



EXCHANGE RATE VOLATILITY AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

This study was centered on the impact of Naira/United States Dollar exchange rate on economic growth in Nigeria from the point of uninterrupted democratic governance- 1999 to 2025 with the nominal gross domestic product as an indicator of economic growth. The study was underpinned by using the Mundell-Fleming Model, Purchasing Power Parity Theory and Endogenous Growth Theory. The research design applied was an ex post facto type of research and the philosophy of the research was positivism, while research data was secondary data obtained once a year from official research data sources. The methods that were adopted included graphical presentation, descriptive statistics, Augmented Dickey-Fuller unit root test, Autoregressive Conditional Heteroscedasticity model (ARCH) and Generalized Autoregressive Conditional Heteroscedasticity model (GARCH). Hypotheses were tested at 5 per cent significant level. The results of the unit root tests showed that the nominal gross domestic product, and the exchange rate were integrated of order one. The results of the Autoregressive Conditional Heteroscedasticity are significant and hence indicated the presence of significant conditional volatility, the results of the Generalized ARCH are also significant showing the presence of significant volatility clustering and persistence with the combined persistence coefficient of 0.872951. The result of the Naira/United States Dollar exchange rate and the Nominal gross domestic product indicated that there was a positive and significant relationship with probability value = 0.0000 which is less than the critical value of 0.05, therefore, the null hypothesis was rejected. The study concluded that exchange-rate shocks were significant for both the nominal economic performance and were supported over time, but that the positive relationship did not necessarily indicate a positive real economic performance. Based on the findings of this study, the Central Bank of Nigeria (CBN) was recommended to introduce the rule based foreign-exchange intervention policy to help regulate the excessive fluctuation of foreign exchange rate.

KEYWORDS: *Economic growth, exchange-rate volatility, Naira/United States Dollar exchange rate, nominal gross domestic product and Nigeria.*

1.1 INTRODUCTION

The stability of exchange rates has a strategic role in the management of macro-economy of open economy countries as the volatility of the domestic currency affects domestic production costs, investment and on international trade, capital inflow and overall economic activity. The degree of uncertainty, or exchange rate volatility, by which any currency changes its value over time compared to another currency can influence the household, firm and investor's capabilities to make decisions. Therefore, changes in the exchange rate may have rapid effects on the level of economic activity in developing economies where intermediate and capital goods are frequently imported. Scholars (Ramoni-Perazzi & Romero, 2022; Din et al., 2024) confirmed that exchange rate volatility has a significant negative impact on economic growth both within and across countries. Therefore, it is important to consider this relationship in the context of the Nigerian economy, which has seen big fluctuations of the naira to the United States dollar and conversely, the Nigerian economy's performance has also undergone significant changes. Likewise, the Nigerian economy can be impacted by exchange rate fluctuations, in terms of the cost of imported machinery, raw materials other productive inputs, as well as with respect to exports, expectations of investment and domestic prices. Relatedly, Orisdare and Olofin (2024) argued that exchange rate volatility negatively impacts productivity in Nigeria both in the short and extended period, while Ezenwaka et al. (2025) revealed that exchange rate shocks impact negatively on manufacturing value added, manufacturing exports and employment. These suggest indicate that forex market volatility may have an impact on the real economy and the productive factors of the economic performance. Therefore, this study sought to ascertain the relationship between exchange rate volatility and economic growth in Nigeria.



1.2 Statement of the Problem

In Nigeria, one of the key macro-economic challenges is the exchange rate instability, which has been characterized by the upward and downward fluctuation of Naira to Dollar resulting in uncertainty in the country's production, investment, international trade and economic activities. This is a critical issue particularly for the period 1999 – 2025 as it represents Nigeria's continuous time under civil rule. Although successive democratic governments in this period have been followed by some re-engineering of the monetary and foreign exchange policy, the naira has been through a lot of instability, leaving a lot of questions as to the impact of exchange-rate volatility on the performance of the Nigerian economy. Iheanachor and Ozegbe (2021) noted that the ongoing changes in the foreign exchange rate affected Nigeria's economy performance negatively in the extended period, while Olabisi and Akeju (2024) observed that the exchange rate volatility affected Nigeria's growth negatively. Therefore, the fundamental empirical question is whether the effect of exchange rate changes on Nigeria's growth is positive, negative or unknown both in sign and magnitude. The exchange rate was found to negatively and substantially affect Nigeria's GDP growth rate in the short-run and long-run by Ezeokoye et al. (2025) and a significant negative relationship was found amidst exchange rate fluctuations and economic growth in Nigeria by Ozigbo et al. (2025). Boboye and Ezekiel (2023) on the other hand showed that exchange rate is positively and substantially related to economic growth and Okonkwo (2026) found out that exchange rate is insignificant on GDP but is a significant determinant of extended period variation in economic growth. The findings of such studies have been varied, however, making it hard to identify the effect exchange-rate volatility may have on the overall economic performance of Nigeria.

