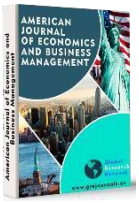

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Article

External Sector Variables, Exchange Rate and Industrial Sector Output Performance in Nigeria

Chidi Wosu[1*], Lawrence Blessing Aturuchi[2]

[12] Department of Economics, Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria
* Correspondence: researchparksafrica@gmail.com

Abstract: This study examines the relationship between external sector variables, exchange rate and industrial sector output performance in Nigeria from 1980-2023 using the Ordinary Least Square analysis, the co-integration test and error correction mechanism. The study revealed the existence of a positive relationship between foreign direct investment and foreign port investment while a negative links exists between exchange rate and industrial capacity utilization on the industrial sector output performance in Nigeria within the period under consideration, 1980-2023. The error correction coefficient ECM (-1) value is -0.804506 or 80 per cent and correctly signed (negative sign) and significant. This implies that external sector variables, exchange rate and industrial sector output performance in Nigeria adjust speedily to the changes in the explanatory variables. Therefore, the ECM is able to correct and tie any deviations from the long –run relationship between industrial sector output performance and the explanatory variables to its short-run period.

Keywords: Exchange Rate, Foreign Direct Investment, Foreign Portfolio Investment, Nigeria

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1. Introduction

Exchange rate policy as an important tool derives from the fact that changes in the rate of exchange have significant implications for a country's balance of payments position and even its income distribution and growth. It is not surprising since its behaviour is said to determine the behaviour of several other macroeconomic variables (Ogu, Aniebo and Paul, 2016; Areghan, Felicia, Maria, Godswill, and Chisom, 2018). It is even more so for Nigeria which had embarked on a course of rapid economic growth with attendant high import dependency. The manufacturing sector plays catalytic role in a modern economy and has many dynamic benefits that are crucial for economic transformation. In an advanced country, the manufacturing sector is a leading sector in many respects (Akpan and Eweke 2017). It is an avenue for increasing productivity in relation to import substitution and export expansion, creating foreign exchange earning capacity, raising employment, promoting the growth of investment at a faster rate than any other sector of the economy, as well as wider and more efficient linkage among different sectors (Babatunde, 2016; Babatunde, 2016; Adjei, 2019).

Manufacturing capacity utilization, this is the extent to which a nation or enterprises actually uses its installed productive capacity. Economically, if market demand grows, capacity utilization will rise, if demand weakens, capacity utilization will fall (Wikipedia). According to Paul Samuelson (Nwosa, 2018; Akeem, 2019) inflation rate is the percentage of annual increase in general price levels of goods and services. GDP is the monetary value of all the finished goods and services produced within a country's border in a specified period, usually one year. Export as well is a function of international trade whereby goods produced in one country are shipped to another country for future sale or trade. The sale of such goods adds to the production of nation's gross profit (Lawal, 2016; Ali, 2020; Ukwunna, Ihugba, and Okoro, 2022). Rate of industrialization which is the process in which a society or country transforms its self from a primarily agricultural society into one based on the manufacturing of goods and services, individual manual labour is often replaced by mechanized mass production and craft- men replaced by assembly lines (Almisshal and Emir, 2021; Amadi, Nwidobie, and Adesina, 2018). But the Nigerian economy is under-industrialized and its capacity utilization is also low. This is in spite of the fact that manufacturing is the fastest growing sector since 1973/74 (Moyo, and Mapfumo, 2015; Nwanne and Eze, 2015). Studies in the past such as Akinde, (2014), Ogu, Aniebo and Elekwa (2016) have shown conflicting impact of the external sector on the manufacturing sector performance. While Otokoni, Olokoyo, Okoye, Ejemeyovwi (2016); Ilemona and Okwanya (2017) found positive effect, others, such as Ammani (2017) found no relationship, either positive or negative between external sector variables and Nigerian manufacturing sector. This suggests that there is no consensus in literature on how external sector variables impact on manufacturing industries in Nigeria. This problem has thus necessitated this study to investigate if a link exits between external sector variables, exchange rate and the industrial sector in Nigeria (Areghan, Felicia, Maria, Godswill and Chisom, 2018).

