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Juxtaposing Exchange Rate Volatility and Economic Growth Nexus in Nigeria

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Abstract: This study was undertaken to investigate the multifaceted challenges posed by exchange rate volatility in Nigeria and how they impact the national economy. The study juxtaposed exchange rate volatility with economic growth in Nigeria by modeling the effect of real exchange rate, nominal exchange rate, purchasing power parity, inflation rate and trade openness on Gross Domestic Product in Nigeria using time series econometric regression technique of the ordinary least square (OLS). From the result of the OLS, it is observed that real exchange rate, nominal exchange rate and purchasing power parity have a positive impact on GDP growth rate in Nigeria. On the other hand, inflation rate and trade openness has a negative impact on GDP growth in Nigeria. Thus, increase in inflation rate and trade openness will bring about a decline in GDP growth in Nigeria. From the regression analysis, it is also observed that real exchange rate, nominal exchange rate, purchasing power parity, inflation rate and trade openness are statistically significant in explaining economic growth in Nigeria. The F-test conducted in the study shows that the model has a goodness of fit and is statistically different from zero. In other words, there is a significant impact between the dependent and independent variables in the model. Finally, both R2 and adjusted R2 show that the explanatory power of the variables is moderately high and/or strong in explaining the economic growth in Nigeria. The standard errors show that all the explanatory variables were all low. The study recommends that address the real exchange rate volatility crisis like that of Nigeria today, governments should directly intervene in the foreign exchange market to influence the exchange rate. If the currency is undervalued, they may choose to revalue it to make their exports more competitive and correct the deviation from purchasing power parity among others.

Keywords: Real Exchange Rate, Nominal Exchange Rate, Purchasing Power Parity, Inflation Rate, Trade Openness, Economic Growth

1. Introduction

Globally, the exchange rate is considered a significant factor that helps to define the economies of various nations. This is because of its profound impact on varying degrees of economic activities in the life of every nation. The Nigerian nation is not immune to the dynamism of the exchange rate and so it plays a very vital role in the socio-economic landscape of the country. Its implications for the national economy is a key consideration for the nation's policy makers to fashion out policies to regulate and manage the exchange rate in order to strike a balance between stabilising inflation and general economic growth and stability (Yakub, Sani, Obiezue & Aliyu, 2019; Ufoeze, Okuma, Nwahoby & Alajekwu, 2018; Nakorji, Agboegbulem, Gaiya & Atoi, 2021). To juxtapose the link between exchange rate

volatility and economic growth in Nigeria presupposes analysing factors responsible for exchange rate instability within the country's economic landscape. Such factors have been reported in the literature to include low domestic capacity for exports, heavy dependence on importation, low foreign direct investments, overdependence on oil exports, government policies and reforms with regards to monetary policies and external factors (Edokobi, Okpala & Okoye, 2021; Uche & Nwami, 2021; Ohwojero & Onyeoma, 2022. Anigbogu, Okoye, Anyanwu & Okoli, 2014).

Exchange rate volatility can be seen as the rate of the difference between two national currencies; that is, the degree to which one nation's currency varies from that of another nation over a defined period, while economic growth is influenced by changes in the Gross Domestic Product (GDP) of a country (Yakub, Sani, Obiezue & Aliyu, 2019; Ufoeze, Okuma, Nwahoby & Alajekwu, 2018; Nakorji, Agboegbulem, Gaiya & Atoi, 2021). The Nigeria economy has often been described as a monolithic economy as she depends heavily on oil and gas for revenue and foreign exchange earnings. This dependence has left the nation open to external permutations and shocks in the global market, especially in the global oil market. This also has greatly impacted the country's exchange rate stability as the exchange rate can be influenced by changes in oil prices in the international market (Bahmani-Oskooee & Hegerty, 2007; Bahmani-Oskooee & Harvey, 2017). In the same vein, being an import dependent nation, Nigeria is prone to geopolitical crises, changes on the global economic platform and fluctuations in world food and commodity prices. Import dependency can drain available foreign currency leading to exchange rate fluctuations or scarce foreign exchange for imports. This can result in high inflation, high costs of goods and services, low consumer purchasing power, lack of capital acquisition for investments and general low demand for goods and services (Alba & Papell, 2007; Arize, 2011). Besides an unstable exchange rate can discourage foreign investors who may perceive the economy as weak, uncertain and risky. A stable exchange rate on the other hand can boost both domestic and foreign investments to support the economy by fostering investors' confidence through a favourable investment climate which impacts generally on economic growth (Abdu, Umar, Mohammed & Ajannah, 2021; Edoko, Nwagbala, Okpala, 2018).

