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Foreign Exchange Market and Manufacturing Sector Performance in Nigeria

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Abstract: *In this paper, we explored the effect of exchange rate on manufacturing sector performance in Nigeria from 1981 to 2022. The motivation for paper arises from the recurring exchange rate depreciation and the declining manufacturing sector performance in recent times. The study utilized the autoregressive distributed lag approach as an analytical technique. Findings from the study portrayed that exchange rate and interest rate exerted negative and significant effect on the manufacturing sector performance in Nigeria. Other key findings include the fact that both bank credit to the manufacturing sector and government expenditure exerted a positive and significant effect on manufacturing sector performance in Nigeria during the study period. It was therefore recommended that exchange rate stability is necessary to curb the uncertainties associated with the import bill of pertinent inputs required by the manufacturing sector.*

Keywords: depreciation, manufacturing, monetary policy, bank credit, exchange rate.
JEL Classification: L60; O14; L88.

INTRODUCTION

In the contemporary economy, the manufacturing sector is a catalyst and offers a host of dynamic advantages that are essential for economic development (Onwuka, 2022). Mlambo (2020) emphasizes that historically, one of the main forces behind the majority of national economies has been the manufacturing sector. In addition to being a major driver of innovation and competitiveness and contributing significantly to productivity growth and exports, the manufacturing industry opens up new trade opportunities (Orji & Ezeanyaeji, 2022). Both the Department of Trade and Industry (DTI) (2017) and Bhorat & Roodney (2016) agree that there

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are very few, if any, instances in economic history where a nation has accomplished long-term, sustainable economic growth that has not been driven by manufacturing. Most economies were based on a strong industrial basis, even if the tertiary sector presently dominates these economies in terms of GDP and employment generation (Small Enterprise Development Agency (SEDA), 2012). Achieving economic growth and development through industrial transformation has been the primary goal and emphasis of Nigerian administrations since the country's political independence in 1960. The manufacturing sector reform is an objective of many development plans and strategies, which serve as examples of this.

However, given that the nation's industrial base is evaluated as weak and outdated by the World Bank (2020), it is concerning that despite all of these development plans and programs, the necessary level of expectation has not been met. The early 1970s oil discoveries made matters worse by causing other economic sectors (including manufacturing) to be disregarded in favour of the easy money generated by selling crude oil, which also had an impact on our foreign exchange reserve. But in the last ten years, changes in the oil market and terrorist activity in Nigeria's oil area have led to calls for Nigeria's economy to be more diversified in order to overcome the country's strong reliance on the oil subsector. The manufacturing sector is crucial to lowering poverty, eliminating hunger and malnourishment, and giving the hordes of jobless young people in the nation work possibilities because of its connections to agricultural and other input providers (Orji & Ezeanyaeji, 2022).

Nel *et al*. (2006) and Ududechinyere Eze, & Nweke (2018) emphasize that historically, one of the main engines of most national economies has been the manufacturing sector. Therefore, the manufacturing sector offers a means of promoting the expansion of other industries, such tertiary services, and attaining certain goals, including the creation of jobs and economic empowerment. Due to its value addition, connections to the economy's upstream production sectors (agricultural and mining), and downstream service sectors, the manufacturing sector has the largest economic multipliers (DTI, 2017).

Creating a strong manufacturing sector is frequently regarded as the first step toward exporting primary goods and achieving self-sustaining growth (Schneider, 2000). An important and lucrative business, manufacturing may make a significant contribution to job creation, economic growth, and increased export earnings (Mlambo, 2020). Thus, it may be claimed that the manufacturing sector of the economy produces or creates wealth. It is important to remember, nevertheless, that in order for the manufacturing sector to provide favourable results, manufacturing companies need to implement competitive strategies. An enabling environment that provides manufacturing enterprises with a competitive advantage both locally and globally is necessary for manufacturing firms to attain a competitive position. A robust and thriving manufacturing industry need a resolute and constructive strategy to establish an atmosphere that fosters manufacturing investment growth and employment creation (Manufacturing Circle, 2014). The manufacturing sector's success can be influenced by several macroeconomic variables. These consist of the exchange rate's value among other factors (Mlambo, 2020). Statistics South Africa (2016) agrees, stating that among the variables frequently monitored while evaluating the success of manufacturing output are the local and worldwide economies' condition as well as the exchange rate.

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According to David *et al*. (2010), exchange rate policy is a crucial instrument in macroeconomic management since fluctuations in the exchange rate have a big impact on a nation's growth and income distribution as well as its balance of payments situation. One element that significantly influences the existence and growth of the manufacturing sector in any country is a competitive currency. In agreement, Soderling (2000) states that promoting manufacturing exports requires effective control of the real exchange rate. An essential component of a nation's manufacturing sector growth is a competitive exchange rate. Stated differently, the performance of every economy is influenced by the value of its exchange rate. It is a major factor in figuring out how competitive the economy is.

The link between domestic and international pricing is another way that the foreign exchange rate affects trade. However, variations in the actual exchange rate cause the pricing of Nigerian commodities to fluctuate globally in local currency terms. Nigerian commodities are more expensive on the global market when the naira appreciates, and vice versa. Foreign exchange rate volatility affects exports and imports in terms of cost and price, and it also adds a degree of risk and uncertainty to trade (Mary & Fagite, 2014). Furthermore, a stable exchange rate in international commerce and a favourable foreign market are prerequisites for the manufacturing sector's success. Numerous academics have noted that the Nigerian currency is extremely unstable and susceptible to global shocks; as a result, the nation's manufacturing sector, which produces both non-oil and oil products, is not immune to these shocks from the outside world or fluctuations in the currency rate (Mary & Fagite, 2014). Furthermore, Fapetu (2013) discovered that the performance of Nigeria's manufacturing sector and economic development are impacted by exchange rate volatility.

As a result, the foreign exchange crisis could be a significant barrier to Nigeria's manufacturing industry's growth, making investment riskier and sector planning more difficult. For example, higher foreign currency rate volatility may lower total foreign direct investment inflows to Nigeria if prospective foreign investors are risk averse because it raises doubts about the returns on a particular transaction. Only if the projected profits are strong enough to offset the risk associated with the investment would potential investors make an overseas investment. The exchange rate, or the price of foreign exchange, also affects the level of external debt and the viability of the balance of payments for a developing nation like Nigeria, which depends heavily on trade. For example, an overvaluation of the foreign exchange rate might lead to an unmanageable deficit in the balance of payments, promote capital flight, and increase the stock of external debt. These events would ultimately result in a decrease in investment and subpar performance from the manufacturing sector.

The recent swings in the Nigerian foreign exchange have created serious concerns on economic agents and policy makers. The exchange rate increased from ₦412.00/US$1 in January 2022 to ₦461.00/US$1 in January 2023 before reaching a record high of ₦899.89/US$1 in December 2023.

