Asian Journal of Economics and Finance. **2024**, 6, 4 : 381-395
ISSN: 2582-340X
https://DOI:10.47509/AJEF.2024.v06i04.04

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Academic Open Access Publishing
www.arfjournals.com

Exchange Rate and Industrial Sector Performance in Nigeria

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ARTICLEINFO

Received: 12 August 2024
Revised: 27 September 2024
Accepted: 05 October 2024
Online: 30 October 2024

To cite this paper:

Hassan O. Ozekhome & Abdul-Ganiyu Braimah (2024). Exchange Rate and Industrial Sector Performance in Nigeria. *Asian Journal of Economics and Finance.* 6(4), 381-395. https://DOI: 10.47509/AJEF.2024.v06i04.04

Abstract: The paper empirically examines the nexus between exchange rate and industrial sector performance in Nigeria using annual time series data for the period 1986-2023. It utilizes the techniques of co-integration and error correction model (ECM). The empirical results show a negative and significant link between exchange rate and industrial sector performance in Nigeria. Credit to the private sector as ratio of GDP is positively related to industrial performance albeit a weak impact. Electricity supply is positively related to industrial sector performance but not significant, while the effect of lending rate is negative and significant. Further evidence show a positive and significant relationship between technological progress and industrial performance. Against the backdrop of the foregoing findings, there is need for the adoption and implementation of a stable, realistic and competitive exchange rate that will stimulate industrial sector performance in Nigeria. Increased lending at sectoral-induced concessional interest rate is also important. Finally, a stable, reliable, accessible and efficient power supply as well as technological development are necessary to propel rapid industrial sector growth and development in Nigeria.

JEL Classification: F31, F4, L16

Keywords: Exchange rate, Industrial sector performance, Managerial enterprise, Technology, Innovation

1. Introduction

The exchange rate is an important macroeconomic variable whose value has implications for external balance and international competitiveness. As a monetary concept, the nominal exchange rate (NER) is the price of one currency in terms of another (Obadan, 1994). To this end, it facilitates the conversion of prices quoted in different currencies into a common denomination. The NER differs from the real exchange rate (RER) to the extent that the latter reflects the domestic NER adjusted for changes in price level differential between the domestic economy and the rest of the world. RER may also be viewed as the price of tradable goods in relation to non-tradable goods. Changes in the nominal exchange rate affect the imports and exports trade as well as capital flows of a country and hence, the balance of payments. The real exchange rate (RER) which reflects the domestic NER adjusted for price level differential between domestic

economy and the rest of the world is of even greater significance than the NER as it determines international competitiveness and resource allocation within the economy (Obadan & Ozekhome, 2016). It also affects investment, inflation, foreign trade flows, balance of payments, fiscal viability, international competitiveness, efficiency in the allocation of resources, external debt crisis, employment, productivity, and consumption.

The industrial sector, on its part, plays a crucial role in any modern economy, with several dynamic benefits and positive linkages for economic transformation. For an advanced economy or a growing sector, it is the basis for technological development and sustained economic growth (Ozekhome, 2020). As an avenue for increasing productivity in relation to import replacement and export expansion, creation of foreign exchange earning capacity, rising employment and per capita income, it also has distinctive consumption patterns. In addition, it creates capital investment at a faster rate than any other sector of the economy, while promoting wider and more effective linkages among different sectors (Ogwuma, 1995, cited in Loto, 2012). Given the critical role of the industrial sector to rapid industrialization, technological and innovative advancement, employment generation, foreign exchange earnings, and substantial poverty reduction, greater policy emphasis is usually devoted to it, particularly as regard the quest to diversify the productive base of the economy and attain rapid economic transformation.