Real GDP or GDP growth rate has been adopted to measure economic growth in many literatures in Nigeria. For instance, Ezeokoye et al. (2025) utilized GDP growth rate while Zebulon (2024) investigated real GDP growth with respect to the exchange-rate fluctuations. However, Obi-Nwosu (2024) broke from this trend to look at nominal GDP and discovered that there is positive and significant relationship amidst exchange-rate fluctuation and nominal GDP, but used OLS regression and Granger causality for the period 2001-2022. In addition, studies such as that of Olabisi and Akeju (2024) have indicated the need to have an explicit volatility and not the level of the exchange-rate as volatility.

Past studies in Nigeria have either ended at 2025, covered time ranges that covered political regimes or focused on the real GDP or GDP growth rate to measure economic growth, rather than the estimated volatility of the exchange rate. For instance, Iheanachor and Ozegbe (2021) covered 1986–2019, whereas Obi-Nwosu (2024) examined 2001–2022. Therefore, limited evidence is employed in this regard to investigate the volatility as said to be associated with the Naira/US Dollar exchange rate vis-à-vis nominal GDP in the unabated democratic era (1999-2025) in Nigeria. The study tries to fill the void by establishing exchange-rate volatility and nominal economic performance relationship in the Nigerian democratic era (1999-2025).

Hypotheses

H₀₁: There is no significant relationship amidst Naira/US Dollar exchange rate and gross domestic product in Nigeria.

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Exchange Rate Volatility

The EXRV is the degree of fluctuation, frequency and irregularity of the change in the price of one currency over a period of time with regard to another currency. The 'EXRV' does not reflect the amount of volatility of the exchange-rate, but rather the volatility of the exchange-rate movement. So, if the currency moves slowly with no so much volatility, it is some level of volatility, but if it's a lot of volatility, it takes place regularly and the moves are unpredictable then it is high volatility. For Ramoni-Perazzi and Romero (2022), the EXRV is defined as one that can generate uncertainty for economic agents, while Olabisi and Akeju (2024) considered it as a time varying instability in the movement of the exchange-rate, which is captured econometrically. In the open economy, particularly the EXRV is important as the exchange rate has a price and information role. External financial obligations, the price of internationally-traded goods in domestic currency, and on foreign assets are all affected by changes in exchange rates, among others. However, if these changes are only temporary, then the economic agents have to cope with additional uncertainty regarding future revenues, costs and returns. The exchange-rate instability was said to be due to uncertainty about revenues versus costs of international transactions (IMF, 1984), and Ramoni-Perazzi and Romero (2022) identified a potential impact of exchange rates not just on the level of currency appreciation and depreciation but also on the allocation of investment resources and productive structure.

2.1.2 Economic Growth

Economic growth is a simple macro-economic concept which can simply be defined as an increase in the value of output of goods and services in an economy in terms of productive and monetary value over time. It is a measure of how well the economy can produce total output and typically is measured as a growth of GDP. GDP is measured as sum of the gross value added of all resident producers, plus



product taxes (excluding subsidies, which are considered part of the value of products) and GDP growth is conventionally measured at constant prices (World Bank, 2026). The International Monetary Fund (IMF) also sees GDP as a summary measure of production in an economy and differentiates amidst variations due to output and to price changes (IMF, 2026). Thus, economic growth is basically about a rise in the overall level of economic output while economic development is about welfare, productive structure, institutional capacity and living conditions. Thus, a rise in GDP does not automatically imply a rise in the distribution of income or welfare of individuals. But what makes GDP continue to be important is its ability to capture the value added in a production process and that for a long time it has served as a systematic measure of the size of an economy (IMF, 2026; World Bank, 2026).