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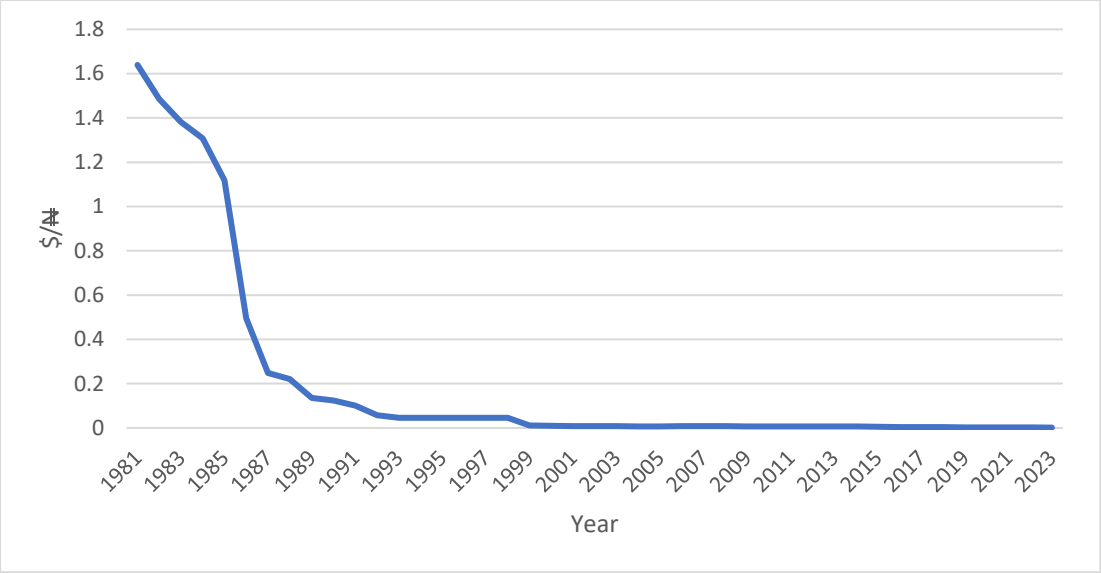

Figure 1: Trends in dollar-naira Exchange Rate, 1981 – 2023.

This portrays a substantial depreciation of the naira in recent times, given that the exchange rate has continuously declined from ₦0.61/US$1 in 1981 to ₦150.30/US$1 in 2010 and then to ₦193.28/US$1 and ₦634.08/US$1 in 2015 and 2023 respectively. Thus, as far back as 1981, an individual needed $1.64 to buy ₦1, but recent trend is the case where ₦1 is just worth $0.0016 as of 2023.

Given this exchange rate depreciation, the growth rate of the manufacturing sector output which was 2.83% in the fourth quarter of 2022 has declined to 1.38% in the fourth quarter of 2023. Within the same period, the contribution of the manufacturing sector to GDP has declined from 8.32% in the fourth quarter of 2021 to 8.11% in the fourth quarter of 2023.Table 1 presents the performance of the manufacturing sector over the years.

Table 1: Manufacturing Sector Performance in Nigeria, 1981 – 2023.

Period	Manufacturing Contribution to GDP (%)	Manufacturing Output Growth (%)	Average Manufacturing Capacity Utilization (%)	Exchange Rate (N/$1)
1981-1985	19.86	1.90	57.39	0.69
1986-1989	20.04	21.85	40.75	3.77
1990-1994	18.85	38.00	40.54	15.84
1995-1999	18.40	21.44	33.73	36.05
2000-2004	12.52	17.23	42.30	119.58
2005-2009	8.66	11.70	54.22	130.82
2010-2014	7.96	20.90	57.07	155.50
2015-2019	9.60	14.82	54.98	273.11
2020-2023	13.25	16.61	47.86	454.78

Source: Compiled by the authors from CBN statistical bulletin

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The average manufacturing contribution to GDP recorded its highest value between 1986 to 1989 where the exchange rate averaged ₦3.77/$1 but declined to a meagre 7.96% between 2010 and 2014 with the exchange rate of ₦155.50/$1. However, the contribution of the manufacturing sector to GDP increased to 13.25% between 2020 and 2023. The growth of the manufacturing sector output has also exhibited high degree of volatility over the years. the fluctuation in the manufacturing sector performance could be presented in Figure 2.

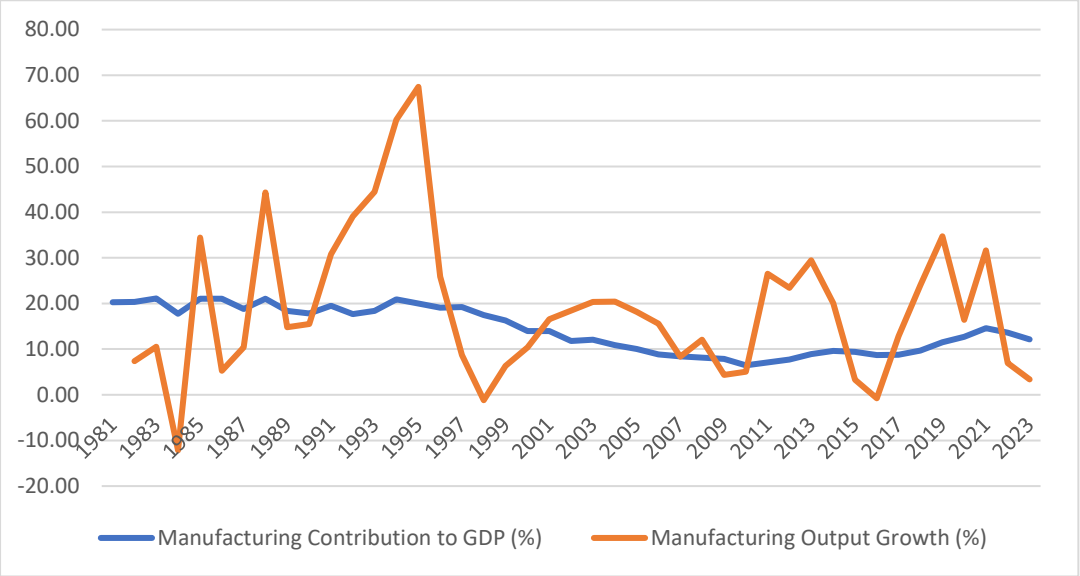

Figure: Trends in the manufacturing sector performance in Nigeria, 1981 – 2023.

The evidence from data portrays that the manufacturing sector performance have been fluctuating over the years. Its contribution to GDP has declined 20.26% in 1981 to 13.93% in 2000. A further decline to 6.45% was recorded in 2010 before a recovery to the tune of 9.43% and 14.61% in 2015 and 2021 were recorded. However, this has declined to 13.59% and 12.13% for 2022 and 2023 respectively. The growth rate of manufacturing output has exhibited greater fluctuation in recent times as it declined from 34.73% in 2019 to 6.93% and 3.40% for 2022 and 2023 respectively. This tremendous decline happened in a period where the naira experienced substantial depreciation. Consequently, there seems to be some sort of connection between exchange rate and manufacturing sector performance in Nigeria since manufacturers need to export key inputs for production. As such, the paper seeks to examine the effect of exchange rate on the manufacturing sector performance in Nigeria from 1981 to 2022. The specific objectives are: To examine the effect of naira-dollar exchange rate on manufacturing sector contribution to GDP; to explore the influence of interest rate on manufacturing sector contribution to GDP; and to investigate the effect of bank credit to the manufacturing sector on manufacturing sector contribution to GDP.

