

Exchange Rate Fluctuations and Economic Performance of Manufacturing Sector: Evidence from Nigeria

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Abstract

Persistent fall in the value of Nigeria currency compared to other foreign currencies, constant fluctuations in the exchange rate and increase in the price of goods and services necessitated the examination of the effects of exchange rate fluctuations on the economic performance of manufacturing sector in Nigeria. Ex-post facto research design was adopted. Manufacturing gross domestic product (MGDP) was proxied for performance; Naira/Dollar exchange rate (NDE), Naira/Pounds exchange rate (NPE), Foreign exchange supply (FES) were used for exchange rate fluctuations; and Inflation rate (INF) was a control variable. Data were collected from CBN Statistical Bulletin (2020) also World Development Indicators of the World Bank, while data collected were analysed using Descriptive analysis, unit root, bounds cointegration test, ARDL. Findings showed that changes in Naira/Dollar exchange rate (NDE) and Naira/Pound Sterling exchange rate negatively but significantly impact on the economic performance of the manufacturing sector, while foreign exchange supply leads to a positive insignificant effect on the economic performance of the manufacturing. The study concludes that exchange rate fluctuations impact negatively on the performance of manufacturing sector in Nigeria. While recommending diversification into agriculture, agro-investment and agro-allied industries, that would boost export, in order to improve the value of Naira, thereby, stabilizing the exchange rate.

Keywords: Exchange rate, Economic performance, Gross domestic product, Inflation rate, Foreign exchange supply

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1. Introduction

Exchange rate fluctuations in developing countries has raised much contention among economist and other policy makers. Nigeria, as a growing economy recognized the commercial sector as the heartbeat of contemporary economic development (Elijah, Anakwue & Musa, 2022). However, one of the major challenges of Nigeria economy is the exchange rate fluctuation and high level of volatility (Osabuohien, Obiekwe, Urhie & Osabohien, 2018; Kelikume & Nwani, 2019; Iheanachor & Ozegbe, 2021). The introduction of Structural Adjustment Program (SAP) which was part of Economic Recovery Program (ERP) brought the existence of financial sector reforms in 1986. This development in financial sector saw the end of the fixed exchange regime and welcomed the free-floating regime towards the end of 1980. The essence of this transition was to control the period of boom and direct the economy towards a better growth. The SAP judiciously incorporated exchange reforms and trade policies to accelerate the fight of the non-oil sector (Omoriegbe, 2020). Before the implementation of SAP, exchange rate was quite stable, but unfortunately, the SAP policy lead to rising exchange movements, whose values ranges from 0.71 naira/dollar to 0.89 naira/dollar. meanwhile, the exchange rate has ceaselessly moved from 1.75 naira/dollar in 1986 to 101.7 naira/ dollar in 2000, then to 253.49 naira/dollar in 2016 and currently 414.75 naira/dollar in 2022 (Central Bank of Nigeria, 2022). Economic theory suggests that, increasing exchange values signifies that the country's currency is losing value; hence, making the nation's exports rather cheap, while its imports becomes too expensive (Karahana, 2020).

The role of the manufacturing sector in the modern-day economy is rather catalytic, having several dynamic advantages which are pertinent for economic transformation. In a developed country, the manufacturing sector

could be seen as a leading sector due to its ability to increase productivity, reduce importation and improve the nation's export, raising interchange earning capability, increasing employment, boosting expansion of investment at a quicker rate, as well as encouraging better economical linkage among completely different sectors (Fakiyesi, 2005; Idris, Ashemi& Musa 2019). However, regardless of the record of fast-growing sector recorded by manufacturing sphere since 1973/74, Nigerian economy has remained under-industrialized with its capacity utilization very low. The world has become progressively hooked in to the external trade for import of non-labour input (Okigbo, as in Opaluwa, Umeh&Ameh, 2010). However, rising import prices, a direct consequence of deregulation, have had a negative impact on the country's ability to import (Opaluwa, et al., 2010). This had a major impact on the manufacturing sector because, almost all the machineries, tools, spare parts as well as the equipment used in this sector are being imported, unlike raw materials, which can be sourced locally (Vo & Zhang, 2019). This accounts for the prevailing technological backwardness and lack of engineering industries in the country today (Simon, Oke&Aibiala, 2010).

Ewubare and Ushie (2022) noted that exchange rate has direct impact on macroeconomic variables therefore plays a vital role of growth in nations building. However, reliance on importation for capital goods and finished goods, unexampled reduction in utilization rate in trade in addition to diverted attention from agricultural sector are responsible for low incomes and debased living standards of Nigerians (Musa, Muhammad, Mohammed & Adamu, 2019). The implications and consequences of fluctuation in exchange rate, on the macroeconomics of developing nations like Nigeria has been a great concern (Iheanachor&Ozegbe 2021). Example, when the rate of exchange is overvalued, it might crash balance of payment, lead to capital flight and intensify external debt stock that successively can cause declining level of investment. On the contrary, true depreciation is expected to increase the value of foreign capital product, because an outsized bulk of investment in goods among developing countries is imported, investment in domestic goods is expected to fall with a real depreciation (Iyoha, 2008). The link between a nation's economic growth and exchange rate through trade could be an important issue viewing from policy and descriptive perspective as stated by Edward (2014) that "it is not an overstatement to say that the problem of real exchange rate behaviour now occupies a central role in policy evaluation and design". A nation's exchange rate behaviour explains the expansion rate of its cross-border commerce, as well as its competitiveness on the foreign corridors (Bah & Amusa, 2003).