2.2 Theoretical Framework

2.2.1 Mundell-Fleming Model

The Mundell-Fleming Model was developed independently by J. Marcus Fleming and Robert A. Mundell from the traditional Keynesian IS-LM model in the early 1960s and for the open economy. Fleming (1962) discussed government policies in a fixed and flexible exchange regime and Mundell (1963) brought in international capital mobility in macroeconomic stabilisation policies. Fleming (1962) and Mundell (1963) were building on the work of these two when they developed the theory of the effects of exchange-rate regimes on domestic output and the effectiveness of economic policies in an economy open to international goods and financial markets.

There are some important assumptions made in the model. It normally assumes a small open economy, which cannot influence the world interest rate and is so well integrated into the world financial markets that capital is free to move across countries. The strong version of the model assumes that capital is perfectly mobile, so that domestic interest rates can be permanently different from the world interest rate only if there are large capital flows (Mundell, 1963; Obstfeld, 2001). It also assumes that in the short run with productive resources being unemployed, the supply of output is elastic and variations in aggregate demand are not absorbed in the prices. It also makes the assumptions that investment is inversely related to the interest rate, money demand is a function of income and interest rate, and net exports are a function of domestic income, foreign income and exchange-rate changes (Fleming, 1962; Mundell, 1963).

2.2.2 Endogenous Growth Theory

Among the theories of extended period economic growth endogenous growth theory has been noticed to be in vogue during 1980s as an alternative explanation as the traditional neoclassical theory of growth failed to explain technological progress within the system. The main contributors of this theory were Paul M. Romer (1986), who developed a extended period growth model, where knowledge is an important factor of production, and increasing returns can occur, and Robert E. Lucas Jr (1988), who emphasized on the importance of human capital accumulation, through education, training and learning by doing, as a key factor in economic development. Therefore, endogenous growth theory tries to understand the process of continuous economic growth by focusing on factors generated in the economy itself and not only the technological changes which are externally determined (Lucas, 1988; Romer, 1986).

One crucial notion in the endogenous growth theory is that the investment can have a permanent impact on the growth path of the economy. The Romers framework alters the thinking about investment as merely increasing the quantity of physical capital to the notion that investment can also lead to the production of something new—knowledge—that can be incorporated into the production of other producers to increase their productivity. Romer (1986), however, showed that knowledge spillovers can cause increasing aggregate returns even with the competitive organization of all the firms. A complementary mechanism was presented by Lucas (1988) who demonstrated that increasing human capital through school education and learning-by-doing can be a mechanism that can continue the economic development of a country over time. These propositions distinguish amidst endogenous growth models and models which suggest that the long-run growth effect of additional capital accumulation will be reduced in the extended period (Lucas, 1988; Romer, 1986).

2.3 Empirical Review

Zhu et al. (2026) examined the working of real EXRV misalignments on Turkish economy. The non-linear ARDL model was used to incorporate non-linearities, and thresholds were identified by the Hansen approach, which allows overvaluations and undervaluations to impact growth positively and negatively. The study results indicate that the aberrations from the equilibrium rates negatively affect economic growth of Turkey, that the impacts of EXRV misalignment on economic growth are asymmetric (i.e. overvaluation and undervaluation have different impacts) and that there are thresholds in terms of the effects of EXRV misalignment on economic growth. Oyadeyi (2026) in his study highlighted the factors influencing the EXRV in Nigeria and the effect of EXRV on Nigeria macroeconomic performance. It was found that ARCH and nonlinear generalised ARCH effects existed in the results. Moreover, the results revealed that MPR, average lending rate, oil prices, government expenditure and financial development are all important factors influencing the EXRV in Nigeria.



Ezenwaka et al. (2025) examined the effect of EXRV on manufacturing sector of the Nigeria economy amidst 1981 and 2022. From the above findings from the FMOLS regression, the positive influence of EXRV on the manufacturing value added and negative impact of EXRV shocks on manufacturing value added of the Nigeria manufacturing sector were observed.

Pappas and Boukas (2025) examined the impact of the inflation rate and the EXRV on the economic growth of the economies in the European Union (EU) amidst 2000 and 2023. The findings of this study did not show a negative effect of the inflation rate on the economic growth. But economic growth was highly substantially being influenced by EXRV.