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LITERATURE REVIEW

Conceptual Review

The price of one currency in terms of another, or the current market value at which one national currency may be exchanged for a unit of another, is known as the exchange rate. Typically, it is stated as the quantity of one domestic currency that can be used to buy one unit of another currency or as the quantity of one foreign currency that can be used to buy one unit of another currency (Orji & Ezeanyaeji, 2022). For instance, one naira may be traded for US$0.000625 if one US dollar can be converted for ₦1,600. The system or methodology used by a nation's monetary authority – typically the Central Bank – to establish the value of its currency in respect to other currencies is known as an exchange rate regime or flexibility. It is also known as the exchange rate mechanism that establishes the value of one currency in relation to another (CBN, 2016).

Conversely, manufacturing encompasses a range of human endeavours, from high-tech to handicrafts, although it is mostly associated with industrial production, where large-scale raw material conversion into finished commodities occurs (Ademu & Ezie, 2017). Similar to this, the manufacturing sector is defined as those businesses and activities that produce and process goods, either by inventing new goods or by adding value (Falade & Olagbaju, 2015).

Theoretical Literature

The theories explaining exchange rate determination include the purchasing power parity theory and the balance of payments theory. Rogoff introduced the concept of purchasing power parity in 1996. One of the essential components of contemporary theories of exchange rate determination is purchasing power parity. The *Salamanca School of Spain* in the sixteenth century is credited with giving rise to the notion of purchasing power. An economic theory called purchasing power parity uses a basket of commodities approach to compare the currencies of various nations. This method considers how different inflation rates across nations relate to the purchasing power of their respective national currencies (Mboto *et al*., 2022). In other words, a consistently high rate of inflation would raise the cost of locally produced goods in comparison to imports. Due to this, there would be a greater need for foreign goods and, consequently, foreign exchange to buy them. The nation's currency would therefore depreciate as a result of the spike in foreign exchange demand, which would increase the value of foreign currencies at the expense of the local currency.

Exchange rates would rise in proportion to the value of the foreign currencies, which would be more costly as the value of the home currency declined. Production lines would use less foreign inputs given the rising cost of foreign exchange. More production expenses often result in higher product pricing, lower output, layoffs in the labour force, lower profitability, or, at the bottom of the pyramid, the complete shutdown of activities. A new production line, increased employment, increased profit margins, and increased output might all result from manipulating the exchange rate at the top stratum (Falaye *et al*., 2019).

As per Herbert Stein, the balance-of-payments accounts of a nation document the amounts that nationals receive and pay out in relation to their dealings with citizens of other nations (Falaye

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et al., 2019). Each nation's receipts and payments must be equal if all transactions are taken into account. Any perceived disparity only results in one nation gaining resources from the others. A nation's currency is significantly influenced by its balance of payments condition. A balance of payments deficit guarantees foreign currency payments, whereas a surplus guarantees receipts of foreign currency. Increased foreign exchange revenues have a positive effect on raising the value of the national currency, while a chronic balance of payments deficit has a negative effect and frequently results in the depreciation of the national currency.

The cost of importing essential manufacturing inputs that are unavailable locally increases for businesses and industries when the country's currency depreciates. An industry that mostly relies on foreign inputs is likely to experience losses. This is only because exports would typically become more expensive and would not be able to boost sales to the point where predicted profit margins are met. The best way to address balance of payments deficits would be to become more dominant in international trade in order to generate more foreign revenues (Falaye *et al*., 2019). The public sector could need to lobby for such an increase. Standards and guidelines must be predetermined and upheld by the government, which is aware of the country's BOP situation. Thus, endogenous growth theory principles should be actively pushed (Aghion & Howitt, 1992).

Although there has not been a clear consensus on the optimal exchange rate regime for macroeconomic performance, the research emphasizes that the influence of exchange rate volatility on the macro economy depends on the exchange rate regime that the economy adopts. Proponents of fixed exchange rate regimes, such as McKinnon (1963), Mundell (1973), Frankel and Rose (2002), assert that increased trade levels foster macroeconomic stability, foreign direct investment, economic growth, and, ultimately, a higher quality of living. Fischer (2001) makes the case that fixed exchange rates would promote overinvestment, moral hazard, and speculative capital inflows.

Conversely, proponents of flexible exchange rates (Meade, 1951; Friedman, 1953; etc.) contend that genuine asymmetric shocks do not prevent changing exchange rates from aiding in the correction of both local and foreign disequilibrium. Money supply is considered to be endogenous in the context of a fixed exchange rate system and global capital mobility, meaning that changes in money demand led to changes in money supply, and LM shocks have no effect on output or inflation. The domestic economy suffers from an external shock when there is a fixed exchange rate (Polodoo *et al*., 2011).

Since exports are a key component of aggregate demand, a drop in foreign income may stifle domestic demand for exports. This negative shock to aggregate demand will, through the multiplier effect, cause a loss in domestic income and employment. The latter will be mitigated by a depreciation of the currency rate under a system where market forces decide the exchange rate (Polodoo *et al*., 2011). Therefore, the impact of a foreign shock will vary depending on the exchange rate regime. Similar to this, in a system with changing exchange rates, an increase in foreign interest rates may cause a depreciation and a gain in revenue, while in a system with fixed exchange rates, there will inevitably be a monetary contraction and a decline in income.

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Empirical Literature

Nwokoro (2017) used error correction model (ECM) to evaluate the impact of interest rate and exchange rate variations on Nigerian manufacturing production from 1983 to 2014. The results demonstrated that interest rates and exchange rates had a negative and substantial impact on manufacturing production. Ugwu (2017) used the *Ordinary Least Squares* (OLS) approach to look at how exchange rate fluctuations affected Nigerian manufacturing performance. The results showed that there is a strong connection between Nigerian manufacturing performance and changes in exchange rates.

Adegbemi (2018) looked at how Nigeria's manufacturing sector performed from 1981 to 2015 in relation to changes in macroeconomic conditions. The results showed that the broad money supply, interest rate, inflation rate, exchange rate, and manufacturing performance were all negatively related. Hunegnaw (2018) examined how ten East African nations' manufacturing exports were impacted by real exchange rates. In contrast to previous research that frequently analyzed aggregate exports by adopting traditional empirical methods vulnerable to different flaws, the study employed pooled mean group and mean group estimators using an ARDL process to assess disaggregated manufacturing exports. Results imply that depreciation of the exchange rate affects export performance in Eastern Africa.

