



Exchange Rate Volatility and Productivity in Nigeria: An Empirical Analysis

Monica A. Orisdare ^a and Sodik Olofin ^{a*}

^a Obafemi Awolowo University, Ile-Ife, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/ajebe/2024/v24i61357>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/117064>

Original Research Article

Received: 04/03/2024

Accepted: 08/05/2024

Published: 14/05/2024

ABSTRACT

The volatile movement in Nigeria's exchange rate constitutes a severe headwind to the economic activity in the country and the eventual performance of productivity and economic growth. Therefore, this study sought to investigate the impact of exchange rate volatility on productivity in Nigeria. Due to the seemingly mixed order of integration in the variables, the Johansen and Bound cointegration tests were used to establish that there are long-run relationships between the variables. Following the cointegration tests, the analysis of the study was based on the Autoregressive Distributed Lag (ARDL) Model. The findings from the study revealed that exchange rate volatility negatively impacts productivity in Nigeria in the short run and in the long run. However, the financial development in Nigeria negatively impacts productivity, reflecting the underdevelopment of the financial system to transmit its function to the real sector. Other variables considered emphasise persistence in the way they impact productivity. The article also emphasised the need for the harmonisation of foreign exchange management guidelines and clarity and transparency in the management of the foreign exchange market.

*Corresponding author: E-mail: sodik.olofin@yahoo.com;

Keywords: Exchange rate volatility; productivity; financial development; ARDL; economic growth; economic globalization.

1. INTRODUCTION

With growing economic globalisation and interdependence of economies, the movement in the exchange rate has become an important factor impacting economic performance, particularly with increasing dependence on imports among developing countries [1,2,3]. The concerns around exchange rate movement, especially for productivity growth, are amplified due to the influence of the exchange rate on factor input costs, domestic demand in the face of foreign substitutes, and the balance sheet effects [4-8]. While this points to the trade channel of exchange rate impact on economic activities, it also emphasises the financial channel as exchange rate volatility impacts the credit position of companies and banks [9,2].

The Nigerian economy has been grappling with low productivity across various sectors, a trend that has persisted over the years. The abrupt and severe movement in the exchange rate has been identified as a critical factor hampering productivity, particularly as Nigeria relies heavily on imports for major raw materials and intermediate inputs [5,10-12]. Over the past decade, Nigeria has been plagued by significant volatility in the exchange rate, with the Naira depreciating from NGN158.6/US\$ in 2014 to an average of N645/US\$ in 2023. The situation worsened in the first quarter of 2024, with the

Naira exchange rate plummeting to N1650/US\$ before recovering to below N1000/US\$ in the second quarter of the year.

The turbulent exchange rate movements in Nigeria have profoundly impacted economic growth over the years [5,6,12-14]. Nigeria's economic growth, which averaged 1.98% between 2014 and 2023, starkly contrasted with the average growth of 6.73% in the previous decade [15,16]. Exchange rate movements have also significantly hampered productivity [5,6,12-14]. The compound annual productivity growth rate has been 1.95% over the past decade [15,16]. The exchange rate volatility has not only restricted access to Forex for importing raw materials and intermediate inputs but has also escalated the operating costs of businesses in Nigeria, thereby severely limiting their productivity potential and competitiveness. (See Fig.1)

With Nigeria's current deficiency in growth performance, productivity growth is essential to propel accelerated growth. Despite the government's persistent efforts to manage the exchange rate market, including the adoption of fixed, managed float, and free float regimes, the impact on stabilising the Naira and supporting productivity has been minimal. This underscores the urgency of exploring the link between exchange rates and productivity growth in Nigeria.