Due to the persistent fall in the Nigerian currency compared to foreign currencies which brought about excessive increase in prices of goods and services, several researchers have carried out studies to proffer solution to the challenges posed by this phenomenon, but unfortunately the outcome of these study come with conflicting, inconsistent and unreliability conclusions, even when powerful tools and techniques have been adopted. However, while some researchers found fluctuation in exchange rate to negatively and significantly affect economic performance of manufacturing sector in the long-run (Ayodele, 2014; Ufoeze, Okuma, Nwakoby&Alayekwu, 2018; Falaye, et al., 2019; Onwuka, Onyebuchi, Ezenekwe&Ukeje, 2020; Iheanachor&Ozegbe, 2021 Elijah, et al., 2022; Ewubare&Ushie, 2022), others found that foreign exchange supply influenced the performance of manufacturing sector positively (Ufoeze, et al., 2018). The inconsistent findings and the constant fall in the value of Nigerian currency suggest that more serious work is still needed to resolve the challenges. It is based on the identified backdrop that this study intends to assess the effects of exchange rate fluctuations on economic performance of the manufacturing sector in Nigeria.

1.1. Research Objectives

Specifically, the study intends to achieve the following objectives:

- i. To examine the effects of Naira/Dollar fluctuations of exchange rate on manufacturing sectors' GDP in Nigeria.
- ii. To assess the effects of Naira/Pound Sterling fluctuations in exchange rate on manufacturing sectors' GDP in Nigeria.
- iii. To evaluate the effects of foreign exchange supply on the manufacturing sector' GDP in Nigeria

1.2. Research Hypotheses

Flowing from the objectives, null hypotheses were formulated thus:

- H₀₁:** Naira/Dollar exchange rate fluctuations have no significant effect on the GDP of manufacturing sector in Nigeria.
- H₀₂:** There is no significant effects of Naira/Pound Sterling exchange rate fluctuations on the GDP of manufacturing sector in Nigeria.
- H₀₃:** Foreign exchange supply does not significantly affect the GDP of manufacturing sector in Nigeria.

2. Literature Review

2.1. Conceptual Review

Exchange rate is described as transaction rate between a country's currency and its counterpart foreign one. It

plays a vital role, and so must be reasonably stable to affect the manufacturing sector positively and the totality of the macroeconomic variables. Exchange rate has been described as a transaction link between foreign market and its local counterparts (Egolum, Iliemena& Goodluck, 2020). Exchange rate fluctuations are described as natural outcomes of floating exchange rate mainly responding to a country's economic performance, interest rate differentials, rate of inflation and capital flows (Segal, 2021). Exchange rate fluctuations are changes in the nation's currency value when compared with other currencies. Exchange rate fluctuation is a sustained movement long a nation's currency value either upward or downward that could cause depreciation or loss on the domestic currency value (Ufoeze, et al., 2018). However, fluctuation in exchange rate is described as constant gyration of the currency of country's in the international market (Alagidede& Ibrahim, 2017). However, Interest rate, political upheaval, foreign investment, inflation rate and economic uncertainty are the major reasons or causes of exchange rate fluctuations. Lawal (2016) opines that fluctuation of exchange rate leaves the manufacturing companies with high cost of production which reduces the bottom line of the manufacturing firms. The scourge of exchange rate fluctuation in Nigeria is more on the manufacturing sector than other sectors because most of the ingredients and capital stock of manufacturing firms comes from abroad (Onyejiuwa, 2019). Due to Nigeria over-dependence on foreign exchange and foreign currencies, exchange rate fluctuation has been a nightmare for Nigerian economy in general and the manufacturing sector by extension. Exchange rate fluctuation is a major determinant of other macroeconomic variables for manufacturing firms and must not be taken for granted (Odili, 2014; Buabeng, Ayasu&Adabor, 2022). The movement of exchange rate up and down have exposed many developing countries, causing poor productivities and have affected the manufacturing sector adversely. When there is depreciation in exchange rate it leads to high cost of importation; thereby increasing the overhead cost of the manufacturing firms whose raw materials are imported from abroad (Ayobami, 2019). Nigeria as one of the countries that depends heavily on the importation of almost all the raw materials and this has faced serious setback as a result of the exchange rate fluctuations (Onwuka, et al., 2020). This assertion is responsible for the collapse of many indigenous manufacturing firms and the uncertainty that have beclouded the manufacturing sector (Abdul-Mumuni, 2019).

Several steps have been taken by Nigerian government in conjunction with the central bank of Nigeria (CBN) with an aim to reduce volatility of exchange rate of Naira relative to her foreign currency counterparts but not much have been achieved as naira crashes before dollar and other foreign currencies (Onwuka, et al., 2020). Nwokoro (2017) stated that Naira crashes in the face of dollars due to the activities of buying and selling of dollar. Exchange rate occupies a vital position in the economic activities of every nation, such that its upward and downward movements affects directly all the macroeconomic variables, which determines the performance of the manufacturing sector, determines the cost of finished goods, affects the profits of the firms and determines their investment. This places exchange rate in a crucial place and so fluctuation is an enemy which need to be eliminated as it frustrates the manufacturing sector (Ewubare, &Ushie, 2022). The above assertion corroborates the purchasing power parity that suggests that transaction rate between two currencies is determined by the purchasing power of their inconvertible currencies. Ufoeze, et al. (2018) opine that exchange rate fluctuations reduces both the operational and financial performance of manufacturing sector in Nigeria.