The role of exchange rate and its impact on the industrial sector performance has continued to generate interest among economists. Many economists argue that exchange rate stability facilitate production activities and overall positive macroeconomic performance. They also contend that excessive depreciation of the exchange rate could harm industrial growth, particularly, when such industries are highly import dependent. To this end, a large volume of the literature on international trade and finance focuses on the effect of real exchange rate changes on economic performance, with several researchers (see Ogundele, 2000; Ilegbinosa, Uzomba & Somigri, 2012; Ozekhome & Mohammed, 2015) showing the effect of exchange rate changes on key macroeconomic variables such as investment productivity, consumption, trade and capital flows. Nigeria is heavily factor and capital import-dependent. As such, the ability to locally source the required inputs in the manufacturing sector is a function of a sound, stable and competitive exchange rate. Consequently, the real exchange rate plays a critical role in the ability of the economy to attain a realistic growth in the industrial sector (Ehinomen & Oladipo, 2012). For example, volatility in the exchange rate induces uncertainty and risk in investment decisions with destabilizing impact on industrial performance.

1.2. Statement of Problem

The exchange rate in Nigeria in recent times has undergone tremendous depreciation, as the Nigerian currency has depreciated on a number of occasions in response to market fundamentals, to attain a realistic exchange rate that would facilitate improved macroeconomic performance and diversify the productive base of the economy. This makes it imperative to ask the question: what is the impact of exchange rate on industrial sector performance in Nigeria? Since the industrial sector in Nigeria is heavily dependent on critical inputs and capital machineries, changes in the exchange rate are most likely to affect industrial performance. Excessive depreciation of the naira relative to the US dollar hurts the performance of the industrial sector as the sector depends heavily on imports for key industrial inputs and capital machineries. For instance, businesses (base on the exchange rate) set out the amount of money to be committed into acquiring raw materials and equipment/machines from abroad. In the same manner, they estimate their future stream of incomes. Depreciation and or instability in the exchange rate may therefore, distort the realization of such estimates.

Exchange rate depreciation results in high cost of importing raw materials and capital goods. This in turn, raises the cost of production and reduces the profits of the firms importing these items. In order to cushion the effects of high cost of production, firms pass it on to the consumers in form of higher prices, thus contributing to inflation through the cost-push channel and mark-up effect. The combination of production decline and reduction in domestic exportable goods results to trade deficits and deterioration of balance of payments, as well as decline in the welfare of the people. Added to this, industrial performance in Nigeria is constrained by host of challenges to include poor funding and access to credit, high cost of inputs and capital machineries required for production, exorbitant lending rate, low managerial skills, inadequate infrastructures, lack of modern technology, government bureaucracy, unfair competition, unfriendly business environment and multiple taxation and unreliable power supply. The combination of these factors and other factors tend to limit industrial performance in Nigeria. Following these challenges, the potential for rapid industrial development is limited. While the channels through which exchange rate movement affects the industrial sector are well known in the literature, the extent to which it affects the industrial sector in Nigeria is the imperative for this study. This study is thus motivated by the desire to examine the effects and extent to which changes in the exchange rate affects industrial performance in Nigeria. In addition, given the recent policy quest in diversifying the productive base of the economy form the volatile influence of an overbearing dependence

on oil, the development of the industrial sector constitutes a the major channel to raise real sector productivity and output The recognition of this gap and foregoing necessitates this study.

Following the introduction, the paper is organized as follows. Section 2 presents a review of the literature, which consists of the theoretical and empirical literature Section 3 deals with the methodology, model specification and data. The empirical results and analysis is presented in Section 5, and Section 6 concludes the paper, with some evidence-based policy recommendations.

2. Literature Review

2.1. Theoretical Literature

Exchange rate is said to depreciate if the amount of domestic currency required to buy a foreign currency increases. On the other hand, the exchange rate appreciates if the amounts of domestic currency required to buy a foreign currency reduces. An appreciation in the real exchange rate may create current account problems because it leads to overvaluation. Overvaluation makes imports artificially cheaper while exports become relatively expensive, with the result of reducing international competitiveness (Takaendessa, 2006). Exchange rate depreciation results in high cost of production, particularly raw materials and capital goods. For an import-dependent economy like Nigeria, it fuels inflationary pressures through the cost-push channel, as producers and firms increase prices, via the mark-up. This ultimately leads to production decline and unemployment. Added to these, are reduction in exports, accumulation of trade deficits and deterioration of balance of payments, as well as decline in the welfare of the people.