Williams (2018) investigated how some Nigerian listed companies performed between 2012 and 2016 in relation to changes in exchange rates. The OLS regression was used in the study as the estimation method, and the results showed that exchange rates significantly and favourably affected the performance of businesses. Furthermore, the study's findings demonstrate a strong and positive connection between inflation and business performance. Tams-alasia, Olokoyo, Okoye, and Ejemeyovwi (2018) investigated how Nigerian manufacturing output performance was affected by exchange rate deregulation from 1980 to 2016. The empirical results showed that the output of the manufacturing industry is positively impacted over the long term by the exchange rate in a non-significant way.

Orji *et al*. (2018) investigated how changes in exchange rates affected Nigeria's manufacturing industry. The study used the OLS estimation approach and found a positive relationship between manufacturing output and the exchange rate, government capital expenditure, imports, and foreign direct investment. Ayobami (2019) looked at how Nigerian manufacturing companies performed from 1981 to 2016 in relation to exchange rate fluctuations. The study used the autoregressive distributed lag (ARDL) model as its estimate approach and found a small but favourable correlation between the expansion of Nigerian manufacturing companies and changes in exchange rates.

Abdul-Mumuni (2019) looked at how Ghana's manufacturing sector performed from 1986 to 2013 in relation to the exchange rate. The performance of manufacturing enterprises was positively connected with the exchange rate, according to the study, which uses the ARDL estimation approach. Boateng (2019) examined the impact of exchange rates on the financial performance of manufacturing companies in Ghana from 2009 to 2017. The study employed panel regression for estimate and included imports, foreign direct investment, and nominal interest rate as control variables. The study's findings demonstrated that there is a negative

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connection between exchange rates and the expansion of manufacturing enterprises' financial performance.

Falaye *et al.* (2019) looked at how currency rates affected the manufacturing sector's performance in Nigeria during a 25-year span (1990-2014). The tests for stationarity, long-run relationship, causal relationship, and the short- and long-run equilibrium relationship were performed using the Unit Root test, Johansen co-integration test, Granger causality test, and Error Correction Model, in that order. The study's empirical findings demonstrated that the depreciation of the Naira had a detrimental effect on the manufacturing sector's performance in Nigeria, as exchange rates were found to have a long-term, significant, and causal relationship with the sector's performance.

According to Ali (2020), who looked at how exchange rate volatility affects Nigerian manufacturing performance, the country's manufacturing industry has suffered as a result of exchange rate volatility. Mlambo (2020) aimed to investigate how the Southern African Customs Union (SACU) states' manufacturing performance was affected by the exchange rate. For the years 1995–2016, the study used the panel group FMOLS and PMG techniques for the analysis. The exchange rate, imports, and foreign direct investment have a deleterious effect with manufacturing performance, according to the results. The success of manufacturing was positively related with both inflation and exports. It was recommended that SACU nations develop well-informed policies that match the exchange rate to the real demands of the manufacturing sector considering the study's results.

The impact of exchange rate movement and volatility on the performance of Nigerian manufacturing firms from 1985 to 2019 was studied by Uruakpa, Okorontah, & Ede (2021). To achieve its goals, the study used two models: the Generalized Autoregressive Conditional Heteroscedastic (GARCH) model and the Ordinary Least Square Double-Log model. The findings indicate that while exchange rate volatility has a major negative impact on Nigerian manufacturing output, the appreciation of the country's currency has a large beneficial impact on manufacturing performance in Nigeria. Among other things, it was suggested that Nigeria implement monetary policies through the monetary authority that will lessen exchange rate volatility and lessen the detrimental impact it has on the country's manufacturing output.

Iwedi (2021) looked at how the foreign exchange crisis affected Nigeria's manufacturing sector's performance during a 35-year span, from 1985 to 2019. The data was analyzed using the regression approach known as Ordinary Least Squares (OLS). The findings showed that Nigeria's manufacturing sector GDP was significantly impacted negatively by exchange rates. The performance of Nigeria's manufacturing sector was significantly and favourably impacted by both trade openness and FDI. The study came to the conclusion that Nigeria's manufacturing sector's performance is significantly harmed by the foreign exchange crisis.

Asaleye *et al*. (2021) looked at how Nigerian industrial performance was impacted by currency rates. The shock impact and the short- and long-term elasticities of exchange rate on manufacturing performance were investigated using structural vector auto regression (SVAR), error correction model (ECM), and canonical co-integrating regression. The results showed

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that output and employment in the manufacturing sector had not increased as a result of the Nigerian exchange rate.

Samuel & Wale-Odunaiya (2021) examined the effects of Nigeria's exchange rate undervaluation on manufacturing production and economic growth from 1981 to 2019. The real effective exchange rate has a negative effect on manufacturing production and has no discernible impact on economic growth, according to the impulse response function, which was obtained using the Vector Error Correction Mechanism. Using the ARDL and ARCH/GARCH model, Onwuka (2022) investigated the effects of exchange rate volatility on the manufacturing sector's performance in Nigeria. The findings of the ARDL demonstrate that the long-term performance of the manufacturing sector is adversely affected by changes in interest rates, inflation, and exchange rate volatility.

The impact of exchange rates on the manufacturing sector's performance in Nigeria was studied by Mboto *et al.* (2022). To investigate the effect of independent variables on the dependent variable, the multiple regression technique of ordinary least square approach was used. According to the findings, the money supply had a positive and substantial impact on the manufacturing sector's performance, whereas the exchange rate had a negative and significant one. According to the study, local sourcing of input and raw materials must be made using agricultural and technical policies.

Between 1990 and 2020, Orji & Ezeanyaeji (2022) looked at how exchange rates affected Nigeria's industrial sector's performance. The results obtained, using the canonical cointegrating regression (CCR) methodology, demonstrated that the manufacturing sector is constrained by exchange rate depreciation, whereas manufacturing output is negatively impacted by exchange rate volatility. According to the report, price increases cause the manufacturing sector to deteriorate. Among other recommendations, the study makes is that policies be developed that balance the manufacturing industry's actual demands with the exchange rate.

Recently, Oyedepo, Rasaki, & Addo (2023) studied how Nigeria's manufacturing sector was affected by exchange rate fluctuations from 1990 to 2020. For the data analysis, the Autoregressive Distributed Lag model (ARDL) was utilized. The long-term link between the variables was demonstrated using the ARDL model, which also shows that imports of raw materials and fluctuations in exchange rates significantly lowered Nigeria's manufacturing output. Conversely, there was a strong positive connection between the GDP of the manufacturing sector and the sector's capacity utilization. The GDP of the manufacturing sector was significantly impacted negatively in the short term by changes in interest rates, imports of raw materials, exchange rate fluctuations, and inflation rates. The study came to the conclusion that Nigeria's manufacturing sector performance is significantly impacted by fluctuations in exchange rates.

The empirical studies explored in review portrays some interesting result. One of the key observations that could be drawn from the empirical studies centres around the mixed findings on the interaction between exchange rate and manufacturing sector performance. The divergence in the findings could be due to the country involved, the period under investigation,

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and the methodology used in the studies. This therefore pose a research gap which this study intends to fill. Consequently, this paper will utilize the autoregressive distributed lag (ARDL) technique to examine both the short run and the long run effect of exchange rate on manufacturing sector performance in Nigeria from 1981 to 2022.