Statement of the Problem

The industrial sector performance in Nigeria is seen to be tied to external sectors such as foreign direct investment, trade openness, foreign portfolio investment and exchange rate as a result of the obtaining of capital equipment in other to enable the growth and enhancement of the industrial sectors processes. This has been a serious problem facing the economy as a whole in Nigeria until the early 1980s, when oil market was the main source of the nation's foreign earnings though it collapsed due to fall in oil prices. Due to this fall in oil prices, there was a drastic decrease of foreign investments gotten from the exportation of oil. This could not provide the essential stimuli needed for the growth and development in the industrial sector. Numerous policy measures by government in Nigeria have been embraced in other to remedy the problems linked with the country's foreign earnings but little was achieved. Among these policies includes the restrictive monetary policy, the stabilization measure of 1982 and the stringent measure of 1984, as well as the structural adjustment programme (sap) of 1986 whose aim specifically was to reduce the high dependency of crude oil as a major foreign exchange earner by promoting non-oil exports especially the industrial products in the economy. Nevertheless, with the pursuant of these policies, Nigeria still recorded the second largest recipient of external sectors inflows such foreign direct investment among low-income countries like Nigeria. It is important to note that various factors are impeding the flow of FDI in the Nigerian economy, which has made other sectors mostly the manufacturing sector to suffer, as the level of productivity and performance seems to be very low and poor. These factors include: the present of social-political upheaval from some anti-social group/terrorists, insufficient human capital skills, poor management of resources, weak or inadequate infrastructure, corruption, political instability and poor technological base to support the growth of industrial activities and obsolete machinery and equipment. Therefore, in the light of the above, this study examines the effect of external sectors and exchange rate on the industrial sector output in Nigeria.

Other problems of the economy include excessive dependence on imports for consumption and capital goods, unprecedented fall in capacity utilization rate in industry and neglect of the Agricultural sector. These have resulted in fallen incomes and devalued standards of living amongst Nigerians. Records shows that the manufacturing outputs in various years stood at ₦345.23 million in 1980, ₦115.29 million in 1985, ₦440.11 million in 1990, ₦663.12 in 1995 and in 2005, the manufacturing sector output stood at ₦435.90 within the review period, exchange rate are 23. 21 in 1980, 15.60 in 1990, 31.40 in 2000, 19.30 in 2010 and 33.21 in 2015 respectively. Finally, foreign direct investment stood at ₦66.56 million, ₦234.23 million and ₦87.09 million from 2018, 2019 and 2021.

Against this background and given the consistent huge inflows of external sectors finances, increasing exchange rate and its associated effect on the industrial sector in Nigeria, notwithstanding all the above policy guidelines for effectiveness, the present study is set to address some pertinent questions like; what constitute a reasonable inflow of the external sectors variables into Nigeria and what are the cause(s) of industrial sector failure in Nigeria.

Objectives of the Study

The broad objective of this study is to examine external sectors variables, exchange rate and industrial sector output performance in Nigeria. The specific objectives are to:

i. Determine the outcome of exchange rate and the industrial output in Nigeria
ii. Examine the impact of foreign direct investment and the industrial output in Nigeria
iii. Investigate the effect of foreign portfolio investment and the on the industrial output in Nigeria
iv. Study the impact of industrial capacity utilization and the industrial output in Nigeria.

Study Hypothesis

$\mathbf{H_o}$: increase in exchange rate increases industrial outputs in Nigeria

$\mathbf{H_1}$: increase in foreign direct investment increases industrial outputs in Nigeria

$\mathbf{H_1}$: increase in foreign portfolio investment increases industrial outputs in Nigeria,

$\mathbf{H_1}$ increase in industrial capacity utilization increases industrial outputs in Nigeria

Theoretical Literature Reviewed

International Monetary Model

The monetary theory of the external sector was propounded by Frankel (`1976). It focuses on the macroeconomic performance of countries that are integrated with the world economy both through trade in goods and services and through the exchange of assets. Some scholars are of the view that it was John Maynard Keynes, an advisor to the British Treasury, who independently drafted plans for the organizations that would provide financial assistance to countries experiencing short-term deficits in their balance of payments (Ugwuanyi and Nkem, 2017; Ugwu, 2017).The monetary model recognizes the importance of asset market changes in determining the exchange rate, as opposed to concentrating merely on the importance of current account flows in the short or long term, as the previous approaches did. It, thus, emphasizes that exchange rate changes are greatly influenced by the asset holders' preference for money. Its central argument is that adjusted by capital transaction through a change in the exchange rate. This explains that exchange rates changes are brought by stock disequilibrium, that is, the willingness of the individuals to hold the outstanding stock of money, rather than from the flow of receipts and payments arising from this perspective, exchange rate is defined as the price of foreign money in terms of domestic money. Thus, being a relative price of two assets (money), the equilibrium exchange rate is attained when the existing stocks of the two moneys are willingly held.