2.2. Theoretical Framework

The study is anchored on Purchasing Power Parity Theory. It explains equilibrium rate of exchange between two countries is bent on the purchasing power of their inconvertible currencies. The theory emphasizes that the domestic price levels of the two countries is a determining factor of their exchange rate. Purchasing power theory is based on two aspects described as Absolute and Relative version. While the absolute version of the theory states that the rate of exchange should be commensurate with the ratio of outlay needed to purchase a particular good in the domestic country when compared with its foreign counterpart (Ewubare&Ushie, 2022). Meanwhile, the relative version maintains that the equilibrium rate of the current period, is explained by the equilibrium exchange rate in the base year as well as the current and base period price indices of its foreign counterpart. This theory is a strong foundational theory of exchange rate determination, as it confirms the existence of a proportional relationship between two nation's exchange rates as well as the inflation rates of the Nations. The theory bases on the premise of one price, that states that, aside trade barriers and transportation costs, the price of any product should be equal across nations under spatial commodity arbitrage.

2.3. Empirical Review

Oseni (2016) assessed exchange rate volatility and private sector consumption in Sub-Sahara Africa. Generalizes methods of moments (GMM) econometric tools were adopted and the finding suggested that manufacturing sector and exchange rate exhibits adverse relation. Alagidede and Ibrahim (2017) reviewed volatility of exchange rate with Ghana economic growth. Secondary data was drawn covering the period between 1980 to 2013. Vector Error Correction model was adopted and the study documented excess volatility as negatively affecting the nations' economic growth. Also, Ufoeze, et al, (2018) reviewed Foreign Exchange rate fluctuations

in Nigeria Economy, the study compared the fixed and floating exchange era with the aim to establish when the country had a better economy. Secondary data covering the periods between 1970 to 2012 were gathered, while OLS regression techniques was used for analysis. The findings showed that while exchange rate had positive effect on GDP in the period of fixed exchange rate, floating regime was characterized with negative effect. Also, money supply was found to be negatively related with GDP during the fixed period but positively related with the floating period.

Amoah and Ahiabor (2019) study the nexus between exchange rate, productivity growth and volatility. The study established a non-linear relationship among output volatility and exchange rate volatility among emerging economies. Idris, et al. (2019) studied exchange rate effect on GDP. The period from 1981 to 2017 was reviewed. The study found exchange rate variations not having significant effect on GDP. Within the same year, Musa, et al. (2019) carried out a study to review, connection between rate of foreign exchange and economic growth of Nigeria. secondary data gathered from reliable sources and ARDL was adopted as estimation technique. The study showed that at long run, exchange rate fluctuation has inverse relationship with economic. Ribeiro, McCombie and Lima (2020) examined the connection between the economic growth of 54 developing countries and the exchange rate between 2002 to 2018. The study documented exchange rate as being negatively connected with economic growth of the countries.

Alasha (2020) carried out a search on exchange fluctuation and its impact on the economy of Nigeria. Data was gathered from the CBN statistical bulletin while OLS was adopted to regress the variables. The study showed inflation and exchange rate to have negative but significant relationship with economic growth. Onwuka, et al. (2020) studied exchange rate volatility on manufacturing sector in Nigeria. Vector autoregressive (VAR) model was adopted to analyze the data. The empirical results revealed that aggregate manufacturing output is negatively related with exchange rate volatility. In the same year, Iheanachor&Ozegbe (2021), reviewed the impact of fluctuations in exchange rate on economy of Nigeria. Secondary data was collected from the reliable sources on inflation rate, exchange rate, net direct foreign investment and GDP. ARDL was adopted to regress the variables and found that all the explanatory variables were negatively but significantly related with Nigeria economic growth. In a recent work by Elijah, et al. (2022) foreign exchange fluctuations effect on the economy of Nigeria was examined. the study which covered the period between 1981 to 2020 used growth rate (GR), inflation rate (INFR), as well as capital formation and the variables. Using ARDL, the study found that exchange rate and inflation rate both have negative but statistically significant effect on the economy in the short run. While gross capital formation showed positive significant effect on the economy, the long run exchange rate and gross capital formation both suggested negative relation with the economy. Also, Ewubare, and Ushie (2022) studied exchange rate fluctuations and economic growth in Nigeria. the study covered 1981 to 2020. Secondary data were gathered from CBN statistical bulletin on change rate, inflation rate, interest rate and GDP. ARDL techniques was adopted and the study found that exchange rate and inflation negatively impacted economic growth, but interest rate showed positive and significant effect on GDP.