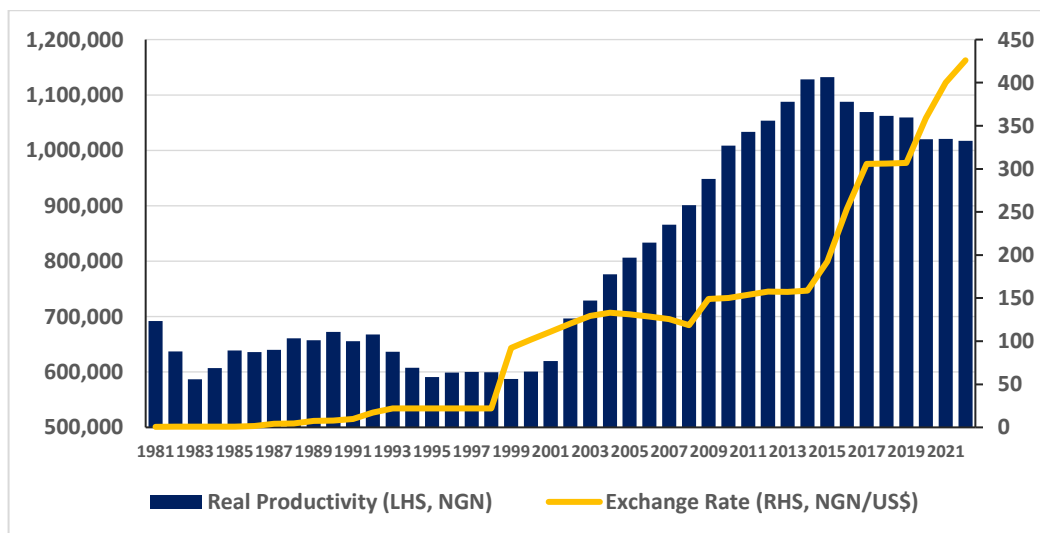


Fig. 1. Trajectory of Exchange Rate and Real Productivity in Nigeria

Source: NBS, CBN & WDI

Based on a global review of the literature, studies such as Aghion et al. [4], Cravino [1], Jiang et al. [17], Ahangari and Hasanpour [18], and Eklou [2] have come up with empirical evidence on the impact of the exchange rate on productivity in an economy; however, they have mixed evidence. In Nigeria, studies on the subject are limited. Studies such as Oseni et al. [3], Ayobami [11], Kenny [12], and Jacob [19] gave a shot at it at the businesses or sectoral level; however, no study has considered the impact of exchange rate volatility on productivity at the macroeconomic level. Therefore, this study seeks to investigate the impact of exchange rate volatility on productivity in Nigeria. Findings from the study will aid understanding of the dynamics of productive activity in the face of exchange rate volatility and guide policymakers and businesses on the kind of responses to exchange rate shocks.

The rest of the paper is ordered as follows: Section Two presents an understanding of the literature, Section Three presents the methodology, Section Four discusses the findings, and Section Five presents the conclusion and recommendations.

2. UNDERSTANDING THE LITERATURE

Abrupt and drastic movements in the exchange rate are major factors adversely impacting productivity and economic growth in Nigeria. Kim and Loayza [20] partitioned the determinants of productivity innovation, education, market efficiency, infrastructure, and institutions. Given that foreign exchange facilitates input importation, exchange rate consideration falls within the market efficiency factors that impact productivity. The literature on the relationship between exchange rate volatility and economic performance has been diverse and inconclusive. The medium through which exchange rate volatility impacts businesses and productivity appears numerous in the literature. One major way of understanding the movement of exchange rates includes the analysis of nominal changes in the value of a currency over time and how they impact business operations. Researchers, in an empirical engagement, often subjected the exchange rate series to ARCH/GARCH transformation. On the other hand, researchers have considered the misalignment of the current exchange rate from the long-run trajectory of the currency, thereby analysing the overvaluation and undervaluation of the currency. In addition, studies have shown that exchange rates pass

through to economic activities. The following discussed these dimensions.

i. Exchange Rate Volatility

The rapid movement in the exchange rate, especially upward, has been the major bane to economic activities and productivity in Nigeria. The impact of nominal changes in the exchange rate on business operations has been adverse, mainly as many sectors and industries depend on imports for certain operations. While this position is apparent, findings from the literature appear diverse, especially at the aggregate level. In a recent study on India, Iqbal et al. [21] reported that exchange rate fluctuation has a detrimental influence on economic growth. Abbasi and Iqbal [22] endorsed this position, arguing that exchange rate fluctuation has a detrimental influence on economic growth. Other research, such as Ehikioya [6], Jehan and Irshad [23], Rashid et al. [24] and Ramoni-Perazzi and Romero [25], reinforce the negative impact of currency rate volatility on the economy. Nonetheless, Rapetti [26] and Jayathilaka et al. [27] found that exchange rate volatility had a favourable impact on Sri Lanka's economy.

Scholars' views on the symmetric impact of currency rate fluctuation on the economy differ because it creates uncertainty and discourages investment inflows. Furthermore, Jayathilaka et al. [25] found that the choice of control variables could have contributed to the divergence of findings. While the divergence might not cease, the preponderance of research points to the detrimental impact of exchange rate volatility on economic activities, particularly in emerging nations, where it affects capital flows, terms of trade, and exports.

ii. Exchange Rate Misalignment

Theoretically, exchange rate misalignment is a situation where the current real exchange rate diverges from the long-run trajectory of the currency, thereby leading to overvaluation and undervaluation. Empirical analyses such as Nwachukwu et al. [28], Mao et al. [29], Jehan and Irshad [23], Mahraddika [30], Jiang et al. [17], Amor et al. [8], and del Carmen Ramos-Herrera and Sosvilla-Rivero [31] have investigated the impact of exchange rate misalignment on economic activities. These studies have emphasised the role of real exchange rate undervaluation and overvaluation. Methodologically, this speaks to the asymmetric

characteristics of fluctuation in the real exchange rates (see Rapetti, [26]; Ribeiro et al., [32]; Shevchuk and Kopych, [33]; Iqbal et al., [19]).