METHODOLOGY

The Model

The model for this study to explore the effect of exchange rate on manufacturing sector in Nigeria is adapted from Mlambo (2020) who examined similar relationship in the case of Southern African Customs Union (SACU). The model is therefore specified as follows:

$$MFP_t = f(EXR_t, INT_t, INF_t, IMP_t, EXP_t, BCM_t, GEX_t) \quad (1)$$

The model is explicitly written in its stochastic form as follows:

$$MFP_t = \gamma_0 + \gamma_1 EXR_t + \gamma_2 INT_t + \gamma_3 INF_t + \gamma_4 IMP_t + \gamma_5 EXP_5 + \gamma_6 BCM_t + \gamma_7 GEX_t + \mu_t \quad (2)$$

Where MFP is manufacturing sector performance captured by manufacturing output, EXR is the exchange rate, INT is the rate of interest, INF is inflation rate, IMP is import volume, EXR is export volume, BCM is the bank credit to the manufacturing sector, GEX is total government expenditure, and μ is the error term. The parameters to be estimated are $\gamma_0 - \gamma_7$, and it is expected that $\gamma_1 < o$ to validate the idea that rising exchange rate will hurt the performance of the manufacturing sector due to the rising cost of importing crucial raw materials for production.

Nature and Sources of Data

The data used in this study, being time series in nature, covers the period 1981 to 2022. The data were obtained strictly from secondary source that is reputable. Data on manufacturing sector performance, exchange rate, inflation rate, interest rate, government expenditure, imports, exports, and bank credit to the manufacturing sector were all obtained from the Central Bank of Nigeria (2022) statistical bulletin. The period of analysis selected for this study is long enough to capture changes in the manufacturing sector performance and the various exchange rate regimes in the country across different political and economic epochs and can be used in examining both short run and long run interaction in the model.

Technique of Data Analysis

3.3.1 Pre-Estimation Diagnostic Test

In this study, this involves checking on the stationarity of the time series variables to know the appropriate technique of analysis to be deployed. It is done by checking the unit root properties of the variables in the model. The test is done using the Augmented Dickey-Fuller (ADF) unit root test under the constant and trend assumption. The null hypothesis is that $\gamma_1 = 1$, implying that there is a unit root. The test generates an ADF statistic which is compared with the 5% critical tau value. It is expected that the ADF statistic must be negative and statistically significant for the null hypothesis to be rejected. The test equation is specified as follows:

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$$V_t = \theta + \delta t + \gamma_1 V_{t-1} + \sum_{t=1}^{k} \beta_i \Delta V_{t-i} + \varepsilon_t \quad (3)$$

Consistent with Equation (3), V_t is the time series variable to be tested for unit root, t is the trend with its coefficient being δ, V_{t-1} is the one-period lag of the time series variable to be tested for unit root, k is the optimal lag length, β_i is the coefficient of the lags of changes in time series variable, the summation component is to free the model from autocorrelation, and ε_t is the random term.

3.3.2 The Bounds Test for Cointegration

The test for cointegration is geared towards determining whether a long run relationship exists among variables in the model. This is because most often, time series variables in a model may not all be stationary at level. Thus, cointegration can be conducted to check whether a linear combination of such variables could yield some long run equilibrium relationship. In doing so, the study utilizes the bounds test for cointegration since the variables were integrated in mixed order of levels and first difference. The test generates an F-statistic which is compared with the 5% critical lower and upper bounds. The significance of the F-statistic implies that cointegration exists hence, there is a long run relationship among the variables in the model. Consequently, the existence of cointegration requires that both the short run and long run models be estimated.

3.3.3 The Autoregressive Distributed Lag (ARDL) Error Correction Model

In the event where the unit root test suggests that the time series variables in the model are integrated in missed order of levels and first difference, and the cointegration analysis presents evidence of long run relationship in the model, the ARDL model is therefore utilized as a technique of analysis. The approach facilitates the estimation of both the short run and long run model simultaneously. The ARDL model incorporating the error correction mechanism is therefore specified as follows.

$$\begin{aligned}\Delta MFP_t = \beta_0 + \sum_{i=1}^{k} \beta_1 \Delta MFP_{t-i} + \sum_{i=0}^{m} \beta_2 \Delta EXR_{t-i} + \sum_{i=0}^{m} \beta_3 \Delta INT_{t-i} + \sum_{i=0}^{m} \beta_4 \Delta INF_{t-i} \\ + \sum_{i=0}^{m} \beta_5 \Delta IMP_{t-i} + \sum_{i=0}^{m} \beta_6 \Delta EXP_{t-i} + \sum_{i=1}^{k} \beta_7 \Delta BCM_{t-i} + \sum_{i=0}^{m} \beta_8 \Delta GEX_{t-i} \\ + +\theta ECM_{t-1} + \epsilon_t \quad (4)\end{aligned}$$

Equation (4) presents the ARDL error correction model which portrays how the short run distortions in the model is corrected to attain long run equilibrium. The variables are as earlier defined, while k and m are respectively the lag length of the dependent and independent variables. The parameter θ is the error correction term which is the coefficient of the ECM in the model. The ECM_{t-1} is simply one-period lag of the residual generated from the estimation of the model. It is expected that θ must be negative and less than unity, and statistically

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significant before the model can adjust to long run equilibrium. The stochastic term in the model is denoted by ϵ_t, while i represents the lags in the model.

Empirical Findings

Descriptive Statistics

To explore the descriptive properties of the variables, Table 2 presents the result obtained from the analysis.

Table 2: Descriptive Properties of the Time Series Variables

	MFP	EXR	INT	INF	IMP	EXPR	BCM	GEX
Mean	14.298	115.741	17.190	18.947	11.931	17.204	23.543	8.919
Median	13.929	115.255	17.380	12.942	12.362	16.524	24.390	8.301
Maximum	21.098	425.981	29.800	72.836	24.357	32.049	42.634	17.286
Minimum	6.452	0.610	7.750	5.388	3.020	4.503	10.129	5.089
Std. Dev.	4.983	119.141	4.647	16.455	4.274	7.883	9.318	2.578
Skewness	-0.022	1.021	0.308	1.877	0.152	0.081	0.222	1.023
Kurtosis	1.446	3.221	3.467	5.437	3.561	1.950	1.808	4.444
Jarque-Bera	4.231	7.388	1.044	35.058	0.712	1.976	2.830	10.972
Probability	0.121	0.025	0.593	0.000	0.700	0.372	0.243	0.004
Observations	42	42	42	42	42	42	42	42

Source: Researchers' Computation.

The result presented in Table 2 indicates that manufacturing sector contribution to GDP averaged 14.29% during the study period (1981 – 2022) and has a standard deviation of 4.983. The maximum contribution was 21.098% which was recorded in 1983 while the minimum value was 6.452% which was recorded in 2010. The manufacturing contribution to GDP was negatively skewed given the skewness coefficient of -0.022 which indicates that majority of the observations concentrated on the left tail. This portrays that the manufacturing contribution to GDP over the years have been on the declining trend. Further, the distribution is platykurtic given the 1.446 coefficient of kurtosis and it is normally distributed as presented by the fact that the Jarque-Bera statistic of 4.231 (with p-value of 0.121) is statistically insignificant at the 5% level.