3. Research Methods

Ex post facto research design was employed in the research to establish a quantitative relationship (cause-effect relationship) between the variables being studied using the existing statistical data. Secondary data covering the periods between 1996 to 2020 where collected via CBN Statistical Bulletin (2020) and other reliable sources on Naira/Dollar exchange rate, Naira/Pound Sterling exchange rate, foreign exchange supply, inflation rate and GDP. While Manufacturing Sector Economic performance was the dependent variable proxy by contribution of manufacturing sector to GDP, exchange rate fluctuations was the independent variable proxy by Naira/Dollar exchange rate, Naira/Pound Sterling exchange rate, foreign exchange supply; inflation rate is the control variable. Pre-estimation test, estimation test (Autoregressive Distribution Lag (ARDL) and post estimation test (serial correlation test, heteroscedascity test, normality test and structural stability CUSUM test) were carried out.

3.1. Variables Measurement and Definition

The research examines fluctuations of exchange rate and economic performance of manufacturing sector, thus, dependent or response variable is the economic performance of the manufacturing sector while exchange rate fluctuation measures are the explanatory or independent variables. The exchange rate fluctuation measures include Naira/Dollar exchange rate, Naira/Pound Sterling exchange rate as well as foreign exchange supply. Meanwhile, to avoid any possible occurrence of the problem of omission, variable errors, inflation rate is employed as a control variable.

Table 1: Variable Description Summary

Dependent Variable:	Proxy/Measure	Definition	Source
Manufacturing sector economic performance	Contribution of manufacturing sector to real GDP	Measure the aggregate market value of goods produced the firms in the manufacturing sector	CBN Statistical Bulletin (2020)
Independent Variable:	Proxy/Measure	Definition	
Exchange rate fluctuations	(a) Naira/Dollar exchange rate	Measures the units of Naira required to buy or sell a unit of US Dollar	CBN Statistical Bulletin (2020)
	(b) Naira/Pound Sterling exchange rate	Measures a unit of Naira required to buy or sell a unit of Pound Sterling.	CBN Statistical Bulletin (2020)
	(c) Foreign exchange supply	The amount of foreign exchange such as US Dollar sold by the apex bank to the foreign exchange dealers.	CBN Statistical Bulletin (2020)
Control Variable	Proxy/Measure	Definition	
Inflation Rate	Consumer price index	Measure the percentage change in general level of price.	WDI (2020)

Source: Researcher's compilation (2022)

3.2. Model Specification

In consonance with the targets of this study, economic performance of the manufacturing sector (using contribution of manufacturing sector to real GDP as a measure) was adopted as the response or dependent variable. Meanwhile, independent variables are Naira/Dollar exchange rate, Naira/Pound Sterling exchange rate, foreign exchange supply and inflation for the model. however, the functional form of the model is stated as:

$$MGDP_t = f(NDE_t, NPE_t, FES_t, INF_t) \dots \quad (1)$$

Where $MGDP$ = Contribution of manufacturing sector to real GDP

NDE = Naira/Dollar exchange rate

NPE = Naira/Pound Sterling exchange rate

FES = Foreign exchange supply

INF = Inflation rate

whereas, the specific ARDL model is expressed as follows:

$$MGDP_t = \theta + \sum_{i=1}^p \alpha_i MGDP_{t-i} + \sum_{i=1}^{q_1} \beta_{1i} NDE_{t-i} + \sum_{i=1}^{q_2} \beta_{2i} NPE_{t-i} + \sum_{i=1}^{q_3} \beta_{3i} FES_{t-i} + \sum_{i=1}^{q_4} \beta_{4i} INF_{t-i} + \epsilon_t \dots \quad (2)$$

where p , q_1 , q_2 , q_3 and q_4 , are the maximum lags of the dependent variable ($MGDP$) while explanatory variables (NDE , NPE , FES , INF) the α_i , β_{1i} , β_{2i} , β_{3i} , and β_{4i} are the coefficients connecting the dependent variable ($MGDP$) with the explanatory variables at their different lags.

ARDL Error Correction Model (ECM) is given as:

$$\Delta MGDP_t = \theta + \sum_{i=1}^p \alpha_i \Delta MGDP_{t-i} + \sum_{i=1}^{q_1} \beta_{1i} \Delta NDE_{t-i} + \sum_{i=1}^{q_2} \beta_{2i} \Delta NPE_{t-i} + \sum_{i=1}^{q_3} \beta_{3i} \Delta FES_{t-i} + \sum_{i=1}^{q_4} \beta_{4i} \Delta INF_{t-i} + \phi ECM_{t-1} + \epsilon_t \dots \quad (3)$$

Equation (3.3), shows the coefficient (ϕ) of the ECM term also known as adjustment speed which is assumed to be negative so as to correct the model back to equilibrium, *i.e.* $\phi < 0$.

Also, in equation (3.4), the long run form of the ARDL is thus:

$$MGDP_t = \psi_0 + \psi_1 NDE_t + \psi_2 NPE_t + \psi_3 FES_t + \psi_4 INF_t \dots \quad (4)$$

The *a priori* expectation: $\psi_1 < 0$, $\psi_2 < 0$, $\psi_3 > 0$, $\psi_4 > 0$

4. Results and Discussion

4.1. Descriptive Statistics

This sub-section provides the descriptive statistics of the variables being examined, such as contribution of

manufacturing sector to real GDP (*MGDP*, a measure for performance of manufacturing sector), Naira/Dollar exchange rate (*NDE*), Naira/Pound Sterling exchange rate (*NPE*), foreign exchange supply (*FES*) and inflation rate (*INF*). *MGDP* is measured in billions of Naira while *FES* is measured in millions of Dollars.