Popular evidence supports the favourable impact of undervaluation on domestic economic activities, particularly in tradeable sectors. According to Ribeiro et al. [32] and Iqbal et al. [21], currency devaluation promotes economic growth while overvaluation stifles it. Similarly, Abbasi and Iqbal [22], using a non-linear ARDL model, found that undervaluation promotes growth while overvaluation inhibits growth in Pakistan. In a little deviation, Amor et al. [8] concluded that overvaluation has a detrimental influence on Tunisian growth, whereas undervaluation has an insignificant impact. However, there is a point at which currency undervaluation might promote growth. This evidence is especially true in many developing countries, but studies in wealthy nations support a floating exchange rate system that reflects the long-run real exchange rate [34,25].

Operationally, exchange rate misalignment could be a fallout of missteps in macroeconomic management or structural challenges in the economy. In Nigeria, for example, policy inconsistency and lack of coordination have been major challenges in managing the economy. Over the past decade, the fiscal policy side has embarked on a heavy expansionary policy, growing public debt from N11.84 trillion in 2014 to N97.34 trillion (Ways and Means inclusive) as of 2023. On the monetary policy side, the Central Bank of Nigeria (CBN) has maintained a contractionary stand, probably to mop up liquidity created by the fiscal side. However, its quasi-fiscal intervention of providing concession loans to businesses and persistently exceeding constitutional limits for Ways and Means constitute policy contradictions. These policy actions over the years have consistently bolstered the money supply, increased the prices of goods, both tradeable and non-tradeable, and dislocated the real exchange rate path. Besides, structural issues such as infrastructural deficiencies, insecurity, and other policy and regulatory encumbrances have suppressed domestic productivity and hiked local prices, fuelling exchange rate misalignment in Nigeria.

iii. Passthrough of Exchange Rate Volatility on the Economy

While some studies emphasise the role of asymmetry or misalignment in the relationship

between exchange rate volatility and economic performance, others, such as Guzman et al. [34], Ehikioya [6] and Jehan and Irshad [23], argue that directly relating exchange rates to economic growth may not provide a complete explanation because some factors during the interaction also play an essential role. According to Ehikioya's [6] findings, exchange rate volatility has a favourable impact on the economy by increasing financial development (credit to the private sector) and moving crude oil prices. Similarly, Jehan and Irshad [23] and Eklou [2] found that the influence of exchange rate volatility on economic and productivity growth is amplified or reduced depending on the level of financial development and investment inflows.

Jiang et al. [17] pointed to the role of import intensity and industrial resource allocation efficiency, whereas Rashid et al. [24] emphasised export intensity as a transmission channel. Ramoni-Perazzi and Romero [25] also highlighted the corruption channel of transmission as well as the financial development channel. They concluded that the higher the level of corruption in the economy, the more significant the impact of exchange rate volatility on economic growth. Tochkov [35] stated in a regional study that the effect of exchange rate volatility is dependent on the economy's exposure to the international commodity market in terms of resource dependence.

The routes of transmission or indirect channels of the influence of exchange rate shocks on economic performance differ among nations. Experts cite financial development as a primary conduit for passing exchange rate shocks to the economy. These findings suggest that most of these economies are still underdeveloped in governance, institutional, and market systems that promote optimal economic outcomes from exchange rate movements.

iv. Experience of developing countries vis-à-vis developed countries

From a developing countries' perspective, most evidence directly relating exchange rate volatility to economic growth suggests negative relationships [6,22,21,31]. However, some divergence comes into play when further contexts are considered. Evidence from advanced countries favours a floating exchange rate system that mirrors the long-run real exchange rate [34,25]. Meanwhile, evidence in

most developing countries emphasised the existence of deviation from long-run real exchange rate, with currency undervaluation having a positive impact on economic growth while overvaluation has a negative effect on growth [29,26,32,33,17,8,21]. These findings also reiterate that most of these economies are still less developed across some governance, institutional, and market systems that support optimal economic exchange rate outcomes.

v. Evidence on Nigeria

Findings from Nigeria are consistent with those of the developing economy due to the low level of development in the financial sector and dependence on imports for finished goods. Ehikioya [12] and Moses et al. [12] reported that exchange rate volatility significantly negatively affects the Nigerian economy. Further evidence from Ehikioya [6] emphasised the past through of financial development and oil price movement in the relationship between exchange rate volatility and economic activity in Nigeria. Meanwhile, focusing on productivity, studies such as Oseni et al. [3], Ayobami [11], Kenny [12], and Jacob [19] have emphasised mixed findings on the impact of exchange rate; however, at the business or sectoral level. Therefore, a dearth of studies considering the effects of exchange rate volatility on productivity at the macroeconomic level exists.

3. METHODOLOGY

3.1 Data Properties

The data analysis in this study is based on annual data points spanning between 1981 and 2022, covering periods of prior and post Structural Adjustment Programme (SAP), the Global Financial Crisis, reasonable episodes of oil price shocks with significant impacts on the exchange rate and productivity, the COVID-19 pandemic which constrained the global supply chain, etcetera. Productivity (PROD) is captured by dividing the economy's total output (nominal GDP) by the number of workers available for jobs (labour force) in the economy. The exchange rate is based on the annual average of the official exchange. One major variable considered in the study is the credit to the private sector (CPS) used to capture financial development, recognised by the extant literature as a major channel through which exchange rates impact economic activities. Other variables considered in the study include fiscal deficit (FSD) and

money supply (MS2) to capture the roles of fiscal and monetary policies, respectively and inflation to capture a real sector factor. The data used in this study were sourced from the National Bureau of Statistics (NBS), World Bank - World Development Indicators, and the Central Bank of Nigeria (CBN).