The naira-dollar exchange rate averaged ₦115.74/US$1 over the period under investigation and had a standard deviation of 119.141. The highest value of the exchange rate was ₦425.98/US$1 which was recorded in 2022 while the minimum was ₦0.61/US$1 which was recorded in 1981. This therefore portrays a significant depreciation of the naira over the years. The distribution of exchange rate is positively skewed, given the skewness coefficient of +1.021, implying that most of the observations lies on the right tail (higher values as observed form the high level of depreciation). Also, the distribution is leptokurtic in nature, and it is not normally distributed given that the Jarque-Bera statistic (7.388) is statistically significant at the 5% level.

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The descriptive properties of other variables can be discussed in similar pattern given their values clearly presented in the table. For instance, interest rate averaged 17.19% while inflation rate averaged 18.955. Also, import (% of GDP) averaged 11.931% while export (% of GDP) averaged 17.204% during the study period. The bank credit to the manufacturing sector (% of total credit) averaged 23.543% while government expenditure (% of GDP) averaged 8.919% during the period under investigation.

Correlation Analysis

The Pearson correlation coefficient is estimated to measure how the variables move together over the years. Though correlation between dependent and independent variable(s) is not a problem, high correlation between explanatory variable(s) could raise multicollinearity problem in the model. Table 3 presents the correlation matrix for all the variables in the model.

Table 3: Correlation Matrix

	MFP	EXR	INT	INF	IMP	EXP	BCM	GEX
MFP	1							
EXR	-0.6473	1						
INT	-0.1093	-0.1539	1					
INF	0.4392	-0.2901	0.3322	1				
IMP	-0.2388	0.1796	0.3410	0.1480	1			
EXP	-0.2927	-0.0780	0.4918	0.0622	0.6993	1		
BCM	0.8542	-0.6798	0.2599	0.5463	0.044	0.043	1	
GEX	0.3026	0.0369	0.2734	0.1593	0.321	0.171	0.4242	1

Source: Researchers' Computation.

It is observed from Table 3 that manufacturing sector performance is negatively correlated with exchange rate given the correlation coefficient of -0.6473. This signifies high correlation between the two variables and as such denotes that as exchange rate depreciates, manufacturing sector performance keeps on declining over the years. This is like the case of interest rate, import, and export as they all had negative correlation coefficient with manufacturing sector performance. It is also observed that bank credit to the manufacturing sector exhibited a strong positive correlation with manufacturing sector performance, indicating that both increased and decreased together. This is also like the case of inflation rate and government spending. It is also observed that none of the explanatory variables exhibited a perfect linear correlation with one another. In fact, none of the explanatory variables had a correlation coefficient of up to 0.70, indicating that the possibility of multicollinearity in the model is negligible.

Stationarity Test

The augmented Dickey-Fuller (ADF) unit root test with the constant and trend assumption is used to test for the stationarity of the time series variables. The result is presented in Table 4, where I(0) indicates stationarity at level and I(1) indicates stationarity at first difference.

Table 4: Unit Root Test Result.

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Variable	Augmented Dickey-Fuller Statistic				Order of Integration
	Level	Probability	First Difference	Probability	
MFP	-1.230492	0.8909	-7.493409*	0.0000	I(1)
EXR	2.609116	1.0000	-5.198802*	0.0007	I(1)
INT	-3.444965	0.0590	-6.440996*	0.0000	I(1)
INF	-4.088291*	0.0132	---------	---------	I(0)
IMP	-3.302447	0.0798	-10.9694*	0.0000	I(1)
EXP	-2.441897	0.3539	-6.251278*	0.0000	I(1)
BCM	-2.476704	0.3374	-6.727329*	0.0000	I(1)
GEX	-3.15593	0.1075	-9.668931	0.0000	I(1)

*Note: * represents significance at the 5% level.*
Source: Researchers' Computation.

The result of the unit root test as captured in Table 4 indicates that all the time series variables except inflation rate were stationary at first difference. Thus, inflation rate was stationary at level making it an I(0) time series variable. The summary from the test is that we thus have a combination of I(0) time series variable with other I(1) time series variables. This necessitates a test for existence of long run relationship in the model.

Cointegration Test

The cointegration test is done using the Bounds test since the time series variables were mixture of I(0) and I(1). The test generates an F-statistic whose significance presents evidence of cointegration (long run) relationship in the model. The result of the test is presented in Table 5 where I(0) and I(1) represents the lower and upper bounds respectively.

Table 5: Bounds Test for Cointegration Result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.5886*	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

*Note: * represents significance at the 5% level.*
Source: Researchers' Computation.

The result indicated an F-statistic of 5.5886 which is significant at the 5% level since it lies outside the 5% I(0) and I(1) bounds. This is a clear evidence of long run relationship in the model. Consequently, both the short run and the long run models were estimated.

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Short Run Error Correction Model

The autoregressive distributed lag (ARDL) technique is utilized in the estimation of the error correction model since the variables were in mixture of I(0) and I(1) order of integration, and the Bounds test presented evidence of cointegration. Table 6 presents the result.

Table 6: Short Run Error Correction Model Estimates

Dependent Variable: D(MFP)				
Selected Model: ARDL(1, 3, 1, 2, 0, 2, 2, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Probability
D(EXR)	-0.0169	0.0073	-2.3223	0.0309*
D(EXR(-1))	-0.0183	0.0075	-2.4359	0.0243*
D(EXR(-2))	-0.0228	0.0079	-2.8789	0.0093*
D(INT)	-0.0434	0.0363	-1.1938	0.2465
D(INF)	0.0567	0.0098	5.7703	0.0000*
D(INF(-1))	-0.0905	0.0119	-7.5945	0.0000*
D(EXP)	-0.1373	0.0244	-5.6321	0.0000*
D(EXP(-1))	0.0952	0.0286	3.3285	0.0033*
D(BCM)	0.0983	0.0286	3.4353	0.0026*
D(BCM(-1))	-0.0754	0.0434	-1.7376	0.0977
ECM(-1)	-0.9352	0.1115	-8.3914	0.0000*
R-squared	0.8518	Mean dependent var		-0.1924
Adjusted R-squared	0.7989	S.D. dependent var		1.5164
S.E. of regression	0.68	Akaike info criterion		2.2993
Sum squared resid	12.9467	Schwarz criterion		2.7685
Log likelihood	-33.8356	Hannan-Quinn criterion		2.4676
Durbin-Watson stat			2.1362	

*Note: * represents significance at the 5% level.*

Source: Researchers' Computation.

The result of the ARDL error correction model presented in Table 6 indicates that the model can adjust at a speed which corrects 93.52% of the short run distortions in the model for long run equilibrium to be established. The model therefore explains 85.18% of the total variations in the manufacturing sector performance in the short run.