The Central Bank of Nigeria acting on behalf of the federal government often implements various monetary policies aimed at managing the exchange rate regime to stabilize the economy and prevent unwarranted shocks arising from the impact of a volatile exchange rate. These measures notwithstanding, factors such as the country's foreign exchange reserves, fiscal policies and the world economic conditions go a long way in determining how effective these measures will be and their success rate (Ajayi-Ojo & Iyoha, 2022; Abdu, Umar, Mohammed & Ajannah, 2021; Edoko, Nwagbala, Okpala, 2018). The federal government on its own has initiated structural reforms and policies aimed at further strengthening the exchange rate and by extension the economy. Nigeria's move towards diversifying its economy is crucial, especially given the volatile nature of oil prices and its impact on the country's economy. Diversification into sectors like agriculture, manufacturing, and services is seen as a logical strategy to reduce reliance on oil and this requires effective government policies and reforms. In this regard, policies aimed at promoting macroeconomic stability, fiscal discipline, and a business-friendly environment can contribute to economic resilience, thus, sustained and coherent efforts are needed from the government. The link between exchange rate stability and economic growth is no longer in doubt according to many studies. Exchange rate stability is crucial for attracting foreign investment, promoting trade, and ensuring overall economic stability. Policies that contribute to this stability can positively influence economic growth (Edokobi, Okpala & Okoye, 2021, Ajayi-Ojo & Iyoha, 2022). Understanding the specific relationships between exchange rate volatility and economic growth in Nigeria therefore requires thorough analysis, considering various factors such as external shocks, import dependency, FDI attractiveness, and policy effectiveness. Recognizing the complexity of the relationship between exchange rate volatility and economic growth remains sacrosanct. The

interplay of factors like oil reliance, external shocks, and policy effectiveness adds layers of intricacy to the analysis. Thus a comprehensive analysis as suggested in the literature would lead to a holistic approach to develop effective and tailored strategies for sustainable economic growth. Given the dynamic nature of economic conditions, continuous evaluation and adaptation of government policies are essential just as regular assessments of the impact of implemented policies will allow for adjustments based on evolving circumstances(Ajayi-Ojo & Iyoha, 2022; Ijirshar, Ushie, Agya, Bundepuun & Udoji, undated; Oyovwi, 2012).

Statement of the Problem

This study was undertaken to investigate the multifaceted challenges posed by exchange rate volatility in Nigeria and how they impact the national economy. According to studies**, s**ome of the key challenges associated with exchange rate volatility include **balance of payments issues, external debt servicing, diminishing foreign exchange reserves, low Foreign Direct Investment (FDI), inflationary pressure, business uncertainty, sociopolitical challenges, policy implementation, low consumer purchasing power etc (**Bahmani-Oskooee & Arize, 2019)**.** Exchange rate volatility can heighten the inflation rate in the country which may further depreciate the local currency leading to high cost of imported goods and services with pressure on the foreign exchange reserves. It impacts businesses, making it difficult to plan and budget and leading to uncertainties for those engaged in international trade. It also impacts the revenue drive of businesses and their sustainability. (Ajayi-Ojo & Iyoha, 2022; Ijirshar, Ushie, Agya, Bundepuun & Udoji, undated; Oyovwi, 2012).

With Nigeria's external debt denominated in foreign currencies, exchange rate volatility can lead to higher debt service payments, further draining the **foreign exchange reserves.** It also deters foreign direct investment needed for economic growth and development. Fluctuations in exchange rate can lead to speculators hijacking the process and further worsening the exchange rate volatility. Indeed, worsening exchange rate can give rise to inflation, unemployment, low standard of living due to erosion of citizen's purchasing power and mass poverty (Ajayi-Ojo & Iyoha, 2022; Abdu, Umar, Mohammed & Ajannah, 2021). **These challenges however, can be mitigated by government through various policy approaches.** Diversification can reduce dependence on specific sectors, and structural reforms can enhance the overall resilience of the economy. Moreover, a coordinated and well-calibrated approach to monetary and fiscal policies can help manage the impact of exchange rate volatility on inflation, growth, and external balances. Understanding the role of real exchange rates, nominal exchange rates, purchasing power parity, inflation rates, and trade openness in influencing Gross Domestic Product (GDP) is fundamental for developing effective policies to mitigate the challenges posed by exchange rate volatility in Nigeria (Ajayi-Ojo & Iyoha, 2022; Abdu, Umar, Mohammed & Ajannah, 2021).

