefang and Kolisi (2017) and Masoud and Khalid (2017). Furthermore, investment has a positive, significant and dynamic impact on output expansion in Nigeria. This is in agreement with Iyoha and Okim (2017) who found that exports, exchange rate and investment were significant determinants of per capita real income growth. In addition, manufacturing capacity utilization rate has a negative and significant impact on output expansion in Nigeria. This is in consonance with Adegbemi, Ismail and Muhibat (2012) whose analyses reveal that trade openness has a positive impact on the manufacturing sector performance.

5. Conclusion

The findings of the study show that trade openness, exchange rate, manufacturing capacity utilization rate and investment have a significant impact on output expansion in Nigeria. In the same vein, the study reveals that there is long run relationship among trade openness, exchange rate, manufacturing capacity utilization rate, investment and output expansion in Nigeria. These findings are imperative in formulating macroeconomic policies and framework in explaining the relationship among trade openness, exchange rate, investment, manufacturing capacity utilization rate and output expansion in Nigeria. In view of the findings of the study, it is hereby concluded that policy makers and economic planners should take cognizance of trade openness, exchange rate, investment, manufacturing capacity utilization rate as the key macroeconomic variables influencing output expansion in Nigeria.

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