Portfolio Balance Approach (PBA.)

Black (1973), Kouri (1976), Branson (1977), and Girton and Henderson (1977) developed the portfolio balance approach. The portfolio-balance framework is a model that relates excess demands for stocks of outside assets to the expected yields on these assets, the relative levels of current and expected future exchange rates are determined as elements of expected yields, but by itself the portfolio-balance model. The portfolio approach means evaluating individual investments based on their contribution to the investment characteristics of the portfolio. Assume an investor's portfolio has three stocks A, B, and C. He is evaluating whether to add another stock, D, to the portfolio. The portfolio – balance model, like the monetary model, is also an asset view of exchange rate determination and stresses the role of asset market adjustment with the assumption of perfect capital mobility. But unlike the monetary model, it assumes substitutability of domestic and foreign interest- bearing assets due to the perceived existence of exchange, political and default risks. It argues those exchange rates reflects the supplies of and demand for a whole range of different currency denominated assets (Ayobami, 2019; Amadi, Nwidobie, and & Adesina, 2018).

The Purchasing Power Parity (PPP) Theory

A Swedish economist named Gustav (1918) developed the theory of exchange rates known as the purchasing power parity (Popoola, Asaleye and Eluyela, 2018; Sunday and Olajide, 2018). The Purchasing Power Parity (PPP) simply states that a unit of any given currency should be able to buy the same quantity of goods in all countries. Many economists believe that the PPP describes the forces that determine exchange rates in the long run (Ayinde, 2014; Azeroual, 2016; Babatunde, 2016). Accordingly, the nominal exchange rate between the currencies of two countries must reflect the different prices level in those countries. PPP, which forms a strong building block of the theory of exchange rate determination, maintains that there exists a proportional relationship between the exchange rate of the currencies of two countries and their relative inflation rates. The theory is based on the law of one price, which explains that, in the absence of trade barriers and transportation costs, spatial commodity arbitrage ensures that the price of any good is equalized across different countries (Bawa, Ahmed and Konga, 2020; Buabeng, Ayesu Adabor, 2019; Ehikioya, 2019). The PPP theory can be formulated in two forms: in absolute forms. The absolute form of PPP asserts that the equilibrium exchange rate equalizes the general purchasing power of a given income in terms of relative price levels. It thus, relates the level of exchange rate to relative prices levels. The relative form argues that changes in exchange rate measured from a base period reflect changes in relative price levels (Ehikioya, 2019; Dalmar, Ali and Ali, 2018; Falaye, Eseyin, Otekunrin, Asamu, Ogunlade, Egbide and Eluyela, 2019).

Location Theory

Alfred (1929), the German location economist formulated a theory of industrial location in his book entitled Über den Standort der Industrien (Theory of the Location of Industries). Location theory addresses questions of what economic activities are located where and why. Location theory or microeconomic theory generally assumes that agents act in their own self-interest. Firms thus choose locations that maximize their profits and individuals choose locations that maximize their utility (Tams-Alasia, Olokoyo, Okoye and Ejemeyovwi, 2018).

Local studies on foreign sectors, exchange rate and industrial output Performance in Nigeria. Implicit in industrial location theory is the assumption that the unit of production (the factory) and the unit of organization (the firm) are combined in the form of the single plant firm. Contemporary industrial production is, however, dominated by large, multi-plant, multiproduct corporations (Onwuka, 2021; Orji, Ogbuabor, Okeke and Anthony-Orji, 2018; Ogu, Aniebo and Paul, 2016).

Empirical Literature Reviewed

Oladipo, Onabote, Adekanye, Ogunjobi, and Folarin (2023) study to investigate the effect of exchange rate fluctuations on Nigerian manufacturing output. The Generalized Autoregressive Conditional Heteroscedasticity technique was used in the study in order to examine the exchange rate oscillations. The result of the model estimation revealed that there is no persistence of shocks in the volatility of the exchange rate in the Nigerian economy. The business cycle stylized facts were also used to examine exchange rate volatility and the result established that exchange rate is highly volatile and has a negative effect on manufacturing output in Nigeria. The Auto Regressive Distributed Lag Bounds test was used to establish the long-run relationship and the result showed that there is a long-run relationship between exchange rate and manufacturing output. The variance decomposition and Impulse Response function were employed and the result revealed that exchange rate fluctuation has a negative impact on manufacturing gross domestic product in Nigeria. In practice, based on the results of the study, it can be recommended to the monetary authorities to constantly monitor the exchange rate fluctuations in order to create policies that are well-informed and match the exchange rate to the actual needs of manufacturing sector in order to boost its output.