Table 2: Descriptive Statistics Result
Sample Period: 1996 – 2020

Statistics	Variable				
	<i>MGDP</i>	<i>NDE</i>	<i>NPE</i>	<i>FES</i>	<i>INF</i>
Mean	4320.547	162.895	249.545	1252.498	12.456
Median	3491.294	133.000	238.772	1791.135	12.090
Maximum	6684.218	358.310	503.289	1791.135	29.270
Minimum	2908.214	81.253	126.417	153.920	5.390
Std. Dev.	1487.983	78.9259	95.0493	617.9966	5.0262
Skewness	0.6169	1.2377	0.9795	-0.4575	1.4282
Kurtosis	1.5659	3.3131	3.4838	1.5652	6.0498
Jarque-Bera	3.7283	6.4847	4.2412	3.0166	18.1877
p-value	0.1550	0.0391	0.1200	0.2213	0.0001
Obs.	25	25	25	25	25

Source: Authors' computation (2022)

Table 2 shows the summarized statistics of the variables being studied. Over the given sample period. All the variables appear to their standard deviations less than their respective averages. The suggests that there are moderate or less dispersions in the observations of the variables over the yearly sampled period.

Except *FES*, all other the variables appear to be positively skewed (long right tail) having positive coefficients of skewness while *FES* exhibits a negatively skewed distribution having a negative coefficient of skewness. Meanwhile, *MGDP* and *FES* appear to have flat-topped distributions (platykurtic) relative to the normal distribution, having their coefficients of kurtosis less than the threshold of 3. However, *NDE*, *NPE* and *INF* appear to be highly peaked in distribution having their coefficients of kurtosis above the threshold of 3.

In summary, the Jarque-Bera statistics for normality test indicate that *MGDP*, *NPE* and *FES* appear to be normally distributed since their respective *p*-values are greater than the 5% level of significance. However, *NDE* as well as *INF* are not distributed having significant Jarque-Bera statistics, that is, their respective *p*-values are less than the 5% level of significance

4.2. Pre-Estimation Tests

This section provides the pre-tests results such as unit root and cointegration tests to examine the statistical properties (stationarity and linear combination) of the variables being examined.

4.2.1. Unit Root Tests

To estimate the model, unit root tests has to be done first to determine the stationarity status of the variables under study. Therefore, Augmented Dickey-Fuller (ADF) test was adopted for this purpose.

Table 3 presents the outcome of the ADF unit root test. Thus, series such as *FES* and *INF* appear to be integrated of order zero, this implies that, they are *I(0)* series. This also implies that they are stationary in their level forms. Meanwhile, *MGDP*, *NDE* and *NPE* are integrated of order one, meaning, they are *I(1)* processes. This suggests that the series had to be differenced once in order to become stationary. Meanwhile, combining *I(0)* and *I(1)* orders of integration, the variables validates bounds co-integration test as valid in determining the presence of linear combination among the variables.

Table 3: Unit Root Test Results
Sample Period: 1996 – 2020

Variable	Test form	ADF- Statistics			<i>I(d)</i>
		Constant & Trend			
		Constant	Trend	None	
<i>MGDP</i>	<i>Level</i>	-0.1683	-2.1385	2.0261	<i>I(1)</i>
	<i>1st Difference</i>	-3.3111**	-3.2309	-3.0294***	
<i>NDE</i>	<i>Level</i>	0.7477	-0.9783	0.9996	<i>I(1)</i>
	<i>1st Difference</i>	-3.3043**	-3.3556*	-2.3677**	
<i>NPE</i>	<i>Level</i>	0.2310	-1.2432	3.4478	<i>I(1)</i>
	<i>1st Difference</i>	-3.7356**	-3.6673**	-2.5423**	
<i>FES</i>	<i>Level</i>	-4.8015***	-2.6032	2.4173	<i>I(0)</i>
	<i>1st Difference</i>	-	-	-	
<i>INF</i>	<i>Level</i>	-4.7128***	-4.7048***	-0.7951	<i>I(0)</i>
	<i>1st Difference</i>	-	-	-	

Source: Researcher's computation (2022)

Note: ***, ** and * denote statistical significance at 1%, 5% and 10% respectively

4.2.2. Bounds Cointegration Test

Since the variables under consideration have different orders of integration, it is therefore paramount to test for possible linear combination or steady state equilibrium among the variables. However, having different orders of integration suggests that bounds co-integration test be employed to check for the presence of steady state or long-run equilibrium among the variables.

Table 4: Bounds Co-Integration Test Result
Sample Period: 1996 – 2020

F – Statistic:	4.9720	
Level of significance	Lower bounds – <i>I(0)</i>	Upper bounds – <i>I(1)</i>
1%	3.29	4.37
5%	2.56	3.49
10%	2.2	3.09

Source: Authors' computation (2022)

The table 4 indicates the outcome of the bounds co-integration test of the ARDL approach. Therefore, because F-statistic (4.9720) exceeds the critical values of the upper bounds at 1%, 5% and 10% levels of significance. This indicates that there is long run relationship or linear combination among the variables. In other words, contribution of manufacturing sector to real GDP (*MGDP*), Naira/Dollar exchange rate (*NDE*), Naira/Pound Sterling exchange rate (*NPE*), foreign exchange supply (*FES*) and inflation rate (*INF*) appear to confirm long-run relationship despite having different orders of integration among variables. Thus, there is no presence of spurious relationship among the variables.