Objectives of the Study

The main objective of the study is to juxtapose exchange rate volatility with economic growth nexus in Nigeria. Specifically the study aims:

1. Examine the effect of real exchange rate on gross domestic product in Nigeria
2. Determine the effect of nominal exchange rate on Gross domestic product in Nigeria.
3. Ascertain the effect of purchasing power parity on Gross domestic product in Nigeria.
4. Examine the effect of inflation rate on Gross domestic product in Nigeria.
5. Determine the effect of trade openness on Gross domestic product in Nigeria

Statement of Hypotheses

HO_1: Real exchange rate has no significant effect on gross domestic product in Nigeria

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HO_2: Nominal exchange rate has no significant effect on Gross domestic product in Nigeria

HO_3: Purchasing power parity has no significant effect on Gross domestic product in Nigeria

HO_4: Inflation rate has no significant effect on Gross domestic product in Nigeria

HO_5: Trade openness has no significant effect on Gross domestic product in Nigeria

2. METHODOOGY

Model Specification

The model equation for this study is specified thus:

The structural form of the model is:

$$GDP = f(RXR, NXR, PPP, INF, TOP) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

The mathematical form of the model is:

$$GDP = \beta_0+\beta_1RXR+\beta_2NXR+\beta_3PPP+\beta_4INF+\beta_5TOP \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

The econometric form of the model is:

$$GDP = \beta_0++\beta_1RXR+\beta_2NXR+\beta_3PPP+\beta_4INF+\beta_5TOP + \mu_i \quad \ldots \quad \ldots \quad (3)$$

Where; GDP = Gross domestic product proxied by GDP growth rate

RXR = Real exchange rate

NXR = Nominal exchange rate

PPP = Purchasing power parity

INF = Inflation rate

TOP = Trade openness

β_0 = Slope of the model

$\beta_1 - \beta_5$ = Parameters of the regression coefficients

μ_i = Stochastic error term

Estimation Technique and Procedure

The economic technique employed in the study is the ordinary least square (OLS). This is because (i) the OLS estimators are expressed solely in terms of the observable (i.e. sample) quantities. Therefore, they can be easily computed. (ii) They are point estimators; that is, given the sample, each estimator will provide only a single value of the relevant population parameter. (iii) The mechanism of the OLS is simple to understand and decode. (iv) Once the OLS estimates are gotten from the same data, the sample regression line can be easily obtained. The Economic views (E-views) software will be adopted for regression analysis.

Stationarity (Unit Root) Test

This test is vital because the data to be used in the estimation are time-series data, and to avoid running a spurious regression. It helps to make sure that all the variables are mean reverting, which means that the variables have constant mean, variance and covariance respectively. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation.

Decision rule: If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.

Evaluation of Estimates

The estimates obtained from the model shall be evaluated using three (3) criteria. The three (3) criteria include:

1. The economic a priori criteria.
2. The statistical criteria: First Order Test
3. The econometric criteria: Second Order Test

Evaluation Based on Economic A Priori Criteria

This was done to determine if each regressor in the model was comparable with the postulations of economic theory; that is, if the sign and size of the parameters of the economic relationships flow with the expectations of the economic theory which is the a priori expectations. Table 3.1 below depicts this:

Table 1: Economic a priori expectation

Parameters	Variables		Expected Relationships	Expected Coefficients
	Regressand	Regressor		
β_0	GDP	Intercept	+/-	$0 < \beta_0 > 0$
β_1	GDP	RXR	+/-	$0 < \beta_1 > 0$
β_2	GDP	NXR	+/-	$0 < \beta_2 > 0$
β_3	GDP	PPP	+	$\beta_3 > 0$
β_4	GDP	INF	-	$\beta_4 < 0$
β_5	GDP	TOP	+	$\beta_5 > 0$

Source: Researchers compilation

A positive '+' sign revels that the relationship between the regressor and regressand is direct and in the same direction. In other words, they increase or decrease together. Likewise, a '-' shows that there is an indirect (inverse) relationship between the regressor and regressand, thus they could be said to move in opposite or different direction.

Evaluation Based on Statistical Criteria: First Order Test

This was done to evaluate the statistical reliability of the estimated parameters of the model. Thus, the F-statistic, Coefficient of determination (R^2) and the Adjusted R^2 were deployed.