Leera Amadi and Ezebunwo (2022) examined the influence of Nigerian external sector environment on the performance of the Nigerian manufacturing sector between 1981 and 2019. The study adopted ex-post research design approach and the Autoregressive Distributed Lag (ARDL) model estimation techniques. The empirical model consists of the Nigerian manufacturing sector output index as the dependent variable and exchange rate, trade openness, and foreign direct investment as independent variables and external sector environment variables. Test of unit root results indicated that the variables have mix order of integration, while the co- integration analysis results indicated that the variables in the model have stable long run relationship. Estimate of the ARDL model reveals that in the short run exchange rate variations has negative, but significant effect on manufacturing sector performance, while trade openness and FDI have positive but insignificant influence on the manufacturing sector performance in the short run. In the long run, exchange rate level and FDI inflows have positive and significant effect on the manufacturing sector performance, while trade openness has negative and significant effect on the Nigerian manufacturing sector performance. The study therefore concludes that the Nigerian external sector Environment has significant influence on the performance of the Nigerian manufacturing sector.

The study by Orji and Ezeanyaeji (2022) examined the impact of exchange rates on the performance of the manufacturing sector in Nigeria between 1990 and 2020. Using canonical co-integrating regression (CCR) framework, the result obtained showed that exchange rate devaluation constrains manufacturing sector while exchange rate fluctuation hampers manufacturing output. The study indicated that price increase leads to decline in the manufacturing sector, the study recommends among other things the need to formulate policies that align with the exchange rate to the actual needs of the manufacturing sector. The study further suggests that change in exchange rate management strategy should be allowed to run a reasonable course of time. Jettisoning strategies at will and on frequent basis has implication for exchange rate and obvious consequence for a sector that depends on foreign inputs. Onwuka (2022) examined the impact of exchange rate volatility on the performance of manufacturing sector in Nigeria using ARCH/GARCH model and Autoregressive Distributed Lag Model (ARDL). The ARDL results show that exchange rate volatility; interest rate and inflation rate has a negative impact on the performance of manufacturing sector in the long run while import and gross capital formation have a positive effect on manufacturing performance in the long run. Also, exchange rate volatility, gross capital formation and interest rate were

found to have a significant impact on manufacturing performance while import and inflation were found to be non-significant.

Asaleye, Maimako, Inegbedion et al (2021) used Structural Vector Autoregression, ECM and Canonical Co-integrating Regression to examine the shock effect, short and long-run elasticities of exchange rate on the manufacturing performance. While employment and output are used as a proxy for manufacturing sector performance. The findings show that changes in the exchange rate are fairly elastic with output and employment both in short and long-run. However, changes in the exchange rate are insignificant with employment in the short run. The variance decomposition form the SVAR shows that forecast error shock of the exchange rate is more prolong on employment than output. Consequently, the result of the estimation of the Impulse Response Function from the Monte Carlos shows that one standard deviation of the exchange shock adversely affect employment. The outcome of the result indicates that the Nigerian exchange rate has not improved output and employment in the manufacturing sector. Several factors may be accounted for this, although, it may be due to cost-push inflationary pressure and unfavourable competitiveness. The study suggests the need to encourage long-term supply-side policies among others to improve the situation. Samuel and Wale-Odunaiya (2021) investigated the consequences of undervaluation of exchange rate in Nigeria on the manufacturing output and economic growth between 1981 and 2019. The Vector Error Correction Mechanism was employed and it was found from the impulse response function that real effective exchange rate does not significantly affect economic growth and it is negatively related with manufacturing output. Okoye et al. (2021) examined the link between exchange rate oscillation and government spending in Nigeria. The study adopted the Mundell-Fleming model and descriptive statistics. They find that both capital and recurrent expenditures have no significant effect on exchange rate in Nigeria.