3.1.1 Descriptive statistics

Table 1 presents the descriptive statistics of the variables considered in the study. All the variables, except productivity, are in their base form. Exchange rate volatility (EXRV) is captured using the volatility series from the estimation of a GARCH model. CPS, FSD, and MS2 are percentage shares of the nominal GDP, while the INF is the percentage change in the consumer price index. Apart from LPRD, which has slight differences in mean, median minimum, and maximum, all other variables have high divergence. The skewness test shows that EXRV, CPS, INF and MS2 experienced more positive changes than negative ones, while LPRD and FSD experienced more negative changes than positive ones. The Kurtosis and Jargue-Bera test suggest normality in distribution for EXRV, CPS, FSD and INF, while LPRD and MS2 are not normally distributed.

3.1.2 Unit root tests

The unit root test establishes the time series' stochastic property and investigates the order of integration of the variables of interest. This study adopted the conventional Augmented Dickey-Fuller (ADF) of Dickey and Fuller [36] and Phillip and Perron [37] tests. The unit root test results are presented in Table 2. The unit root test shows that all the variables considered in this study are integrated of order one $I(1)$, except for fiscal deficit (FSD), which is integrated of order zero $I(0)$ with constant but integrated of order one $I(1)$ with constant and intercept.

3.1.3 Cointegration tests

The cointegration test is used to investigate long-run relationships among variables of interest. Given that all the variables are integrated of order one based on the unit root tests with constant and trend, the Johansen Cointegration test will be appropriate to establish a long-run relationship among the variables [37]. However, with the FSD being integrated of order zero with constant, it will be sufficient to subject the variables to an Autoregressive Distributed

Lag (ARDL) Bound Cointegration test proposed by Pesaran and Shin [39], which accommodates a mixed order of integration. As presented in Table 3, the null hypothesis of no cointegration will be rejected with three cointegrating equations identified by the Johansen Cointegration test and the F-Statistic of the ARDL Bound test significantly higher than the I(1) bound both at a 5 percent level of significance.

Table 1. Descriptive statistics

| | LPRD | EXRV | CPS | FSD | INF | MS2 |
|--------------|----------|----------|----------|----------|----------|----------|
| Mean | 12.0113 | 7.1147 | 12.6228 | -2.5622 | 18.9475 | 16.6340 |
| Median | 12.3062 | 1.0309 | 8.8651 | -2.5069 | 12.9449 | 14.8080 |
| Maximum | 14.8147 | 34.0426 | 23.7590 | 0.7844 | 72.8355 | 25.9671 |
| Minimum | 8.4932 | 0.0003 | 6.4423 | -8.5696 | 5.3861 | 9.1546 |
| Std. Dev. | 2.1462 | 11.1006 | 5.9949 | 1.8502 | 16.4572 | 4.7799 |
| Skewness | -0.3275 | 1.5210 | 0.5713 | -0.7473 | 1.8758 | 0.4752 |
| Kurtosis | 1.6554 | 3.7559 | 1.5253 | 4.0591 | 5.4343 | 1.9933 |
| Jarque-Bera | 3.9147 | 17.1948 | 6.0902 | 5.8728 | 34.9999 | 3.3544 |
| Probability | (0.1412) | (0.0002) | (0.0476) | (0.0531) | (0.0000) | (0.1869) |
| Observations | 42.0000 | 42.0000 | 42.0000 | 42.0000 | 42.0000 | 42.0000 |

Source: Author's Computation. ARDL: Autoregressive distributed lag

Table 2. Unit root tests

| | Levels | | 1st Difference | | Decision (5%) |
|------------|---------|---------|----------------|----------|---------------|
| | ADF | PP | ADF | PP | |
| LPRD (C) | -1.7917 | -1.3957 | -3.6740 | -3.6324 | I(1) |
| LPRD (C/T) | 0.3182 | -0.3500 | -4.0242 | -3.9822 | I(1) |
| EXRV (C) | -2.3950 | -2.1535 | -4.4709 | -4.5711 | I(1) |
| EXRV (C/T) | -0.7344 | -0.9164 | -5.7341 | -5.7756 | I(1) |
| CPS (C) | -0.8398 | -0.8243 | -6.6174 | -6.6264 | I(1) |
| CPS (C/T) | -2.1297 | -2.1411 | -6.5629 | -6.5726 | I(1) |
| FSD (C) | -3.1057 | -3.1719 | -7.3321 | -9.4729 | I(0) |
| FSD (C/T) | -3.0481 | -3.1263 | -7.2986 | -10.0566 | I(1) |
| INF (C) | -3.0301 | -2.8979 | -5.9005 | -10.6105 | I(1) |
| INF (C/T) | -4.0944 | -2.9440 | -5.8260 | -10.7743 | I(1) |
| MSG (C) | -0.9150 | -0.8435 | -5.5317 | -5.8862 | I(1) |
| MSG (C/T) | -2.7662 | -2.4141 | -5.5085 | -5.9410 | I(1) |