4.3. Model Estimation

Since the variables are co-integrated, the model estimation result provides both long-run and short-run estimates. Moreover, the natural logs of the variables were used in estimation. Thus, the estimates provided are elasticity coefficients.

Table 5 shows the outcome of the short run form of the ARDL. The coefficient (-0.9944) of the *ECT* term called the adjustment speed is negative but statistically significant (*p*-value = 0.0006) at 1% level of significance. As expected, the coefficient lies between -1 and 0 indicating a convergence situation. Thus, this implies that *MGDP* adjusts to *NDE*, *NDE*, *FES* and *INF* in the long run. Meaning that, system is able to correct its disequilibrium in the previous period at a speed of 99.44%, thus, restoring to equilibrium in the present period. Therefore, equilibrium or long-run relationship has been restored among the variables being examined. Besides, all the short-run coefficients have statistically significant impact on the economic performance of manufacturing sector (*MGDP*). The explanatory power of the model judging by the adjusted R-squared is substantially high (89.27%) and thus, implies that *NDE*, *NDE*, *FES* and *INF* are good predictors of the economic performance of the manufacturing sector (*MGDP*) in Nigeria in the short-run for the considered sample period.

4.3.1 ARDL Short-run Estimation Result

Table 5: Estimated ARDL Short Run Coefficients
Sample Period: 1996 – 2020
Dependent Variable: *MGDP*

Independent Variable	Coefficient	Std. Error	t-Statistic	p-value
$\Delta MGDP_{t-1}$	-2.5723***	0.4301	-5.9803	0.0019
$\Delta MGDP_{t-2}$	-1.7713***	0.2634	-6.7248	0.0011
ΔNDE_t	-1.5384***	0.1874	-8.2089	0.0004
ΔNDE_{t-1}	-2.2931***	0.3541	-6.4758	0.0013
ΔNDE_{t-2}	-1.9001***	0.3137	-6.0576	0.0018
ΔNPE_t	0.2456*	0.1062	2.3123	0.0687
ΔNPE_{t-1}	2.1716***	0.3201	6.7848	0.0011
ΔNPE_{t-2}	1.2830***	0.2214	5.7937	0.0022
ΔINF_t	-0.1685***	0.0236	-7.1412	0.0008
ΔINF_{t-1}	0.1663***	0.0216	7.7089	0.0006
ΔINF_{t-2}	0.0948**	0.0310	3.0578	0.0282
ECT_{t-1}	0.9944***	0.1287	7.7243	0.0006
R-squared	0.9489			
Adjusted R-squared	0.8927			

Source: Researcher's computation (2022)

Note: ***, ** and * indicates significance statistically at 1%, 5%, 10% respectively.

4.3.2 ARDL long run Estimation Result

Table 6: Estimated ARDL long run coefficients
Sample Period: 1996 – 2020
Dependent Variable: *MGDP*

Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>NDE</i>	-1.3857**	0.4701	-2.9478	0.0320
<i>NPE</i>	-3.4972***	0.7491	-4.6685	0.0055
<i>FES</i>	0.9028***	0.1992	4.5328	0.0062
<i>INF</i>	0.0499	0.1531	0.3260	0.7576
<i>C</i>	2.1044**	0.6455	3.2601	0.0224

Source: Researcher's computation (2022)

Note: ** & *** denotes statistical significance at 5% and 10%.

Table 6 shows the outcomes of the estimated long run equation of the ARDL for the given sample period. Thus, the tests of significance of the individual coefficients are as follows:

4.3.2.1 Test of Hypothesis 1

H₀: Naira/Dollar exchange rate fluctuations do not have significant effect on the economic performance of the manufacturing sector in Nigeria.

As revealed in table 6, Naira/Dollar exchange rate fluctuations (*NDE*) result in a negative effect on economic performance of the manufacturing sector (*MGDP*) with a partial regression coefficient of -1.3857. This signifies that a 1% increase in *NDE* (units of Naira required to purchase a unit of US Dollar) will on average, lead to a fall in *MGDP* by about 1.39% in the long-run while holding other variables constant. Statistically, the changes in Naira/Dollar exchange rate (*NDE*) exert negative and significant effect (p-values = 0.0320 < 0.05) on the economic performance of the manufacturing firms in the long-run. Thus, the null hypothesis that "Naira/Dollar exchange rate fluctuations do not have significant impact on the economic performance of the manufacturing sector in Nigeria" can be rejected. Besides, *MGDP* is *NPE* elastic having an elasticity coefficient (1.386) being greater than 1 percent. In other words, the relative change in *MGDP* is greater than that of *NDE*. Nevertheless, economic performance of the manufacturing sector responds negatively and significantly to Naira/Dollar exchange rate fluctuations (that is, changes in Naira value against US Dollar) for the considered sample period. More appropriately, an increase Naira value against US Dollar (that is, lesser units of Naira to purchase a unit of US Dollar) has the tendency to enhance economic performance of the manufacturing sector in Nigeria or vice versa.