Ali (2020) examined the effect of exchange rate fluctuations on manufacturing performance in Nigeria and the results showed that exchange rate volatility has negatively affected the performance of the Nigerian manufacturing sector. Mlambo (2020) examined the impact of the exchange rate on manufacturing performance in the Southern African Customs Union (SACU) states using the panel group FMOLS and PMG approaches for the period 1995 to 2016. The results showed that the exchange rate, imports and foreign direct investments have a negative relationship with manufacturing performance. Exports and inflation had a positive relationship with manufacturing performance Ali (2020) examined the impact of exchange rate fluctuations on manufacturing performance in Nigeria using the ARDL approach. The study's revealed that exchange rate fluctuation has a negative impact on the performance of the Nigerian manufacturing sector. Sugiharti, Esquivias and Setyorani (2020) examines the impact of exchange rate volatility on Indonesia's primary export commodities to the top five export destination countries, namely China, India, Japan, South Korea, and the United States. This study uses a GARCH model to obtain an estimated value of exchange rate volatility, using monthly data covering from 2006 to 2018. The ARDL method helps to measure the effect of exchange rate volatility on exports to destination countries in both the short and the long-term. Aggregate exports are compared employing a linear (ARDL) and a non-linear autoregressive distributed lag model (NARDL). The findings suggest that exchange rate volatility has a significant effect on exports of commodities in the short or long-run. The exchange rate volatility of exports to China only affects plastics goods although many goods experience negative effects due to exchange rate depreciation. In India, exchange rate volatility affects the largest number of export commodities. The Index of Industrial Production (IIP) has a strong long-term effect on exports to Asian countries. Impacts due to exchange rates offer both negative effects and positive effects (expected) in exports at commodity and trade partner case-to-case levels. Both aggregate ARDL and NARDL

models suggest that Indonesian exports are negatively affected by exchange rate fluctuations.

2. Materials and Methods

The study design embraced for this study is the time series experimental research design. The reason is that time series experimental research design combines the theoretical exposition with empirical observation. The Ordinary Least Square (OLS) linear regression model was used to estimate the variables. This involves estimation of the model in order to investigate external sector variables, exchange rate and the industrial sector in Nigeria. The linear estimation technique targets at achieving unique parameter estimates that would permit us to interpret the regression coefficients and subsequently give a slightly better fit. Unit root test shall be conducted on the variables using the Phillip-Peron (P-P) test. Unit root test is a test of stationary or non-stationary of time series data used in the model. This is to find out if the link between economic variables is spurious or nonsensical (Asaleye, Popoola, Lawal, Ogundipe and Ezenwoke, 2018; Akinlo and Lawal, 2015; Akpan and Gamaliel, 2017).

Model Specification

Leera, Amadi and Ezebunwo, 2022; Ali, Ali and Dalmar, 2018; Ammani, 2017) examined the impact of manufacturing output (MOQ), exchange rate, trade openness using data from Nigeria for the period 1981-2016.The data on manufacturing output (MOQ), exchange rate (EXR), foreign direct investment(FDI) and trade openness (TOP). The functional relationship as;

$$MSQ = f(EXC, FDI, TOP) \quad \text{.....(1)}$$

Where,
MSQ =. Manufacturing output
EXCHR = Exchange rate.
FDI = foreign direct investment
TOP= Trade openness
The econometric form adopted is stated as;

$$MSQ = \beta_1 EXC + \beta_2 FDI + \beta_3 TOP + \mu_t \quad \text{.....(2)}$$

Equations (2) helped to shape the present study. Accordingly, the functional link in this present study imitates the above model but with major scope and methodological differences and as a result is represented as;

$$IDQ = f(EXC, FDI, FPI, ICU) \quad \text{.....(3)}$$

And the multiplicative form of the model is thus represented as;

$$IDQ = \Omega_0 EXC^{\Omega_1} FDI^{\Omega_2} FPI^{\Omega_3} ICU^{\Omega_4 \mu} \quad \text{.....(4)}$$

Where:
IDQ = Industrial sector output
EXR = Exchange rate
FDI = Foreign direct investment
FPI = Foreign portfolio investment
ICU = industrial sector capacity utilization
Accordingly, the econometric form of the model is stated as:

$$IDQ_t = \Omega_0 + \Omega_1 EXC_t + \Omega_2 FDI_t + \Omega_3 FPI_t + \Omega_4 MCU_i + \mu_t \quad \text{.....(5)}$$

Where
IDQ = Industrial sector output at time‘t’
EXR = Exchange rate at time‘t’
FDI = Foreign direct investment at time‘t’
FPI = Foreign portfolio investment at time‘t’