Source: Author's Computation. Note: ADF/PP critical values with intercept are -3.61 (1%), -2.93 (5%) and -2.61 (10%); ADF/PP critical values with trend and intercept are -4.21 (1%), -3.53 (5%) and -3.19 (10%). ADF: Augmented dickey fuller, PP: Phillips-Perron

Table 3. Cointegration test

| Johansen Cointegration Test | | | | | |
|-----------------------------|------------|-----------------|---------------|---------------------|---------------|
| No. of CE(s) | Eigenvalue | Trace Statistic | Probability** | Max-Eigen Statistic | Probability** |
| None * | 0.78817 | 186.3099 | 0.00000 | 62.07881 | 0.0003 |
| At most 1 * | 0.686115 | 124.2311 | 0.00000 | 46.34912 | 0.0049 |
| At most 2 * | 0.61445 | 77.88198 | 0.00210 | 38.12337 | 0.0082 |
| At most 3 | 0.352693 | 39.75861 | 0.09990 | 17.39738 | 0.4248 |
| At most 4 | 0.302859 | 22.36123 | 0.12870 | 14.4307 | 0.2265 |
| At most 5 | 0.179846 | 7.930529 | 0.25740 | 7.930529 | 0.2574 |
| ARDL Bound Test | | | | | |
| F-statistic | 10.3082*** | 10% | 5% | 2.50% | 1% |
| I(0) Bound | | 2.26 | 2.62 | 2.96 | 3.41 |
| I(1) Bound | | 3.35 | 3.79 | 4.18 | 4.68 |

Source: Author's Computation. ARDL: Autoregressive Distributed Lag

3.2 Autoregressive Distributed Lag (ARDL) Model

The ARDL model is developed such that the dependent variable is expressed as a function of lagged variables of itself (autoregressive) and the independent variable alongside their lagged values (distributed lag). The choice of the model is based on the seemingly mixed order of integration among the variables of interest, as the ARDL framework can accommodate variables with I(0), I(1) or both. Moreover, it minimises the random errors that may arise due to the non-stationary nature of some of the variables in the model and is robust to the error of misspecification as all the variables of interest

are endogenous within the ARDL framework [40]. The ARDL model, as proposed by Pesaran and Shin [39] and Pesaran et al. [41], is expressed in compact form as

$$\Phi(L)y_t = \alpha_0 + \alpha_1 w_t + \beta'(L)x_{it} + \varepsilon_t \quad (1)$$

where $\Phi(L) = 1 - \sum_{i=1}^{\infty} \Phi_i L^i$ and $\beta'(L) = \sum_{j=1}^{\infty} \beta_j L^j$ with L , y_t , x_{it} , w_t and ε_t being the lag operators of the dependent variable, vector of independent variables, vector of deterministic variables with fixed lags and the error term, respectively. The ARDL relationship between the variables of interest is expressed as follows:

$$\begin{aligned} \Delta LPRD_t = & \alpha_0 + \rho_i LPRD_{t-1} + \theta_1 EXRV_{t-1} + \theta_2 CPS_{t-1} + \theta_3 FSD_{t-1} + \theta_4 INF_{t-1} + \theta_5 MS2_{t-1} \\ & + \sum_{i=1}^p \varphi_i \Delta LPRD_{t-i} + \sum_{i=0}^q \Phi_{1,i} \Delta EXRV_{t-i} + \sum_{i=0}^q \Phi_{2,i} \Delta CPS_{t-i} + \sum_{i=0}^q \Phi_{3,i} \Delta FSD_{t-i} \\ & + \sum_{i=0}^q \Phi_{4,i} \Delta INF_{t-i} + \sum_{i=0}^q \Phi_{5,i} \Delta MS2_{t-i} + \varepsilon_t \end{aligned} \quad (2)$$

where ρ_i and θ_i are long-run parameters of the dependent variable and independent variables, respectively. Also φ_i and ϕ_i represent short-run parameters of variables in the model. Therefore, the model provides information on the long-run and short-run relationships between the variables of interest.