3.0 Methodology

The design of the study was an ex post facto study, in order to investigate the effect of EXRV on economic growth in Nigeria 1999 – 2025. The design was suitable as the variables had already taken place in history, and could not be manipulated or controlled by the researcher. The study was based on the positivist research philosophy. Positivism assumes that the observable phenomena is measurable objectively, and that the relationships amidst the variables can be investigated by systematic empirical procedures and statistical analysis. The study data was made up of quantitative secondary time series data of annual observations for the years 1999-2025. The quantitative data was the characteristic of the data obtained in this research, namely EXRV data and nominal GDP data which was presented numerically and then analyzed statistically and econometrically. The major source of data was the Central Bank of Nigeria (CBN) Statistical Bulletin and statistics database.

The level of variability in the Naira/US Dollar EXRV (₦/US\$), was operationally defined as EXRV. The EXRV for the observations was derived from the EXRV statistics reported by the CBN which gives the EXRV of the naira with respect to the US dollar. The value of current gross domestic product was measured as a total monetary value of the aggregate of domestic production at current prices. This was based on the observations of annual nominal GDP (in current Nigerian naira).

Several factors were cited in the selection of the EXRV such as the unpredictable naira value which would impact on import cost, investment decision, production condition and the domestic monetary value of economic activities. Empirical evidence (Olabisi & Akeju 2024; Orisdare & Olofin 2024) has shown the impact of EXRV on economic performance and productivity in Nigeria. The Naira/US Dollar EXRV was especially pertinent, in that the CBN officially quotes in Naira/US Dollar and that there are historical series that can be analyzed.

The study is an adaptation of the models of Olabisi and Akeju (2024) and Orisdare and Olofin (2024) with some modification. The research is based on a three-model evaluation, the functional model is:

$$NGDP = f(EXRV) \quad 3.1$$

$$GDP_t = \alpha_0 + \alpha_1 EXRV_t + \xi_t \quad 3.2$$

Where: NGDP = Nominal gross domestic product

EXRV = Exchange rate volatility

α_0 = intercept, and α_1 = coefficient. ξ = Error term. The study adopted the use of descriptive statistics, unit root, ARCH, and GARCH techniques in analyzing the data.

On Apriori Expectations

The hypothesis that was mooted was that volatility of the Naira/US Dollar EXRV would have a depreciating link on nominal GDP of the country, that is, the higher the volatility of the EXRV of Naira/US Dollar the poorer the economic performance, ceteris paribus. This is because, uncertainty about the EXRV could have an impact on investment, the cost of imports could be more variable, as well as productive activity being impacted. Olabisi and Akeju (2024) have reported negative effect of EXRV on Nigeria's growth while Orisdare and Olofin (2024) have reported negative effect of the volatility of the EXRV on productivity. So, the a priori value of the coefficient for exchange-rate volatility was taken as: $\alpha_1 < 0$

But this hope was to be tested empirically as evidence from Nigeria was not consistent. But Obi-Nwosu (2024) discovered that there is a positive and significant relationship amidst EXRV fluctuation and nominal GDP, which suggests that divergent outcomes are possible with regards to measurement and specification of the model. So, the negative a priori expectation was tested and the final endpoint of the empirical results of the research was not assumed to be the same.



4.0 RESULTS AND DISCUSSION

4.1 Results and Analyses

Table 4.1: Presentation of Descriptive Statistics Result

	NGDP	EXRV
Mean	92594.73	304.9100
Median	71713.94	157.3100
Maximum	302800.8	1478.970
Minimum	5426.471	92.69000
Std. Dev.	83449.77	356.0297
Skewness	1.015753	2.622529
Kurtosis	3.146709	8.859265
Jarque-Bera	4.667106	69.57183
Probability	0.096951	0.000000

Source: E-views 10 Output

The average of the nominal GDP was ₦92,594.73 billion while the median was ₦71,713.94 billion. The mean is the average monetary value of the total domestic production in Nigeria for the period of study while the median indicates that 50% of the data was less than the value of ₦71,713.94 billion and 50% of the data was greater than this value. Because the mean was greater than the median there was positive evidence of a positive skew in the nominal GDP distribution. This was due to the nominal GDP was considerably higher at the end of the study period. This relatively big observation in the more recent years, therefore, resulted in an upward revision of the arithmetic mean.