ICU = Industrial capacity utilization at time‘t’
μ_i = Stochastic variable or error term
Ω_0 = Constant term.
$\Omega_1, \Omega_2, \Omega_3$ and Ω_4 = Parameters to be estimated

3. Results

Table 1. Unit root Test (P-P)

P-P Test: level				**P-P Tessst: 1 st dff**		
variables	**Test stat**	5%.	**Order**	**Test stat**	5%.	**Order**
IDQ	-1.179547	-2.933158	**NS**	-7.202042	-3.523623	**S**
EXC	-1.340535	-3.520787	**NS**	-7.202042	-3.523623	**S**
FDI	-1.340535	-3.520787	**NS**	-7.202042	-3.523623	**S**
FPI	-1.340535	-3.520787	**NS**	-7.202042	-3.523623	**S**
ICU	-1.340535	-3.520787	**NS**	-7.202042	-3.523623	**S**
Note: the ADF tests for H_0Xt as 1(1) against H_1Xt as 1(0).						
NS= Not stationary at 5%. **S.** Stationary at 5 %						

***Source*:** Authors’ computation (E.view 9.0). Note: (1) NS = Non – stationary.
(2) S = Stationary

From Table 1, the P-P unit root test method is used to confirm the presence or absence of unit root in the model. This was carried out to determine the time series properties of the model. The results show that the P-P statistics is greater than the 5 per cent test critical values. The variables from the estimated result were integrated of the same order 1(1). The variables in the model were not stationary at levels but became stationary at their first differences and are consequently homogeneous of order one 1(1). This helped in removing the problem of spurious regression often linked with time series data. In order words, the variables could be co-integrated. To ascertain this, we apply the Johansen Co-integration procedure (Moyo and Mapfumo, 2015; Nwanne and Eze, 2015).

Table 2. Johansen Co-integration test. (Trace Stat)

Hypothesized No. of CE(s)	**Eign value**	Trace stat.	**0,05 crit. Value**	Prob.**
None *	0.711608	83.11328	79.34145	
At most 1	0.352245	32.13249	55.24578	
At most 2	0.183768	14.32853	35.01090	
At most 3	0.132876	6.003200	18.39771	
At most 4	0.003839	0.157707	3.841466	
Trace test indicates 1 co-integrating eqn (s) at the 0.05 level				

***Source*:** Authors’ computation (E.view 9.0)

Table 2 is the Trace statistic indicating 1 co-integrating equation at 5 per cent level of significance thus signifying the rejection of the null hypothesis of no co-integrating link. This is established by the fact that the Trace statistic statistics value is greater than the critical value at 5 per cent level of significance. Consequently, there is a long-run equilibrium relationship between external sector variables, exchange rate and the industrial sector in Nigeria within the period under review. Summarily, both the Trace and Max-Eigen tests statistic confirms the existence of a long-run equilibrium relationship between the variables and the hypothesized fundamentals for the period under consideration i.e. 1980 - 2022. We, thus reject the null hypotheses of no co-integration amongst the variables but we do not reject the alternative hypotheses. On the premises of the result from the Johansen co-integration test which established the existence of a long run link among the variables, we, thus have the confidence to conduct the short run dynamic adjustment (Onabote, Abuh, Emmanuel, Eseyin, and Okafor, 2021).

Table 3. Johansen Co-integration tests (Max-Eigen Test)

Hypothesized No. of CE(s)	**Eign value**	Max-Eignen stat.	**0.05 crit. Value**	Prob.**
None *	0.711608	50.98079	37.16359	0.0007
At most 1	0.352245	17.80396	30.81507	0.7248
At most 2	0.183768	8.325329	24.25202	0.9702
At most 3	0.132876	5.845493	17.14769	0.8313
At most 4	0.003839	0.157707	3.841466	0.6913

Max-Eigen Test indicates 1 cointegrating eqn(s) at the 0.05 level

***Source*:** Authors' computation (E.view 9.0)

Correspondingly, from Table 3, the Maximum-Eigen statistic indicates 1 co-integrating equation at 5 per cent level of significance thus signifying the rejection of the null hypothesis of no co-integrating affiliation. This is established by the fact that the Max-Eigen statistic value is greater than the critical value at 5 per cent level of significance. Therefore, there is a long-run equilibrium association between external sector variables, exchange rate and the industrial sector in Nigeria within the period under review. Summarily, both the Trace and Max-Eigen test statistic confirms the existence of a long-run equilibrium affiliation between the variables and the hypothesized fundamentals for the period under consideration i.e. 1980 - 2022. We, therefore reject the null hypotheses of no co-integration amongst the variables but we do not reject the alternative hypotheses. On the premises of the result from the Johansen co-integration test which confirmed the existence of a long run relationship among the variables, we, therefore have the confidence to conduct the short run dynamic adjustment. Consequently, we proceed to estimate an over-parameterized error correction model from where the parsimonious error correction mechanism was obtained (Lawal, Asaleye, Iseolorunkanmi and Popoola, 2018; Leera, Amadi and Ezebunwo, 2022; Mlambo, 2020).