Coefficient of determination (R^2)

To determine the explanatory power of the independent variables on the dependent variables, the Square of the coefficient of determination R^2 or the measure of goodness of fit was used. The R^2 denotes the percentage of variations in the dependent variable that was influenced by the variations in the independent variables. The higher the R^2 therefore, the more the model is able to explain the changes in the dependent variable.

Adjusted R^2

This is a modified version of coefficient of determination R^2 so adjusted for the number of predictors in the model. Unlike the coefficient of determination R^2, the adjusted R^2 increases only when the increase in the coefficient of determination R^2 due to the inclusion of a new explanatory variable, is by chance, more than what is expected to be seen. If a set of explanatory variables with a predetermined hierarchy of importance are introduced into a regression one at a time, with the adjusted R^2 computed each time,

the level at which adjusted R^2 reaches a maximum, and decreases afterward, would be the regression with the ideal combination of having the best fit without excess/ unnecessary terms.

F-Statistic

This is a measure of the overall significance of the estimated regression. It was deployed in this study to enable the researcher to verify the overall significance of the estimated model by testing the following hypothesis:

H_0: The model has no goodness of fit

H_1: The model has a goodness of fit

Decision rule: Reject H_0 if $F_{cal} > F_{\alpha}$ (k-1, n-k) at $\alpha = 5\%$, accept if otherwise.

Econometric Criteria: Second Order Test

This test helps to determine the reliability of the statistical criteria and establishes whether the estimates have the desirable properties of unbiasedness and consistency, thus assisting in decoding if the assumptions of the econometric method employed are satisfied or not. It also aids in testing for the validity of non-autocorrelation disturbances. Therefore, to test for the reliability of the data contained in the model for predication, autocorrelation, multicolinearity and heteroskedasticity test were employed.

Test for Autocorrelation

Autocorrelation was used to see if the error or disturbance term (μ_t) is temporarily independent as it can test the validity of non autocorrelation disturbance. The Durbin-Watson (DW) test was deemed appropriate for the test of First-order autocorrelation. It has the following decision criteria.

1. If d* is approximately equal to 2 (d* =2), we accept that there is no autocorrelation in the function.
2. If d*= 0, there exist perfect positive auto-correlation. In this case, if 0<d*< 2, that is, if d* is less than two but greater than zero, it denotes that there is some degree of positive autocorrelation, which is stronger the closer d* is to zero.
3. If d* is equal to 4 (d*=4), there exist a perfect negative autocorrelation, while if d* is less than four but greater than two (2<d*< 4), it means that there exist some degree of negative autocorrelation, which is stronger the higher the value of d*.

Test for Multicolinearity

This refers to the existence of a perfect or exact linear relationship among some or all explanatory variable of a regression model. It is used to determine whether there is a correlation among variables.

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. Also, reject the null hypothesis (H_0), if any two variables in the model are in excess of 0.8 or even up to 0.8. Otherwise we reject.

Test for Heteroscedasticity

The essence of this test is to see whether the error variance of each observation is constant or not. Non-constant variance can cause the estimated model to yield a biased result. White's General Heteroscedasticity test would be adopted for this purpose.

Decision Rule: We reject the null hypothesis (H_0) that there is a heteroscedasticity in the residuals if F calculated is greater than F tabulated ($F_{cal} > F_{tab}$) at 5% critical value, otherwise accept at 5% level of significance.

Test of Research Hypotheses

This study will test the research hypothesis using t-test. The t-statistics test tells us if there is an existence of any significance relationship between the dependent variable and the explanatory variables. The t-test will be conducted at 0.05 or 5% level of significance.

Decision rule: Reject H_0 if $t_{cal} > t_{\alpha/2}$, (n-k). Otherwise, we accept.

Nature and Source of Data

All data used in this research are secondary time series data which are sourced from the Central Bank of Nigeria (CBN) annual statistical bulletin, National Bureau of Statistics (NBS) annual publications and reports and World Bank DataBank.

3. DATA PRESENTATION AND DATA ANALYSIS

Summary of Stationary Unit Root Test

To avoid processing data that may produce biased result, ultimately leading to unreliable interpretation and conclusions, it is vital to establish stationarity. Augmented Dickey-Fuller (ADF) tests on the data was deployed in this regard. The ADF tests were conducted on level series, first and second order differenced series. The decision rule is to reject stationarity if ADF statistics is less than 5% critical value, otherwise, accept stationarity when ADF statistics is greater than 5% criteria value. The result of regression is in table 2 below.