The highest nominal GDP value was ₦302,800.80 billion whilst the lowest was ₦5,426.47 billion. Nigeria's GDP has experienced a significant monetary growth over the period with the difference amidst the highest level and the lowest level being about ₦297,374.33 billion. The lowest was at the start of the study period and the highest was at the end of the study period. The large span was consistent with the upward trend of nominal GDP from 1999 to 2025. This study however, used nominal GDP, and this large difference amidst the minimum and maximum could be partly due to differences in the volume of production and partly to differences in prices. The descriptive evidence should therefore be understood to refer to a surge in the monetary value of the economic activity at home and not simply a surge in the quantity of production.

The standard deviation of the nominal GDP was relatively big at ₦83,449.77 billion when compared to its mean at ₦92,594.73 billion. This indicated that there was a lot of variation of observations of nominal GDP around the mean value of nominal GDP over time of the study. The magnitude of the standard deviation was similar to that of the series which had the clear-upward trend in which observations made in the last years of the study period were several times the observation made in the earlier years.

The coefficient of skewness of nominal GDP is 1.015753 which further revealed the distributional characteristics of nominal GDP. This is a coefficient that is positive and greater than zero, thus indicating the distribution of nominal GDP is positively, or right-skewed. This suggests that there were relatively high values on the top end of the series in the distribution. This was consistent with the relationship amidst the Mean and the Median which shows that Mean (₦92,594.73 billion) is higher than the Median (₦71,713.94 billion). Kurtosis coefficient = 3.146709, a little bit above the normal value of 3. Thus, nominal GDP was a little leptokurtic, a little more peaked and had slightly heavier tails than a normal distribution. However, the difference with the normal kurtosis standard was not very high.

The Jarque-Bera of nominal GDP was 4.667106 and probability value was 0.096951. The probability value obtained was 0.096951, this is larger than the five per cent level of significance. So, there was no evidence to reject the null hypothesis that GDP (at 2013 prices) had a normal distribution. This revealed that the deviations from normality were not substantial at the 5 per cent level, but that it was positively skewed and was slightly leptokurtic. Therefore, it can be inferred that the distribution of nominal GDP is indeed normally distributed based on Jarque-Bera test. It is important to stress however that this is a distributional result and not a stationarity test result: a normally distributed variable is not necessarily stationary. The nominal GDP thus still had to be formally considered a unit root process. The Mean for the Naira/United States Dollar EXRV was ₦304.91 per United States dollar while the Median for the EXRV of Naira/United States Dollar was ₦157.31 per United States dollar. The difference amidst the two measures of central tendency is rather large, which is strong evidence of the distribution of the EXRVs being highly asymmetric. This resulted in the mean being nearly twice the median with the extremely high exchange-rate observations recorded towards the end of the period contributing much to the arithmetic average. Economically, the higher the number of naira on the EXRV, the more naira was required to purchase one United States dollar (USD), implying that it was a sign of depreciation or deterioration of the external value of the naira. So, the average EXRV



was relatively high, not due to the improvement of the domestic currency but because of the noteworthy depreciation periods in the second half of the study period.

The highest EXRV was the value of the Naira at the rate of N1,478.97 per 1 United States Dollar while the lowest EXRV was the value of Naira at N92.69 per 1 United States Dollar. The weakest was the highest value recorded for the naira in the set as it required N1478.97 to purchase one United States of Dollar. On the other hand, the lowest was the best naira rate as it took only ₦92.69 to buy one dollar. The naira external value depreciated hugely during the study period by the difference of the two values, which is ₦1,386.28. Thus, the shift from the low to high isn't a shift up in the value of the naira. Rather, it was a huge drop in the external value of the naira against the United States dollar.

The mean of EXRV was ₦304.91 with a standard deviation of ₦356.0297 which is greater than its mean value. This result indicated that the observations on the exchange-rate had a very high dispersion from the mean. The relatively large standard deviation was in line with the big spread amidst the exchange-rate level in the first and second periods of the study. The total of the observations is ₦ 8232.57 and the total of the squares of the deviations is 3295687. Preliminary evidence from the size of the standard deviation suggested that there was significant variability in the EXRV. But, the standard deviation, which measures unconditional dispersion across the sample, is not a good measure of conditional exchange-rate volatility. Thus, conditional volatility would have to be tested for and confirmed by means of the autoregressive conditional heteroscedasticity test and generalized autoregressive conditional heteroscedasticity model.