Table 4. Parsimonious Error Correction Model (1980 -2022)

Variable	**Coefficient**	**Std Error**	**T***	**Prob**
D(EXC)	-0.106899	0.075770	-1.410838	0.1697
D(EXC(-1))	0.203036	0.098470	2.061904	0.0490
D(EXC(-2))	0.289072	0.119224	2.424611	0.0223
D(FDI)	0.967424	1.505833	0.642451	0.5260
D(FDI(-1))	2.175909	1.517145	1.434213	0.1630
D(FDI(-2))	0.855193	1.545597	0.553309	0.5846
D(FPI)	0.000153	6.82E-05	2.239689	0.0335
D(FPI(-1))	-2.50E-05	5.71E-05	-0.437903	0.6649
D(FPI(-2))	-1.56E-07	4.31E-05	-0.003612	0.9971
D(ICU)	-0.061835	0.119395	-0.517906	0.6087
D(ICU(-1))	0.035891	0.140528	0.255400	0.8003
D(ICU(-2))	-0.179338	0.130770	-1.371394	0.1815
ECM(-1)	-0.804506	0.094622	-3.893095	0.3797
R^2 = 0.716568	Adj. R^2 =0.590598	DW=7.849520		

Source: Author Computation (EVIEW 9.0)

The result from table 4 discloses that the Adjusted R^2 is 0.590598 which indicate that about 59 per cent of the systematic variation in the industrial sector output is explained by the independent variables in the model. The remaining 41 per cent is attributed to variables

not included in the model but are captured by the error term. The result also shows that DW statistic value is (7.849520) and depicts absence of first –order serial autocorrelation in the model. The error correction coefficient ECM (-1) value is -0.804506 or 80 per cent and correctly signed (negative sign) and very significant. This implies that industrial sector output in Nigeria adjust speedily to the changes in the explanatory variables. Therefore, the ECM is able to correct and tie any deviations from the long –run relationship between industrial sector output performance and the explanatory variables (Nwanne and Eze, 2015; Nwosa, 2018; Oladipo, Onabote, Adekanye, Ogunjobi, and Folarin, 2023).

Table 5. Short Run Multiple Regression Result at OLS

Variables	Coefficient	Std Error	t-Statistic	Prob.
C	79.16303	8.787411	9.008686	0.0000
EXC	-0.133662	0.074337	-1.798063	0.0801
FDI	5.801477	1.827685	3.174221	0.0030
FPI	0.000179	0.000111	1.613333	0.1149
ICU	-0.018039	0.128083	-0.140835	0.8887
R^2 = 0.217102			**F*=** 2.634407	

Source: Computed Result (E-View 9.0)

Arising from Table 5 above, a unit increase in exchange rate by -0.133662 units causes industrial sector output to decrease by -0.133662 units and is insignificant at 5 per cent level given that the calculated (t*) value of -1.798063 is lesser than the t–critical value of 2.04. EXR is in line with a-priori expectation and conformed to economic theory. As exchange rate (EXR) depreciates (falls), industrial sector output performs well as more component inputs needed can be imported into the country. The result equally showed that EXR is rightly signed. Again, from Table 5 above, a unit increase in foreign direct investment by 5.801477 units causes industrial sector output to increase by 5.801477 units and is significant at 5 per cent level given that the calculated (t*) value of 3.174221 is greater than the t–critical value of 2.04. Foreign direct investment is in line with a-priori expectation and conformed to economic theory. As foreign direct investment appreciates, industrial sector output performs well as more foreign finances are flown into the country. The result equally showed that foreign direct investment is rightly signed. Table 5 shows a unit increase in foreign portfolio investment by 0.000179 units thereby cussing industrial sector output to increase by 0.000179 units. It is insignificant at 5 per cent level given that the calculated (t*) value of 1.613333 being less than the t–critical value of 2.04.