4.3.2.2 Test of Hypothesis 2

H₀: Naira/Pound Sterling exchange rate fluctuations do not have significant effect on the economic performance of the manufacturing firms in Nigeria.

Table 6 showed that Naira/Pound Sterling exchange rate fluctuations (*NPE*) result in a negative impact on economic performance of the manufacturing firms (*MGDP*) with a partial regression coefficient of -3.497. meaning that a 1% increase in *NPE* (units of Naira required to purchase a unit of Pound Sterling) will on average, lead to a fall in *MGDP* by about 3.497% in the long-run while other variables remain constant. Statistically, the changes in Naira/Pound Sterling exchange rate (*NPE*) exert negative and significant effect ($p\text{-values} = 0.0055 < 0.01$) on the economic performance of the manufacturing sector in the long-run. Thus, the null hypothesis that “Naira/Pound Sterling exchange rate fluctuations do not have significant impact on the economic performance of the manufacturing sector in Nigeria” can be rejected. Furthermore, *MGDP* is *NPE* elastic having an elasticity coefficient (3.497) being greater than 1 percent. In other words, the percentage change in *MGDP* is greater than that of *NPE*. Nevertheless, economic performance of the manufacturing sector responds negatively and significantly to Naira/Pound Sterling exchange rate fluctuations (meaning that, changes in Naira value against Pound Sterling) for the considered sample period. More suitably, a rise in the value of Naira against Pound Sterling (that is, lesser units of Naira to purchase a unit of Pound Sterling) has the tendency to enhance economic performance of the manufacturing sector in Nigeria or vice versa.

4.3.2.3 Test of Hypothesis 3

H₀: Foreign exchange supply does not have significant effect on the economic performance of the manufacturing firms in Nigeria.

As revealed in table 6, changes in Foreign exchange supply (*FES*) lead to a positive impact on economic performance of the manufacturing firms (*MGDP*) with a partial regression coefficient of 0.9028. This implies that a 1% rise in *FES* will, on average, lead to a rise in *MGDP* by about 0.902% in the long-run while other variables remain constant. Statistically, the changes in *FES* exert positive significant impact ($p\text{-values} = 0.0062 < 0.01$) on the economic performance of the manufacturing sector in the long-run. Thus, the null hypothesis that “foreign exchange supply does not have significant effect on the economic performance of the manufacturing firms in Nigeria” can be rejected. Besides, *MGDP* is *FES* inelastic having an elasticity coefficient (0.9028) being less than 1%. In other words, the relative change in *MGDP* is less than that of *FES*. Nevertheless, foreign exchange supply does not have significant effect on the economic performance of the manufacturing firms in Nigeria as it responds positively and significantly to foreign exchange supply for the given realization. More appropriately, increase in or consistent supply of foreign exchange by the apex bank would raise the purchasing power of manufacturers regarding raw material importation, thereby improving performance of the manufacturing firms.

Meanwhile, changes in inflation rate (*INF*) yield a positive but statistically insignificant impact ($p\text{-values} = 0.7576 > 0.1$) Viewing the economic performance of the manufacturing sector (*MGDP*) with a partial regression coefficient of 0.0499. Thus, a 1% rise (fall) in *INF* will on average amount to increase (decrease) in *MGDP* by about 0.05% in the long-run. Meanwhile, economic performance of the manufacturing firms responds positively, however, insignificantly to inflation in Nigeria.

4.3.3 Post Estimation tests (Residuals Diagnostics)

The post estimation tests are: serial correlation test, Heteroscedasticity test, normality test, specification error test (Ramsey RESET test) and stability test (CUSUM test).

Table 7: Results of Post Estimation tests

Sample Period: 1996 – 2020

Serial correlation (BG) test:		p-value
F-statistic	0.0179	0.9000
LM Statistic	0.0980	0.7543
Heteroscedasticity test (ARCH LM):		p-value
F-statistic	1.5809	0.2239
LM Statistic	1.6131	0.2041
Normality Test:		p-value
Jarque-Bera	1.7645	0.4138
Linearity Test		p-value
t-statistic	1.8195	0.1430
F-statistic	3.3105	0.1430

Source: Researchers’ computation (2022)

Table 7 indicate the outcomes of the serial correlation test, Heteroscedasticity, normality and linearity test. For the serial correlation test, since the p-values (0.9000 and 0.7543 respectively) of both the F-statistic (0.0179)

and LM statistic (0.0980) are higher than 5% level of significance, therefore, null hypothesis of no serial correlation cannot be rejected since the Breusch-Godfrey (BG) test statistics are statistically insignificant. Hence, ARDL model estimated have no serial correlation problem with the sample examined.

The result of the heteroscedasticity test using ARCH methodology implies the acceptance of the null hypothesis of homoscedasticity (i.e. absence of heteroscedasticity) since the p-values (2239 and 0.7543) of both the F-statistic (1.5809) and LM statistic (1.6131) respectively are higher than 5% level of significance. Therefore, the model estimated have no heteroscedasticity issues for the period under review.