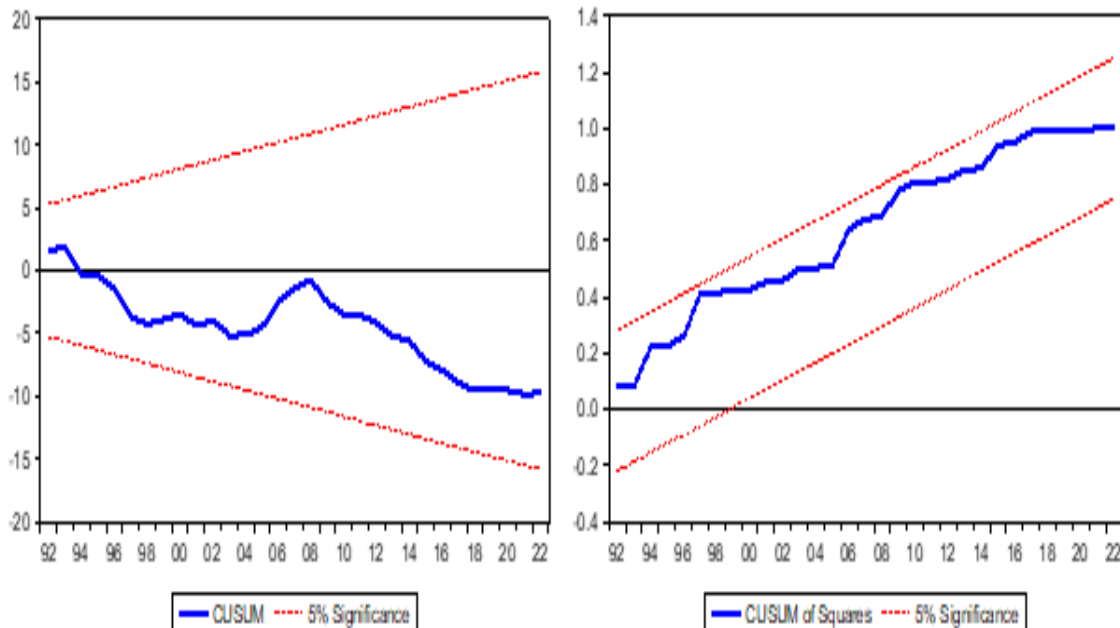


Fig. 2. CUSUM and CUSUM square
Source: Author's computation

Table 4. ARDL model estimation

| | Coefficient | t-Statistic | Prob. |
|---------------------------------------|--------------------|--------------------|--------------|
| Short Run Coefficient | | | |
| LPRD(-1) | 0.9806*** | 65.5688 | 0.0000 |
| EXRV | -0.0057*** | -2.9718 | 0.0057 |
| CPS | -0.0114* | -1.9447 | 0.0609 |
| FSD | 0.0203*** | 3.3601 | 0.0021 |
| FSD(-1) | -0.0132** | -1.9714 | 0.0577 |
| INF | 0.0031*** | 3.8865 | 0.0005 |
| INF(-1) | -0.0008 | -1.2689 | 0.2139 |
| MSG | -0.0059 | -0.8711 | 0.3904 |
| MSG(-1) | 0.0151*** | 3.0085 | 0.0052 |
| C | 0.3973** | 2.4349 | 0.0208 |
| Long Run Adjustment Parameters | | | |
| | -0.00976 | -0.652661 | 0.5188 |
| Long Run Coefficients | | | |
| EXRV | -0.2922** | -2.0177 | 0.0524 |
| CPS | -0.5883 | -0.9973 | 0.3263 |
| FSD | 0.3646 | 0.8852 | 0.3829 |
| INF | 0.1139 | 1.0356 | 0.3084 |
| MSG | 0.4738 | 1.0350 | 0.3087 |
| C | 20.4476** | 2.4841 | 0.0186 |

Source: Author's Computation. ARDL: Autoregressive Distributed Lag

4. EMPIRICAL FINDINGS

Table 4 presents the ARDL estimation of the relationship between exchange rate volatility and productivity in Nigeria. It shows the short-run and long-run effects of exchange rate volatility and other independent variables on productivity. While the long-run adjustment parameter is negative, as expected theoretically from the model, it is not statistically significant, suggesting that adjustment, in the long run, is nonexistent in the model. This could be traced to the lack of statistical significance of all the variables considered in the long-run estimates except exchange rate volatility. The ARDL model is subjected to the CUSUM and CUSUM Square tests to assess its stability. Fig. 2 shows no form of instability in the model's coefficients, as the CUSUM and CUSUM Square statistics of parameter stability fall within the critical bands at a 5% confidence interval.

The findings from the ARDL analysis show that exchange rate volatility negatively impacts productivity in Nigeria in the short run, with a significance level of less than 1%. This suggests that as exchange rate volatility increases, productivity is constrained, leading to lower productivity in the economy. Likewise, in the long run, exchange rate volatility has a negative impact on productivity at a 5% significance level,

with a more severe effect than in the short run. This is a reminiscence of the current reality in the Nigerian economy. With Nigeria's high dependence on imports for raw materials and intermediate inputs, the impact of the volatility in the exchange rate becomes persistent and enduring on productivity in Nigeria, suffocating the efficient operations of businesses, thereby constraining their performance. This finding reiterates the submissions of Aghion et al. [4], who found that exchange rate volatility constitutes a headwind to productivity in an economy. However, it contradicts the conclusions of Ayobami [11] and Oseni et al. [3], who reported otherwise.

Regarding the other variables of interest, credit to the private sector is used to capture financial sector development. The result shows that financial sector development counterintuitively impacts productivity negatively in the short run, with a significance level of 10%. Meanwhile, the long-run relationship is not statistically significant. This emphasises the Nigerian financial system's less-developed nature and inability to support productivity. With the market interest rate in the capital ranging between 25% and 35%, the cost of capital becomes terminal to businesses. The finding, however, contradicts that of Aghion et al. [4], who is the pioneer study on the role of financial sector development in the relationship between exchange rate volatility and productivity.