The short-term equilibrium real exchange rate is the rate that equilibrates current foreign exchange supply and demand in the absence of official intervention. On the other hand, the long-run equilibrium real exchange rate is the rate that ensures that that the current account balance (current and future) is compatible with long-run sustainable capital flows for external equilibrium and that non-tradable goods market clears with employment at its natural level for internal equilibrium (Edward, 1989, cited in Kumm, 1993). In simplified terms, and in the context of tradable and non-tradable items, the equilibrium real exchange rate is the relative price which results in the simultaneous attainment of equilibrium in the external sector and in the domestic economy (i.e non-tradable sector) (Obadan, 1994). In line with the traditionalists, under the output effect, exchange rate depreciation, promotes trade balance, and alleviates balance of payment difficulties, as the production of exportable goods

and services is encouraged in domestic industries by discouraging imports whose prices have become relatively higher due to depreciation. By making domestic goods cheaper in the international market, the depreciation of the domestic currency accordingly encourages domestic production thus, stimulating the capacity of domestic industries.

Industrial development is a process by which a country acquires the technological and productive competence for semi-finished or finished manufactured or industrial goods and equipment. Industrial development entails structural transformation such that there is increased share of manufactured and industrial products in an economy. Although technological development is a prerequisite for industrial development, the industrial sector is the fundamental propeller of technological development and innovation (Ernst, Ganiastor & Mytelka, 1994; Okafor 2008; Ozekhome, 2020). Industrial growth requires improved production techniques, technological development, innovation and managerial expertise that facilitate the production of high-scaled manufactured and industrial goods (Ozekhome, 2020). Industrial development enhances employment generation through entrepreneurship development and thus, has the capacity to improve the living conditions of the people. The industrial sector plays an important intermediating role by fostering strong industrial linkages with positive economic and social implications, and diffusion of techniques by producing inputs and services for the large-scale units in the domestic and export market. The industrial sector therefore, induces many dynamic benefits and positive spillovers relevant for rapid and sustained economic growth.

The indisputable importance of the progressive performance of the industrial sector in the Nigerian economy cannot be-over-emphasized considering its employment potentials and financial impacts on the economy. Apart from its role of building grounds for development through the laying of solid foundation for the economy, it also serve as import-substituting industry and provides ready - market for intermediate goods. The industrial sector contributes significantly to the nation's economic development through increase in government revenue, employment generation; infrastructural growth, contribution to the Gross National Product (GNP) of the country through earnings from exportation of industrial manufactured goods, manpower development, technological transfer, amongst others. In addition, the industrial sector fosters bilateral relationship through increased international trade, as well as stimulating foreign direct investment.

2.2. Empirical Literature

Ogundele (2000) utilized simultaneous equation to estimate the impact of macroeconomic variables, such as exchange rate on industrial output for the

period 2001-2005 (i.e. period of alternative trade and exchange rate policies). The empirical findings showed that exchange rate and trade policy were negatively and statistically significant related to real non-oil export growth. He attributed the findings to the fact that production activities in Nigeria non-oil sector depend heavily on imported inputs. He maintained that the theoretical expectation that currency depreciation promotes domestic output could not be empirically validated in Nigeria. He concluded by using simulation analysis to show that appreciation of the domestic currency promotes the demand for foreign inputs and has a high tendency to promote domestic production (industrial output).

Schnabl (2007) found robust evidence using panel estimation that real exchange rate stability is associated with greater industrial output growth in the European Monetary Unit (EMU) periphery. The evidence is strong for emerging Europe, which has moved to a more stable environment. Although several studies found evidence for contractionary effect of depreciation on output (see for example, Kandil, 2004), a pocket of other studies (e.g. Bahmani-Oskooee & Kandil, 2007) found evidence for expansionary effects of real exchange rate depreciation. Yaqub (2008) found that appreciation of real exchange rate exert positive impact on real industrial growth in Nigeria.