Similarly, the normality test result reveals that the residuals of the estimated model are normally distributed as the p-value (1.7645) of the Jarque-Bera statistic (0.4138) is greater than 5% level of significance (statistically insignificant).

The linearity test using Ramsey RESET test examines whether there is existence of linear relationship between the dependent variable (*RGDP*) and the explanatory variables (*NDE*, *NPE*, *FES* and *INF*). Meanwhile, null hypothesis states that the model is linear and correctly specified. Thus, since the t-statistic (1.8195) and F-statistic (0.1430) are not statistically significant (that is, having their respective p-values above 5% level of significance), the null hypothesis for linearity cannot be rejected. This suggests that the estimated model in this is linear or correctly specified.

Meanwhile, the CUSUM test result is presented as figure 4.1 below:

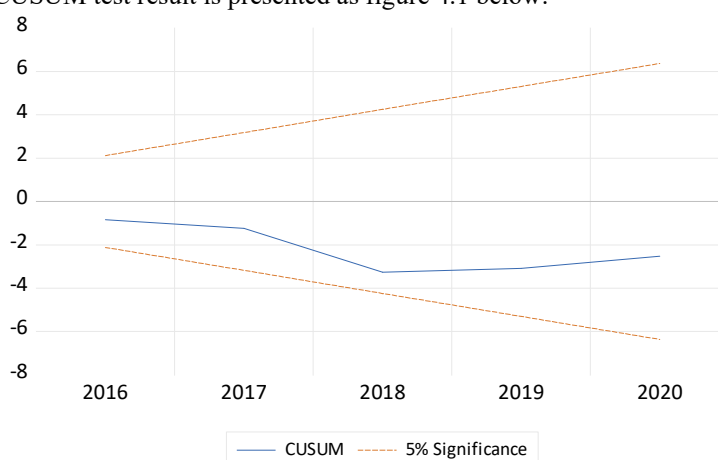


Figure 1: Plot of Cumulative Sum (CUSUM) of Recursive Residuals

Source: Authors' Presentation (2022)

Figure 1 indicates the outcomes of the stability test of CUSUM measure. Because the plot falls within the critical regions for the given sampled period at 5% level of significant, therefore, the model is said to be stable structurally. In other words, the parameters are stable for the chosen realization. Therefore, all the post estimation test results indicate that the short-run and long-run estimates from estimated ARDL model satisfy the underlying assumptions of the OLS (ordinary least square) estimator, thus, are efficient for forecasting and policy making.

4.4. Discussion of Findings

The study reviewed the effect of exchange rates fluctuations on the economic performance of manufacturing firms in Nigeria. Using time series methodology, the study utilised the annual time series datasets in contribution of manufacturing firms to real GDP, Naira/Dollar exchange rate, Naira/Pound Sterling exchange rate, foreign exchange supply as well as inflation rate between the years 1996-2020. The study revealed that the changes in Naira/Dollar exchange rate (*NDE*) impact negatively but significant effect on economic performance of the manufacturing firms during the long-run. However, Economic performance of the manufacturing sector responded negatively and significantly to Naira/Pound Sterling exchange rate fluctuations (meaning, changes in Naira value against Pound Sterling) for the considered sample period. These findings corroborate the work of previous researchers (Oseni, 2016; Alagidede& Ibrahim, 2017; Ufoeze, et al., 2018; Amoah &Ahiabor, 2019; Musa, et al., 2019; Ribeiro, et al., 2020; Alasha, 2020; Onwuka, et al., 2020; Iheanachor&Ozegbe, 2021; Elijah, et al., 2022; Ewubare&Ushie, 2022) who found that a fluctuation of the Naira to foreign currency has a negative impact on the performance of the Nigerian economy. Meanwhile, the third hypothesis found that Foreign exchange supply on the contrary led to a positive impact on the economic performance of the manufacturing sector but does not significantly have effect on the economic performance of manufacturing sector for the sample period being considered. This finding is in alliance with the findings of Elijah, et al. (2022) who observed that capital formation has positive impact on the economy.

5. Conclusion and Recommendations

The main objective of the research was to determine the effects of exchange rate fluctuations on economic performance of manufacturing sector in Nigeria. Based on the findings of this study, the study concludes that changes in Naira/Dollar and Naira/Pound Sterling exchange rate exert negative but significant effect on the economic performance of the manufacturing sector in the long-run. Based on the consistent fall in the value of Naira compared to other foreign currencies, all sectors of the economy have been strongly affected, especially the manufacturing sector as most of the raw materials and machineries for production process are imported. The research also concluded that foreign exchange supply influenced the performance of manufacturing sector positively and significantly. The broad focus of the study enables proper analysis of positive and negative effect of currencies devaluation as well as explaining how the purchasing power parity theory ensure equilibrium between rate of exchange of countries' currencies. However, flowing from the findings and the above conclusion, the researchers recommends the following:

- i. Government should encourage export diversification through agriculture, agro-investment and agro-allied industries, oil allied industries in order to improve the value of Naira, thereby, stabilizing the exchange rate.
- ii. The Policy makers should embark on policies capable of encouraging foreign direct investment (FDI) into the country in order to increase the foreign exchange supply in the country.
- iii. There should be reduction of export duties in order to encourage exportation of goods which will surely improve foreign exchange supply in the country.

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