From the parameter estimates, changes in exchange rate are observed to exert negative and significant short run effect on manufacturing sector performance. This implies that exchange rate depreciation stifles manufacturing performance since manufacturing firms will incur higher cost to import necessary inputs for production. Apart from this, exchange rate

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depreciation will cause local manufactured goods to be costly relative to foreign goods. This will therefore cause greater demand for foreign manufactured goods which further frustrates the operations of the local manufacturing firms. The result is in line with the findings from earlier works like Polodoo *et al*. (2011), Falaye *et al*. (2019), and Mlambo (2020). The coefficient therefore indicated that a 1% depreciation of the exchange rate will lead to a 0.0169% decrease in the manufacturing sector performance in Nigeria. Also, both the first period and the second period lags of the changes in exchange rate reduced the current manufacturing sector performance by 0.1083% and 0.0228% respectively. Thus, it therefore signifies that the exchange rate in the past two years stifled manufacturing sector performance in a significant way.

Changes in interest rate was observed to exert a negative but insignificant effect on manufacturing sector performance. However, inflation exerted a positive and significant short run effect on manufacturing sector performance. This is because inflation acts as an incentive for profit maximizing enterprises involved in manufacturing. From the coefficient, a 1% increase in inflation will lead to a 0.0567% increase in manufacturing sector performance. However, the one period lag of inflation exerted a negative and significant effect as it reduced manufacturing sector performance by about 0.0905% on the average.

The change in export is observed to exert a negative and significant effect on manufacturing sector performance. This does not align with the a priori expectation. The coefficient therefore denoted that a 1% increase in exports will lead to a 0.1373% decrease in manufacturing sector performance. However, the one-period lag of export significantly increased manufacturing sector performance by 0.0952% on the average. This therefore denotes that opportunities to export manufactured products will spur increased manufacturing activities within the domestic economy.

The changes in bank credit to the manufacturing sector during the study period exerted a positive and significant short run effect on the manufacturing sector performance. This is because credit aids manufacturing entities to expand their operations and acquire the needed capital for increased productivity. The result is in line with earlier findings from Effiong & Ekong (2022). From the coefficient, a 1% increase in credit to the manufacturing sector will lead to a 0.0983% increase in manufacturing sector performance. However, the one-period lag of bank credit to the manufacturing sector exerted a negative but insignificant effect on manufacturing sector performance.

Long Run Model

The long run estimated model is presented in Table 7.

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Table 7: Long Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Probability
EXR	8.03E-05	0.0036	0.0221	0.9826
INT	-0.2177	0.0563	-3.8640	0.0010*
INF	0.0988	0.0249	3.9679	0.0008*
IMP	-0.0725	0.0911	-0.7962	0.4353
EXP	-0.2746	0.0513	-5.3514	0.0000*
BCM	0.3454	0.0495	6.9789	0.0000*
GEX	0.4054	0.0902	4.4925	0.0002*
C	10.5022	1.2051	8.7147	0.0000*

*Note: * represents significance at the 5% level.*
Source: Researchers' Computation.

It was observed that exchange rate exerted a positive but insignificant long run effect on manufacturing sector performance in the long run. however, interest rate still exerted a negative and significant effect on manufacturing sector performance even in the long run. This points to the fact that the cost of credit must be kept low for manufacturing firms to be able to borrow for expansion. The coefficient indicated that a 1% increase in interest rate will lead to a 0.2177% decrease in manufacturing sector performance in the long run. This finding is in line with earlier studies like Nwandu (2016), Ojo & Ololae (2014), and Adigun, Ologunwa & Ayilara (2022). Thus, a contractionary monetary policy is likely to stifle manufacturing performance. Inflation rate is also observed to exert a positive and significant effect on manufacturing sector performance since rising prices acts as incentive for profit making. A 1% increase in the inflation rate will lead to a 0.0988% increase in manufacturing sector performance in the long run.

While imports exerted a negative but insignificant effect on manufacturing sector performance, the effect of export is negative and significant in the long run. This finding reveals a contradictory result to findings from the work of Mlambo (2020) where a positive effect of export on manufacturing sector performance was established. The case of Nigeria could be that Nigeria only export primary products and not key manufactures. This therefore acts as a disincentive to manufacturing firms in Nigeria.

The bank credit to the manufacturing sector was observed to exert a positive and significant long run effect on manufacturing sector performance during the study period. This therefore points to the importance of credit in manufacturing capacity to expand their operations. The coefficient indicates that manufacturing sector performance will improve by about 0.3454% for every 1% increase in credit to the sector. The findings align with earlier works like Oparah, Ugochukwu, & Okoye (2023), Ibrahim, Abdulrahman, & Abubakar (2021), and Elijah (2018). Government expenditure was also observed to exert a positive and significant long run effect on manufacturing sector performance. This therefore points to the critical role that the government plays in the provision of economic overheads for the smooth running of manufacturing firms. The coefficient indicated that for every 1% increase in government

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expenditure, the manufacturing sector performance improved by 0.4054% on the average. The constant term portrays that holding all the explanatory variables constant, the manufacturing sector will only contribute 10.50% to the GDP of Nigeria.

Post Estimation Diagnostic Tests

The first post estimation diagnostic test presented is the normality test for residuals. This is presented in Figure 3.

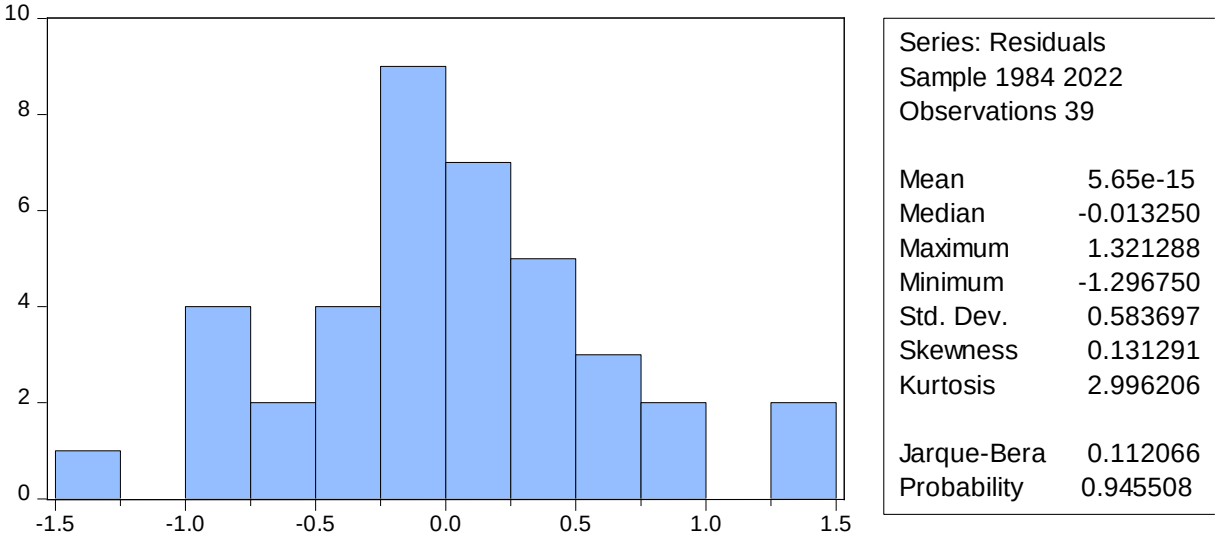

Figure 3: Histogram Normality Test for Residuals.