The skewness coefficient of the distribution of EXRV is 2.622529 that is highly positive or right skewed distribution. This great positive skewness resulted from the extremely large values of naira/dollar, which were observed at the end of the study period. Economically, these were high as they were a huge devaluation of the naira and not appreciation of the currency. The kurtosis coefficient for the EXRV was also 8.859265 which is more than the normal-distribution value of 3. The result was thus highly leptokurtic with a higher peak and heavier tails than a normal distribution. The exchange-rate series had large positive skewness and kurtosis, indicating the presence of outliers and that they were quite different from what is normal.

This was confirmed by the Jarque-Bera statistic that was 69.57183 with p-value of 0.000000. The probability value obtained was < 5 per cent level of significance thus the hypothesis of normality was rejected for Naira/United States Dollar EXRV. Thus, the observations on the exchange-rate did not follow a normal distribution. This was compared with a nominal GNP normality test which could not be rejected. The non-normality of the exchange-rate series, however, alongside the value of the exchange-rate series mean, standard deviation, skewness and kurtosis serve as important preliminary evidence of irregular and extreme movements in the EXRV of the naira to the dollar. These characteristics make it interesting to formally analyze the conditional heteroscedasticity and volatility clustering of the exchange-rate series.

Table 4.2: Result of Unit Root Test (Using ADF)

Variables	ADF T-Stat @ Level (5%)	T-Critical @ level (5%)	P-value @ level (5%)	ADF T-Stat @ 1 st Diff. (5%)	T-Critical @ 1 st Diff. (5%)	P-value @ 1 st Diff. (5%)	Order of Integra tion
NGDP	-1.320848	-2.981038	0.5423	-3.472075	-2.986225	0.0177	I(1)
EXRV	1.285020	-2.981038	0.9978	-4.193267	-2.986225	0.0033	I(1)

Source: E-views 10 Output

The results indicated that nominal GDP and EXRV of Naira to the United States Dollar were integrated of order one as evidenced by non-stationarity at level and stationary at first difference. This was of methodological interest because it was conceivable that the traditional regression equation(s) might be based on the non-stationary level series and could produce spurious results. Perhaps more importantly, to this study, the time-series nature of the EXRV allowed the move to the volatility analysis. Since the study was not only to identify the level of the EXRV, but to also determine the volatility of the EXRV, it was necessary to consider the appropriately transformed exchange-rate series for autoregressive conditional heteroscedasticity effects. The results in this paper suggested that if these effects were confirmed then they would act as evidence of volatility clustering and thus a rationale for using the generalized ARCH model to estimate the conditional variance that would capture the volatility of the EXRV.

Table 4.3: Result of ARCH

Dependent Variable: NGDP				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C(3) + C(4)*RESID(-1)^2				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
EXRV	0.000929	0.000170	5.464812	0.0000
C	11.26259	0.069498	162.0567	0.0000
Variance Equation				
C	0.003053	0.003796	0.804236	0.4213
RESID(-1)^2	0.570568	0.209666	2.721325	0.0065
R-squared	0.678761	Mean dependent var		5.368614
Adjusted R-squared	0.665911	S.D. dependent var		0.743434
Durbin-Watson stat	1.637349			

Source: E-views 10 Output

The coefficient of the exchange-rate was 0.000929 in mean equation and z-statistic was 5.464812 and probability was 0.0000. The results showed that the probability value was less than the five per cent significance level, which means that the EXRV had positive and substantial relationship with nominal gross domestic product. The positive coefficient was an indication of the association amidst the depreciation of the naira and the increase in the nominal gross domestic product, since increase in the numerical Naira/United States Dollar EXRV was an indication of depreciation of the naira.