David, Umeh and Ameh (2010) examined the effect of exchange rate movement on the Nigerian industrial sector. They employed multiple regression and found evidence of a negative relationship between exchange rate depreciation and industrial sector performance. Razazadehkarsalari, Haghiri and Behrooznia (2011) found that during stagnation and low price period in Iran, the depreciation of currency has positive and significant impact on real manufacturing industry GDP, while depreciation has insignificant effect during periods of high price. Usman (2011) empirically examined the nexus between real exchange rate misalignment and macroeconomic performance in Nigeria for the period 1970 to 2007. They employed the cointegration and the error correction mechanism to investigate the long run, as well as the short run relationship between real exchange rate and its major economic fundamentals. The results showed that real exchange rate appreciation lowers domestic manufacturing exports in Nigeria by increasing export prices.

Aliyu (2011) applying several econometric analysis found that the appreciation of real exchange rate results in increased imports and reduces industrial export, while depreciation expands exports and discourage imports. Further evidence showed that the depreciation of real exchange rate tend to cause a shift from foreign goods to domestic goods. Hence, it leads to diversion

of income from importing countries to exporting countries through a shift in terms of trade, and this tend to have impact on the exporting and importing countries economic growth.

Ehinomen and Oladipo (2012) examined the impact of exchange rate management on the performance (growth) of the industrial sector in Nigeria. Using Ordinary Least Square (OLS) multiple regression analysis for a study period of 1986 – 2010, the empirical findings show that depreciation had no significant link with industrial sector productivity. They further found that exchange rate appreciation promoted the growth in the manufacturing industrial sector. They therefore recommended that government should direct its exchange rate management policy towards real exchange rate appreciation in order to reduce the cost of production in the manufacturing industrial sector, which is heavily dependent on imports for on factor– inputs. Loto (2012) examined the impact of global economic downturn and the associated exchange rate changes on the manufacturing sector in Nigeria with quarterly time – series data spanning two periods, (2005 Q1 – 2006 Q4) and (2007 Q1 to 2008 Q4) and also empirically pooled the data for the two periods. Using multiple regression technique, the study found that global economic meltdown has insignificant effect on manufacturing sector of the Nigerian economy.

Ilegbinosa, Uzomba and Somigri (2012) investigated the impact of macroeconomic variables, like exchange rate on the performance of the Nigerian economy from 1986 – 2010. Using OLS and cointegration test analysis, the result indicated that real exchange rate is positively related to the industrial sector. The study further showed that a 10% appreciation in the real exchange rate spurs the growth of the industrial subsector by 1.97%. Azeez, Funso and Ajayi (2012) found evidence that unwarranted changes in exchange rate has asymmetric effects on macroeconomic aggregates, like as output.

Ozekhome and Mohammed (2015) empirically examined the nexus between real exchange rate (RER) and manufacturing sector's performance in Nigeria. They utilized the techniques of cointegration and error correction model (ECM). The empirical findings show a negative and significant relationship between real exchange and manufacturing performance in Nigeria. Based on this, they recommend the adoption of a realistic exchange rate to enhance the performance of the manufacturing sector and make it relevant for rapid and sustained economic growth in Nigeria.

In another dimension, Ozekhome (2020) investigated the link between macroeconomic variables, including electricity supply and industrial development in Nigeria. He utilized the techniques of cointegration and dynamic error

correction on annual time series data spanning the period 198-2018. The empirical results show evidence of a short-run dynamic and a long-run equilibrium relationship between electricity supply and industrial development in Nigerian. Specifically, electricity supply has a negative and insignificant effect on industrial development in the short run, and a positive and moderate impact in the long-run. Exchange rate has a positive, albeit a non-significant effect on industrial development. The author recommended effective and efficient policies to enhance industrial development in Nigeria in the area of accessible, reliable, efficient and sustainable electricity supply, including sound exchange rate management. Some other studies that found a significant nexus between exchange rate and industrial sector performance are IMF (2023) and UNCTAD (2024).

From the review of the pertinent literature, it appears that the findings of empirical studies on the exchange rate-industrial performance nexus are still mixed and inconclusive for, thus, warranting further empirical investigations.

3. Empirical Methodology

3.1. Model Specification

To investigate the nexus between exchange rate and industrial sector performance in Nigeria, a stylized exchange rate-industrial sector performance model is specified in the form:

$$INDSP_t = f(EXR_t, X_{it}) \tag{1}$$

where INDSP is the dependent variable, here industrial sector performance, EXR is the real exchange rate; *t*, is time, and *X* is a vector of additional macroeconomic variables in line with the literature, that influence industrial performance (see Ozekhome, 2020).