Given the test result, it can observe that the Jarque-Bera statistic of 0.112066 is not statistically significant at the 5% level (p = 0.9455). Thus, the residuals are normally distributed.

The heteroscedasticity test is also conducted to test for whether the variance of the error terms is constant. Table 8 presents the result of the test.

Table 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.970923	Prob. F(18,20)	0.5220
Obs*R-squared	18.18702	Prob. Chi-Square(18)	0.4434
Scaled explained SS	4.773839	Prob. Chi-Square(18)	0.9992

Source: Researchers' Computation.

Since both the F-statistic and the Chi-square statistic are statistically insignificant, the null hypothesis is accepted, and we conclude that there is no heteroscedasticity in the model. Consequently, the variance of the error terms is homoscedastic.

The stability test is also conducted to check whether the parameter estimates are stable for the purpose of inference. The cumulative sum (CUSUM) of squares is plotted and the result is presented in Figure 4.

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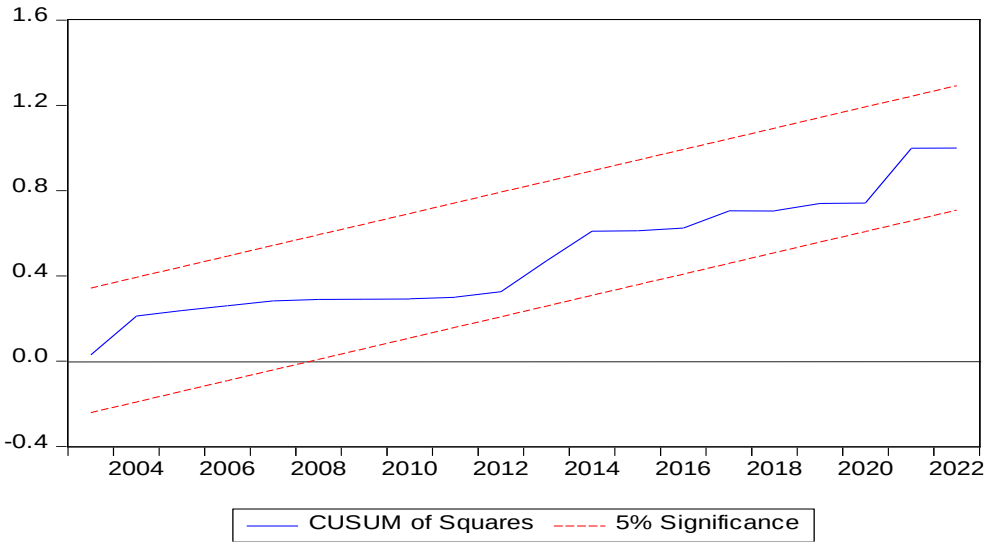

Figure 4: Cumulative Sum (CUSUM) of Squares Test for Stability

The result of the CUSUM of Squares test indicated that the line lies within the lower and upper bounds at the 5% level of significance. Consequently, the parameter estimates are stable for proper inferences to be drawn.

DISCUSSION OF MAJOR FINDINGS

The major findings of the study are as follows:

i) Exchange rate exerted a negative and significant effect on manufacturing sector performance in Nigeria. Thus, exchange rate depreciation is likely to negatively impact the manufacturing sector in Nigeria.
ii) Interest rate exerted a negative and significant effect on manufacturing sector performance in Nigeria. Thus, a contractionary monetary policy will stifle the performance of the manufacturing firms.
iii) Bank credit to the manufacturing sector exerted a positive and significant effect on manufacturing sector performance in Nigeria. Hence, increased credit expansion will accelerate productivity and growth within the sector.

CONCLUSION AND RECOMMENDATIONS

Achieving a stable exchange rate is desirable for an economy. Exchange rate affects other prices within the economy especially in an import dependent economy like Nigeria. Since majority of the inputs, especially plants and machineries, required by a manufacturing firm are imported, exchange rate fluctuations creates uncertainties among investors within the industry. The Nigerian economy in recent times have experienced drastic depreciation of the currency from ₦0.61/US$1 in 1981 to ₦ 634.08/US$1 in 2023, such has caused imports to be very expensive. This therefore create an additional cost for the manufacturing firms in Nigeria with attendant effect on the production level. As such, this paper examined the effect of exchange rate on manufacturing sector performance in Nigeria from 1981 to 2022. With the variables in the model being stationary in mixture of levels and first difference as reported by the augmented

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Dickey-Fuller test, the autoregressive distributed lag model (ARDL) was employed for the analysis.

The Bounds test for cointegration revealed the existence of long run relationship in the model and as such, we estimated both the short run and the long run model. In the short run, exchange rate was observed to exert a negative and significant effect on manufacturing sector performance. This means that high exchange rate (depreciation) leads to a decline in the manufacturing sector performance in Nigeria during the study periods. However, the long run result indicated a positive but insignificant effect of exchange rate on the performance of the manufacturing sector. It was also observed that while interest rate exerted a negative and significant effect on the manufacturing sector, bank credit to the manufacturing sector and government expenditure exerted a positive and significant effect on the sector's performance. It is within these findings that the paper concluded that exchange rate depreciation has been the one of the key factors stifling the performance of the Nigerian manufacturing sector over the years.

Consistent with the key findings of the study, the following recommendations are therefore provided:

i) Exchange rate stability is necessary to curb the uncertainties associated with the import bill of pertinent inputs required by the manufacturing sector. It is pertinent that the monetary authority of the country, the Central Bank in this regard, must consistently deploy the managed float to shield the foreign exchange market from the whims and caprices of the market forces in the determination of exchange rate.

ii) Interest rate must be kept relatively low while considering the inflationary tendencies within the economy. The monetary authority's drastic decision to increase the interest rate in order to curb inflation will only continue to worsen the performance of the real sector (the manufacturing sector in particular) since the cost of borrowing will discourage firms within the manufacturing sector to borrow. This will even stifle the performance of the manufacturing sector, increases cost of domestic manufactured products relative to foreign goods with the attendant effect of excessive importation which further weakens the naira.

iii) Increased lending to the manufacturing sector should be encouraged by increasing the proportion of credit to the manufacturing sector. Data have shown that the proportion of bank credit to the manufacturing have consistently declined from 30.99% in 1981 to 17.36% as of 2023. There is therefore the need to revisit the credit need of the manufacturing sector with greater involvement of the Bank of Industry.

iv) Government must continue to spend on key sectors of the economy, especially in the area of infrastructure development. This will create the needed economic overheads needed for manufacturing firms to thrive.

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