The R-squared obtained by the model was 0.678761, which means that about 32.12 per cent of the variation in the dependent variable (nominal gross domestic product) was not explained by the model. More importantly, the adjusted R-squared of 0.665911 indicated that after the number of the explanatory variables and number of degrees of freedom were taken into account, the model accounted for about 66.59 per cent of the variation in nominal GDP. The value of the adjusted R-squared was very similar to the R-squared, indicating that the model had a relatively good ability to explain the variance in the data after adjustment. Further, the Durbin-Watson statistic was not far from 2, showing a Durbin-Watson value of 1.637349, suggesting that there was not severe first order serial correlation in the residuals. But the Durbin-Watson statistic by itself should not be used as an ultimate diagnostic tool for a specification of autoregressive conditional heteroscedasticity for the presence of serial correlation.

The most important is that the variance equation gave a lagged squared residual coefficient of 0.570568, a z-statistic of 2.721325 and the probability level of 0.0065. The probability value was less than 0.05, which means that the lagged squared residual was substantial. This confirmed the presence of an autoregressive conditional heteroscedasticity effect that hinted that past shocks had a significant impact on the conditional variance at the present period and that there was a volatility clustering effect in the series. Hence, it was decided to move on to the generalized autoregressive conditional heteroscedasticity model where the volatility magnitude and persistence for the timeframe of the study were estimated.

Table 4.4: Result of GARCH

Dependent Variable: NGDP				
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
EXRV	0.000941	2.37E-05	39.62756	0.0000
C	11.26395	0.045633	246.8367	0.0000
Variance Equation				
C	0.001908	0.002324	0.820942	0.4117
RESID(-1)^2	0.529832	0.071085	7.453510	0.0000
GARCH(-1)	0.343119	0.055531	6.178858	0.0000
R-squared	0.689652	Mean dependent var		5.368614
Adjusted R-squared	0.677238	S.D. dependent var		0.743434
Durbin-Watson stat	1.873234			

Source: E-views 10 Output



The exchange-rate coefficient in the mean equation was equal to: 0.000941, z-statistic: 39.62756 and probability: 0.0000. The probability value was found to be less than 5 per cent of significance level indicating that the EXRV had a positive and substantial relationship with nominal gross domestic product.

The model explained about 68.97 per cent of the total variation in the nominal gross domestic product and about 31.03 per cent of the total variation was not explained by the model. The adjusted R-squared of 0.677238 also indicated that the model was able to explain approximately 67.72 per cent of the variance in the nominal gross domestic product after allowing for the number of degrees of freedom in the model. Furthermore, the Durbin-Watson statistic value was close to the benchmark value of 2 which means that there was no serious first-order serial correlation present in the residuals.

The results revealed that the squared residual coefficient of the variance equation is 0.529832 with probability 0.0000 and variance conditional coefficient of the variance equation is 0.343119 with probability 0.0000. Both were thus substantial, showing that it was previous shocks and previous volatility, respectively, that substantially affected current volatility. Their total coefficient was 0.872951 but this was less than but close to 1.0. This showed high persistence of volatility conditional on the exchange-rate, that is, shocks to the conditional variance were slow to dissipate.

4.2 Discussion of Findings

The autoregressive conditional heteroscedasticity result provided evidence for the conditional volatiles of the exchange-rate related disturbances for the period under study. In particular, the lagged squared residual coefficient was 0.570568 with a probability value of 0.0065 which suggests that the conditional variance was largely affected by the previous shocks. This is a discovery that helped identify volatility clustering and led to the model estimation of GARCH. This corroborates the findings of Oaikhenan and Aigheyisi (2015) who found the presence of clustering and persistence in the bilateral Naira/United States Dollar EXRV. Similarly, Iliyasu et al. (2024) detected the existence of conditional exchange-rate volatility in Nigeria using the autoregressive conditional heteroscedasticity modelling. In this regard the present study also corroborates the empirical evidence that foreign-exchange shocks can be stand-alone shocks but can also affect future foreign-exchange instability periods.

The evidence for the magnitude and the persistence of the volatility process was improved by the generalized autoregressive conditional heteroscedasticity result. The lagged squared residual coefficient was 0.529832, substantial at a probability level of 0.0000 and the lagged conditional variance coefficient was 0.343119, substantial at a probability level of 0.0000. Both coefficients were less than unity (0.872951), but close enough to unity to indicate that the volatilities have a more or less high degree of persistence. This implied that shocks in the Naira/United States Dollar foreign exchange-rate market did not dissipate immediately, but over a period of time. This is corroborated by the result of Oaikhenan and Aigheyisi (2015) that revealed clustering and persistence in the volatility of the Nigeria EXRV. It also corroborates the findings of Olabisi and Akeju (2024) which employed the generalized autoregressive conditional heteroscedasticity specification to estimate the volatility of the Nigerian EXRV and found that the volatility of the EXRV was a key factor in economic performance.