The variables are commercial bank loans- i.e. credits to the private to GDP percent (CPS); lending rate (LR), electricity supplied to the industrial sector (ELECTS) and technological progress (TECH). Following this, the expanded version of the model is specified as:

$$INDSP_t = f(EXR_t, CPS_t, LR_t, ELECTS_t, TECH_t) \tag{2}$$

The empirical specification of the model to be estimated is therefore:

$$INDSP_t = \alpha_0 + \alpha_1 EXR_t + \alpha_2 CPS_t + \alpha_3 LR_t + \alpha_4 ELECTS_t + \alpha_5 TECH_t, + \varepsilon_t \tag{3}$$

$\alpha_1 - \alpha_5$ are parameters to be estimated, t represents period, and ε is the unobserved error term.

$$Apriori, \alpha_1, \alpha_3 < 0; \alpha_2, \alpha_4, \alpha_5 > 0.$$

3.2. Definition of Variables and Sources of Data

The definitions of the variables in the model, unit of measurement, as well as the sources of data are provided in Table 1.

Table 1: Definition of Variables, Measurement and Data Sources

Variable	*Description/Measurement*	*Source*
Industrial Performance	Growth rate of industrial output in GDP	CBN
Exchange rate	Nominal exchange rate adjusted for price level differential between domestic economy and the rest of the world (i.e. the US).	World Bank
Commercial bank loans (credits)	Credit to the private sector as ratio of GDP	CBN
Lending Rate Electricity supply	Maximum Lending rate Electricity supplied to the industrial sector (in Mega Watts per hour).	CBN Power Holding Company of Nigeria (PHCN)
Technological progress	Total factor productivity growth-residual from the estimation of the simple Cobb-Douglass production function, where Total output (Q) =F(L,K).	World Bank

Source: Author's compilation.

3.2. Estimation Technique

The study employs Cointegration and Error correction Model (ECM) approach to examine the empirical nexus between exchange rate and industrial sector performance in Nigeria. As a preliminary tool, the unit root properties of the time series variables are investigated since the regression of non-stationary time series variable on another may yield spurious and inconsistent parameter estimates (Engle & Granger, 1987). The study covers the period 1986 – 2023. The choice of the period is partly dictated by data availability, and because it encompasses several policy reforms, incentives, initiatives and institutional support aimed at enhancing industrial sector performance in Nigeria. The starting year (1986), epitomizes significant policy reforms and development in exchange management in Nigeria, specifically exchange rate liberalization

4. Results and Discussion

4.1. Descriptive Statistics

The descriptive statistics of the variables used for the analysis are presented in Table 2. The mean value of industrial sector performance (measured as share of

industrial output in total output) is 4.25 percent, with a median value of 3.83. The wide gap between the maximum and minimum values of 4.25 and 0.25 and the standard deviation of 3.28 is an indication of disparity and instability in industrial sector performance in Nigeria over the period . The mean value of exchange rate (corrected for inflation/production costs) is 115.2. The maximum and minimum values are 215.3 and 40.91, respectively. The corresponding average values for credit to the private, lending rate, electricity supply, and technological progress are 12.84, 21.25, 2024.6 and 0.971, respectively.

Table 2: Descriptive Statistics

	Mean	*Median*	*Max.*	*Min.*	*Std. Dev.*
INDSP	4.25	3.83	9.20	0.25	3.28
EXR	115.2	112.3	215.3	40.91	28.26
CPS	12.84	11.05	36.75	5.82	6.50
LR	21.25	21.36	36.10	10.05	5.98
ELECT	2,024.6	1,980.4	4025.3	926.7	142.28
TECH	0.97	0.78	13.52	-8.50	7.22

Source: Author's computation

4.2. Unit Root Test for Stationarity

Unit root test involves the test of stationarity for variables used in regression analysis. The importance of stationarity of time series used in regression borders on the fact that a non-stationary time series cannot generalize to other periods apart from the present. This makes forecasting based on such series of little practical value. Moreover, regression of a non-stationary time series on another non-stationary time series may produce spurious result. The Augmented Dickey Fuller (ADF) test is employed in order to analyze unit roots. The results are presented in levels and first difference in Table 3.