In terms of the role of policy in the relationship between exchange volatility and productivity, fiscal and monetary policies are captured using the fiscal deficit and money supply. The result shows that fiscal policy, in the immediate short-run, positively impacts productivity, with a significance level of 1%. However, the persistence of fiscal deficit, as reflected by the lag of fiscal deficit, will make fiscal deficit impact productivity negatively. This is intuitive as a fiscal deficit serves as an impetus to expand aggregate demand in the economy and grow economic activities and productivity. However, a persistent fiscal deficit severely impacts the cost of capital and drives inflationary pressures. The evidence from the analysis does not support the long-run relationship between fiscal policy and productivity.

In the immediate short run, the money supply does not impact productivity in Nigeria. However, with a period lag, the analysis revealed that the impact of money supply becomes positive on productivity. This suggests a time lag in transmitting monetary action to economic activities. In the long run, the result suggests no evidence of a long-term relationship between money supply and productivity, making monetary policy a short-term phenomenon in economic activities.

Meanwhile, the inflation rate is an additional variable that captures the real sector. The result shows that inflation immediately impacts productivity but without a lagged or long-run impact. This emphasises how the price rise can motivate productivity in the short term. Though not supported statistically, the result shows that a persistent rise in inflation becomes inimical to productivity.

5. CONCLUSION AND RECOMMENDATIONS

Exchange rate volatility has been a major bane to productivity growth in Nigeria over the past decade. This is due to its impact on input costs, as Nigeria has a maladjusted dependence on imported raw materials and intermediate inputs, especially equipment. Hence, this article attempts to investigate the impact of exchange rate volatility on productivity in Nigeria. The analysis is based on the ARDL model following a mixed order of integration among the variables considered. The findings from the study revealed that exchange rate volatility has a negative impact on productivity in both the short run and

the long run. Meanwhile, credit to the private sector used to capture financial development impacts productivity negatively, emphasising Nigeria's less developed financial system. The findings emphasise that monetary policy exhibits lags in its impact on economic activities, while the persistence of fiscal deficit can become perilous for productivity. However, the inflation rate positively impacts productivity in the short run.

Having established a negative relationship between exchange rate volatility and productivity in Nigeria, this study recommends that the government needs to facilitate uniform and appropriate pricing of foreign exchange rates, ensure efficient management of foreign exchange access, enhance domestic productivity to boost the foreign exchange availability, provide clarity and ensure transparency in market operations, and develop an efficient capital mobility framework.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Cravino J. Exchange rates, aggregate productivity and the currency of invoicing of international trade. In Working Paper; 2017.
2. Eklou K. Dollar exchange rate volatility and productivity growth in emerging markets: Evidence from Firm Level Data; 2023. Available at SSRN 4484773
3. Oseni IO, Adekunle IA, Alabi MO. Exchange rate volatility and industrial output growth in Nigeria. *Journal of Economics and Management*. 2019;38(4):129-156.
4. Aghion P, Bacchetta P, Ranciere R, Rogoff K. Exchange rate volatility and productivity growth: The role of financial development. *Journal of Monetary Economics*. 2009;56(4):494-513.
5. Oloyede JA, Fapetu O. Effect of exchange rate volatility on economic growth in Nigeria (1986-2014). *Afro-Asian Journal of Finance and Accounting*. 2018;8(4):404–412.
6. Ehikioya BI. The impact of exchange rate volatility on the Nigerian economic growth: An empirical investigation. *Journal of*