The mean equation also revealed that the Naira/United States Dollar EXRV had a positive relationship with the nominal gross domestic product with a positive coefficient of 0.000941 and the probability value of 0.0000 which is substantial. The results showed that the nominal gross domestic product was negatively related to the naira depreciation as viewed from the numerical EXRV which was the depreciation of naira during the period of study. This finding differs from the findings of Moses et al. (2020) that the volatility of Naira/United States Dollar exchange-rate substantially negatively affected the gross domestic product growth in Nigeria. It also compares with the study of Olabisi and Akeju (2024) which reported that the volatility in the EXRV negatively impacted economic growth and Orisdare and Olofin (2024) which revealed the adverse effect of exchange-rate volatility on productivity in the short run and extended period. This may be because the present study has looked at the nominal gross domestic product as against the real gross domestic product, productivity or gross domestic product growth, which is the changes in the prices prevailing during the specific period. It provides the most direct explanation, consistent with Mundell-Fleming Model, because exchange-rate movements are a type of transmission of external-sector disturbance to aggregate economic activity. Depreciation can impact net exports, imported input costs, investment and aggregate expenditures and therefore, the exchange-rate shocks can impact domestic output. From a price perspective, the Purchasing Power Parity Theory can be used to explain the finding. The depreciation of the naira might also come with the changes in domestic prices as the dependent variable was gross domestic product in nominal terms and in this case, any increase in domestic prices may lead to an increase in nominal gross domestic product without a corresponding increase in real gross domestic product. Taylor and Taylor (2004) stressed that purchasing power parity is better thought of as a long-run relationship amidst relative prices and EXRVs, in which sizeable short-run deviations are allowed. Lastly, as a complementary explanation, the Endogenous Growth Theory argues that investment, productive capacity, acquisition of technology and accumulation of knowledge are mechanisms of sustained



economic performance. EXRV can introduce uncertainty, increase the domestic prices of imported intermediate inputs and machines and influence investment decisions which can then affect productive mechanisms that influence economic performance. This is in line with the negative effect of productivity as reported by Orisdare and Olofin (2024).

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study concluded that the Naira/US Dollar had positive and significant relationship with nominal GDP in Nigeria 1999 – 2025. Specifically, we discovered that the devaluation of Naira was positively correlated with the increase in the nominal GDP. However, this did not imply improvement in the real productive performance of the Nigerian economy as the GDP is nominal and reflects both level of production and prices. The study also revealed that the exchange-rate fluctuations were also highly significant and persistent indicating that the shocks on the Naira/United States Dollar exchange rate were not of transitory nature but of long-term nature.

5.2 Limitations of the Study

The study has the following drawbacks:

- i. The year period was selected to show the unabated democratic era in Nigeria, but the number of observations per period was not sufficient enough to increase the degree of freedom for the estimation of the econometrics model.
- ii. This study only covered the exchange rate of the Naira to the United States Dollar and did not take into account other currencies and other factors such as government expenditure, inflation, interest rates, money supply, crude oil etc.

5.3 Recommendation

This recommendation was made on the basis of the fact that it has been found that there was a lot of exchange rate volatility and it was persistent;

- i. A rule-based foreign-exchange (FX) intervention regime with a specific focus on dampening excessive volatility amidst the Naira/United States Dollar exchange rate is recommended for the Central Bank of Nigeria. This should include a threshold based on moving averages of the exchange rates, a measure of the volatility of the exchange rate and provision for foreign exchange liquidity in time if the exchange rates deviate from the moving averages in the predetermined thresholds. Intervention should be carried out mainly to prevent disorderly changes in the exchange rate, and enhance rate predictability, but not to seek a "set" rate. This would reduce the prevailing uncertainties with regard to the exchange-rate in the eyes of producers, importers and investors and allow the exchange-rate direction to be determined by market forces, which would help to promote more stable productive economic activity.

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