Table 3: Unit Root Stationary Test for Variables in Levels and First Difference

Variables	*ADF Statistic (in Levels)*	*ADF Test Statistic (in First Difference)*	*Order of Integration*	*Remark*
INDSP	-1.3274	-5.1174	I(1)	Stationary
EXR	-0.8251	-4.2814	I(1)	"
CPS	-1.1123	-5.2260	I(1)	"
LR	-1.7302	-4.7753	I(1)	"
ELECT	-0.9721	-4.2212	I(1)	"
TECH	-0.0741	-4.3262	I(1)	"

Source: Author's computation

The unit root test in the table above using the ADF test statistic shows that at the 5% level of significance, the null hypothesis of no unit root could not be rejected for the time series data implying that the variables were non-stationary at levels. Following Box, Jenkins and Reinsel (1994) that non-stationary time series in levels maybe made stationary by taking their first differences, the first differences of the respective variables is conducted. After first differences, the variables became stationary i.e. $t_{cal} > t_{tab}$ in absolute term. This implies that the variables are difference-stationary, attaining stationary after first difference. They are thus integrated of order one (i.e. I [1].

4.3. Johansen Test for Co-integration

Having established that the series in the analysis are not stationary in their levels, the test of cointegration is conducted to determine if they are cointegrated. The Johansen Cointegration test approach is used. The result of the multivariate cointegration test is presented in Table 4.

Table 4: Johansen Multivariate Cointegration Tests Results

Trace Statistic			*Maximum Eigenvalue Test*			
Null Hypothesis	*Test Statistic*	*Critical Value*	*Null Hypothesis*	*Test Statistic*	*Critical Value*	*Hypothesized No of CE(s*
r = 0*	128.24	84.28	r = 0*	78.14	65.15	None**
r ≤ 1 *	85.21	56.07	r = 1*	46.20	48.17	At most 1**
r ≤ 2*	51.35	42.05	r = 2*	38.25	39.33	At most 2**
r ≤ 3*	28.46	20.72	r = 3*	19.72	17.16	At most 3**
r ≤ 4*	9.27	7.22	r = 4*	6.97	6.15	At most 4**
r ≤ 5*	0.07	0.09	r = 5*	0.09	0.09	At most 5

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level(**) denotes rejection of the hypothesis at 5% significance level.
Source: Author's computation

As can be seen from the table, both the ë-max and the trace test statistics indicate that there is at least five significant cointegrating vector among the variables since the hypothesis of no cointegrating vector (r=0) is to be rejected. Apparently, the number of cointegrating relations or vectors (indicated by r) is at least five. The implication of this is that a long run relationship exists between exchange rate and industrial sector performance in Nigeria. Given the existence of cointegration (cointegrating vectors) among the series, the requirement for fitting in an Error Correction Model (ECM) is satisfied.

4.4. The Error Correction Model (ECM)

The results of the error correction model is presented in Table 5. An examination of the results show impressive goodness of fit. The adjusted R-squared value indicates that the independent variables and the ECM explain 92 percent of the net systematic variations in industrial sector performance in Nigeria. The F-value of 85.4 is significant at the 1 percent level, validating the hypothesis of the existence of a significant linear relationship between dependent variable and the explanatory variables.

Table 5: Error Correction Model Results

Dependent Variable: INDSP		
Variable	*Coefficient*	*T-ratio*
C		
DLINDP (-1)	-0.0174	1.1624
DLEXR	-0.0673	-2.1422**
DLCPS	0.1782	1.4472
DLR	-0.2013	-2.0763**
DELECTS	0.0840	1.2107
DTECH	1.4211	3.2248***
C	0.1174	1.0261
ECM(-1)	-0.7341	-3.225**

R-squared =0.961Adjusted R-squared = 0.920F-statistic= 85.4(0.000)Mean VIF = 6.15Breusch- Godfrey Serial Correlation LM Test = 1.25 (0.34)Breusch-Pagan-Godfrey Heteroskedasticity Test = 0.867 (0.53)
Note: *, **, ***, implies statistical significance at 10%, 5 % and 1% levels, respectively
Source: Author's computation