- Economics and Management. 2019;37(3):45-68.
7. Omoregie OK, Olofin S. Corporate performance in Nigeria: The effect of oil price and exchange rate fluctuations. *International Journal of Economics and Financial Issues*. 2020; 10(1):170-179.
 8. Amor TH, Nouira R, Rault C, Sova AD. Real exchange rate misalignments and economic growth in Tunisia: New evidence from a threshold analysis of asymmetric adjustments. *The Quarterly Review of Economics and Finance*. 2023;88:215-227.
 9. Avdjiev S, Bruno V, Koch C, Shin HS. The dollar exchange rate as a global risk factor: Evidence from investment. *IMF Economic Review*. 2019;67(1):151–173.
 10. Adeniyi AP, Olasunkanmi AO. Impact of exchange rate volatility on economic growth in Nigeria (1980-2016). *International Journal of Management Studies and Social Science Research*. 2019;1(4):6-14.
 11. Ayobami OT. Exchange rate volatility and the performance of manufacturing sector in Nigeria (1981–2016). *African Journal of Economic Review*. 2019;7(2):27-41.
 12. Kenny SV. Manufacturing sector performance, exchange rate volatility and inclusive growth in Nigeria (1981-2015); 2019.
 13. Moses TK, Victor OU, Uwawunkonye EG, Fumilade OS, Nathaniel G. Does exchange rate volatility affect economic growth in Nigeria. *International Journal of Economics and Finance*. 2020;12(7):1-54.
 14. Comfort AB. The impact of exchange rate volatility on economic growth in Nigeria: A dynamic econometric approach. *African Journal of Business and Economic Development*; 2021. ISSN, 2782, 7658
 15. Central Bank of Nigeria (2024) 2022 Statistical Bulletin - Real Sector. Available:<https://www.cbn.gov.ng/documents/Statbulletin.asp>
 16. National Bureau of Statistics (2024). Nigeria Gross Domestic Product Q4 2023. Available:<https://nigerianstat.gov.ng/elibrary/read/1241460>
 17. Jiang C, Wu F, Yan H. Exchange rate appreciations and the distribution of productivity: Is importing inputs sustainable for emerging countries? *Sustainability*. 2022;14(22):15005.
 18. Ahangari A, Hasanpour S. The effect of real exchange rate volatility on productivity growth in Iran with the role of financial development. *Growth*. 2023;1:2.
 19. Jacob OD. Effect of Foreign Exchange Rate Volatility on Industrial Productivity in Nigeria, 1981-2015; 2019.
 20. Kim YE, Loayza N. Productivity growth: Patterns and determinants across the world. *World Bank Policy Research Working Paper*. 2019;8852.
 21. Iqbal J, Mahmood F, Nosheen M, Wohar M. The asymmetric impact of exchange rate misalignment on economic growth of India: An application of Hodrick–Prescott filter technique. *Economic Analysis and Policy*. 2023;77: 809-823.
 22. Abbasi GA, Iqbal DJ. The asymmetric impact of RER-Misalignment on economic growth: An application of Hodrick–Prescott filter technique. *The Singapore Economic Review*. 2021;1-29.
 23. Jehan Z, Irshad I. Exchange rate misalignment and economic growth in Pakistan: The role of financial development. *The Pakistan Development Review*. 2020;81-99.
 24. Rashid A, Khan A, Fraz A. Effects of export orientation, exchange rates and leverage on firm productivity: Evidence from Pakistan. *Global Business Review*, 09721509211056480; 2021.
 25. Ramoni-Perazzi J, Romero H. Exchange rate volatility, corruption, and economic growth. *Heliyon*. 2022;8(12).
 26. Rapetti M. The real exchange rate and economic growth: A survey. *Journal of Globalization and Development*. 2020;11(2):20190024.
 27. Jayathilaka R, Rathnayake R, Jayathilake B, Dharmasena T, Bodinayake D, Kathriarachchi D. Exploring the growth direction: The impact of exchange rate and purchasing managers index on economic growth in Sri Lanka. *Quality and Quantity*. 2023;57(3):2687-2703.
 28. Nwachukwu NE, Adebayo RO, Shettima AM, Anigwe JO, Udechukwu-Peterclaver CT. Real effective exchange rate misalignment in Nigeria. *CBN Journal of Applied Statistics*. 2016;7(1):71-91.
 29. Mao R, Yao Y, Zou J. Productivity growth, fixed exchange rates, and export-led growth. *China Economic Review*. 2019;56:101311.
 30. Mahraddika W. Real exchange rate misalignments in developing countries: The role of exchange rate flexibility and

- capital account openness. *International Economics*. 2020;163:1-24.
31. Del Carmen Ramos-Herrera M, Sosvilla-Rivero S. Economic growth and deviations from the equilibrium exchange rate. *International Review of Economics and Finance*. 2023;86:764-786.
 32. Ribeiro RS, McCombie JS, Lima GT. Does real exchange rate undervaluation really promote economic growth? *Structural Change and Economic Dynamics*. 2020;52:408-417.
 33. Shevchuk V, Kopych R. Exchange rate volatility, currency misalignment, and risk of recession in the central and eastern European countries. *Risks*. 2021;9(5): 82.
 34. Guzman M, Ocampo JA, Stiglitz JE. Real exchange rate policies for economic development. *World Development*. 2018;110:51-62.
 35. Tochkov K. Regional real exchange rates and growth: Evidence from resource-based regional economies. *Review of International Economics*. 2021;29(3): 626-640.
 36. Dickey DA, Fuller WA. Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: Journal of the Econometric Society*. 1981;1057-1072.
 37. Phillips PC, Perron P. Testing for a unit root in time series regression. *Biometrika*. 1988;75(2):335-346.
 38. Johansen, Søren. "Statistical analysis of cointegration vectors." *Journal of economic dynamics and control* 12, no. 2-3 (1988): 231-254.
 39. Pesaran MH, Shin Y. An autoregressive distributed lag modelling approach to cointegration analysis. Cambridge, UK: Department of Applied Economics, University of Cambridge. 1995;9514.
 40. Arize AC. A convenient method for the estimation of ARDL parameters and test statistics: USA trade balance and real effective exchange rate relation. *International Review of Economics and Finance*. 2017;50:75–84.
 41. Pesaran MH, Shin Y, Smith RJ. Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*. 2001;16(3):289-326.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/117064>