Foreign portfolio investment is in line with a-priori expectation and conformed to economic theory. As foreign portfolio investment appreciates, industrial sector output performs well as more foreign finances are flown into the economy. The result equally showed that foreign portfolio investment is rightly signed but may not have any impact on the economy due to misuse by the authority. As industrial capacity utilisation increases by -0.018039 units, industrial sector output decrease by -0.018039 units. It is insignificant at 5 per cent level given that the calculated (t*) value of --0.140835 being less than the t–critical value of 2.04. Industrial capacity utilisation is not in line with a-priori expectations and did not conform to economic theory. As foreign portfolio investment depreciates, industrial sector output performs poorly. The result equally disclosed that foreign portfolio investment is not rightly signed and may not have any impact on the economy.

The R^2 of 0.217102 or 21 per cent indicates that the external sector variables and exchange rate has a good effect on industrial sector output in Nigeria. It shows that about 21 per cent of the variation in industrial sector output is explained by exchange rates, foreign direct investment, foreign portfolio investment and industrial sector capacity utilization while the remaining 79 per cent is captured by the error term. (Oduor, Ngala, Ruto and Umulkher, 2021; Okoye, Okonkwo, Okeke, and Agbo, 2021; Onabote, Abuh, Emmanuel, Eseyin and Okafor, 2021).

Parameter Stability Test

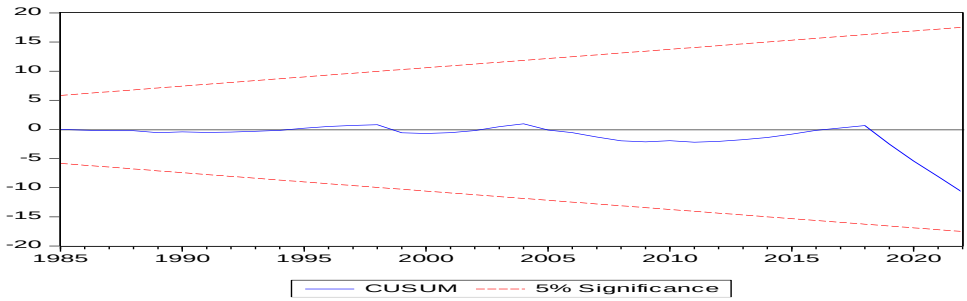

Fig. 1. Note that there is the existence of structural stability

4. Conclusion

The study empirically confirmed the outcome of external sector variables, exchange rate fluctuation and the manufacturing sector in Nigeria. It is pragmatic that the Nigeria's economy is highly dependent on the external sectors for the economy to do well. Import of input has made the effect of exchange devaluation worsens especially in manufacturing sectors because capacity to import was constrained by the depreciating currency lending to a corresponding decline in output. Against the background, exchange rate is a crucial variable and the manufacturing sector is expected to be the moving force in the drive towards industrialization. It is perceived that the fact Nigeria is highly dependent on the external sector for import of input which has made the effect of exchange devaluation worse especially in manufacturing sector because capacity to import was constrained by the depreciating currency lending to a corresponding decline in output. It is pertinent to note that the devaluation of exchange rate in relationship with factors such as technological and human skills are necessary for a country to be established in the export market which are lacking in the case of Nigeria.

5. Recommendations

a) Manufacturing sector undertakings should be reinvigorated by government in a of giving inducements and subsides to indigenous manufacturers and improving the technological and infrastructural development so as to upsurge the sector's contribution to gross domestic product and employment within the country.
b) Transformation in exchange rate management strategy should be allowed to run a reasonable course of time. Abandoning approaches or policies at will and on recurrent basis has consequences for exchange rate and apparent significance for a sector that hinge on external inputs.
c) The monetary authority such as Central Bank of Nigeria should monitor the unscrupulous practice of some commerce bank which has resulted in much instability in the rate of exchange. Extra stringent punitive have to be taken against the defaulting banks.
d) These results made it evident that the stabilization of exchange rates will go a long way in maintaining a reasonably high level of Manufacturing Output in Nigeria. Monetary authorities therefore, need to continuously scrutinize the exchange rate in order to create informed policies, and match the exchange rate to the actual needs of manufacturing sectors to increase its output.
e) Further studies can examine the effect of anticipated and unanticipated exchange rate shocks on manufacturing output. Invariably, this will help the monetary

authorities to make adequate policies to cushion the economic effect of exchange rate fluctuations.

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