The coefficient of lagged industrial performance is positively signed but fails the significance test. Thus, past realizations of industrial sector performance do not significant influence current or future levels of industrial performance. The coefficient of the exchange rate variable (adjusted for inflation/rising production costs) is negatively signed in line with economic theory and significant at the 5 percent level. Thus, the depreciation of the exchange rate has a destabilizing effect on industrial sector performance, given the import-dependent nature of local industries. The result corroborates the findings of Kandil (2004), Yaqub (2008), Ozekhome and Mohammed (2015), and at variance with Razazadehkarsalari et al (2011) and Aliyu (2011). A unit percent depreciation in the exchange rate diminishes industrial sector performance by 0.07 percent. The coefficient of credit to the private sector is appropriately positive but is not statistically significant. Since the t-value is greater than 1, it can be inferred that credit to the industrial sector positively industrial sector performance in Nigeria but the effect is weak. The coefficient of lending rate (proxied by the maximum

lending rate) is negatively signed in consistency with apriori expectation and statistically significant at the 5 percent level. Thus, high and exorbitant cost of lending on loanable funds dampens industrial sector performance in Nigeria. This is because, apart from discouraging industrial initiative, it increases production costs via the cost-push, with the consequence of output deterioration in the industrial sector. The result confirms the findings of Nwandu (2016). A unit percent increase in bank credit to the private sector stimulates industrial sector performance by 0.18 percent, while that of lending rate leads to a decline in industrial sector performance by 0.20.

The coefficient of electricity supply fails the significance test, though positively related to industrial performance. The observed statistical insignifance may be due to poor and erratic power supply that results to production decline and stoppages in industrial firms, with many of the industrial firms resorting to self-generating plants, with the resultant rise in production costs. The finding is in sync with the findings of Ozekhome (2020). A 1 percent improvement in the supply of electricity to the industrial sector stimulates industrial sector performance by 0.08 percent. Finally, the coefficient of technology (measured by growth rate of total factor productivity) is positively related to industrial performance and statistically significant at the 1 percent level. Thus, technological progress is a propelling force for industrial development in Nigeria. The result is consistent with the findings of Ozekhome (2020). A 1 percent improvement in technological progress engenders industrial sector growth by 1.42 percent.

Apart from the diagnostic statistics, the coefficient of the error term is appropriately negative and significant at the 5 percent level. Its coefficient of 0.73 indicates that the contemporaneous speed of adjustment of industrial sector performance to long-run equilibrium after a temporary disequilibrium and perturbation is 72 percent. The post-estimation evidence show a mean variance inflation of 6.15 that is below the threshold of 10; an indication that there is no multi-collinearity in the model. The Breusch-Godfrey LM serial correlation test leads to the non-rejection of the null hypothesis of no serial correlation {with F-Statistic = 1.25 (0.34)}. The heteroscedasticity test using the Breusch- Pagan-Godfrey test approach also confirms the absence of heteroscedasticity in the model. The estimated model is thus fit and consistent for structural and policy perspectives.

5. Conclusion

This paper empirically examined the nexus between exchange rate (with other control variables) and industrial sector performance in Nigeria using the techniques of cointegration and error correction model over the period 1986-

2023. The empirical findings show a negative and significant relationship between exchange rate and industrial performance in Nigeria. This implies that capricious depreciation of the exchange rate hurts industrial sector performance in Nigeria. Other variables that significantly influence industrial sector performance are lending rate (i.e. cost of loanable funds) and technological progress. Credit to the private sector is positively related to industrial sector performance, albeit a weak impact, while the effect of electricity supply is not significant due perhaps to the poor electricity supply in the country

Against the backdrop of the positive spillover effects, revenue generating capacity and employment potentials of a vibrant industrial sector, it is important that government and policy makers implement sound, stable and competitive exchange rate policy, anchored on diversifying the productive base of the economy through industrial sector enhancement in Nigeria. Improved lending to the industrial sector at concessional lending rates, provision of stable and efficient electricity supply as well as rapid technological drive are other important ways of enhancing industrial sector performance in Nigeria.

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