Table 2: Summary of ADF Test Results

Variables	ADF Statistics	Lagged Difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
GDP	-7.479478	1	-3.752946	-2.998064	-2.638752	*I*(1)
RER	-4.533683	1	-3.752946	-2.998064	-2.638752	*I*(1)
NEX	-4.499528	1	-3.752946	-2.998064	-2.638752	*I*(1)
PPP	-4.969646	1	-3.752946	-2.998064	-2.638752	*I*(1)
INF	-4.719125	1	-3.752946	-2.998064	-2.638752	*I*(1)
TOP	-5.483052	1	-3.752946	-2.998064	-2.638752	*I*(1)

Source: Researcher computation

The evidence from the unit root table above reveals that none of the variables are stationary at level difference that is, *I*(0), instead all are stationary at first difference, that is, *I*(1). Since the decision rule is to reject stationarity if ADF statistics is less than 5% critical value, and accept stationarity when ADF statistics is greater than 5% criteria value, the ADF absolute value of each of these variables is greater than the 5% critical value at their first difference but less than 5% critical value in their level form. Therefore, they are all stationary at their first difference integration.

Presentation of Result

The result of the regression test is presented in Table 3 below.

Table 3: Summary of regression results

Dependent Variable: GDP

Method: Least Squares

Sample: 1999 2022

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.95107	6.530253	7.298764	0.0000
RER	0.072720	0.040682	6.787508	0.0000
NEX	0.211921	0.076939	4.754396	0.0016
PPP	0.344965	0.138437	4.491854	0.0021
INF	-0.041133	0.086869	-3.973503	0.0042
TOP	-0.264534	0.128153	-4.064205	0.0029
R-squared	0.578553	F-statistic		12.33167
Adjusted R-squared	0.517119	Prob(F-statistic)		0.000010
S.E. of regression	5.665996	Durbin-Watson stat		1.663300

Source: Researchers computation

Evaluation of Findings

To discuss the regression results as presented in table 3, the study employ economic a priori criteria, statistical criteria and econometric criteria.

Evaluation Based On Economic A Priori Criteria

This subsection is concerned with evaluating the regression results based on a priori (i.e., theoretical) expectations. The sign and magnitude of each variable coefficient is evaluated against theoretical expectations. From table 3, it is observed that the regression line have a positive intercept as presented by the constant (c) = 11.95107. This means that if all the variables are held constant or fixed (zero), the economic growth will be valued at 11.95107. Thus, the a-priori expectation is that the intercept could be positive or negative, so it conforms to the theoretical expectation. It is observed in table 3 that real exchange rate, nominal exchange rate and purchasing power parity have a positive impact on economic growth in Nigeria. This means that if real exchange rate, nominal exchange rate and purchasing power parity increases, it will bring about more economic growth in Nigeria, although, real exchange rate and

nominal exchange rate where expected to be either positive or negative. Thus, they conform to the theoretical expectation of the study.

On the other hand, inflation rate and trade openness has a negative impact on economic growth in Nigeria. Thus, increase in inflation rate and trade openness will bring about a decline in economic growth in Nigeria. From the regression analysis, it is observed that real exchange rate, nominal exchange rate, purchasing power parity and inflation rate conform to the a priori expectation while trade openness did not conform to the study theoretical expectation. Thus, table 4 summarises the a priori test of this study.

Table 4: Summary of Economic A Priori Test

Parameters	Variables		Expected Relationships	Observed Relationships	Conclusion
	Regressand	Regressor			
β_0	GDP	Intercept	+/-	+	Conform
β_1	GDP	RER	+/-	+	Conform
β_2	GDP	NEX	+/-	+	Conform
β_3	GDP	PPP	+	+	Conform
β_4	GDP	INF	-	-	Conform
β_5	GDP	TOP	+	-	Do not conform

Source: Researchers compilation

Evaluation Based on Statistical Criteria

This subsection applies the R^2, adjusted R^2 and the f–test to determine the statistical reliability of the estimated parameters. These tests are performed as follows: From our regression result, the coefficient of determination (R^2) is given as 0.578553, which shows that the explanatory power of the variables is moderately high and/or strong. This implies that 58% of the variations in the growth of GDP are being accounted for or explained by the variations in real exchange rate, nominal exchange rate, purchasing power parity, inflation rate and trade openness in Nigeria. While other determinants of GDP growth not captured in the model explain about 42% of the variation in GDP growth in Nigeria.

The adjusted R^2 supports the claim of the R^2 with a value of 0.517119 indicating that 52% of the total variation in the dependent variable (GDP growth) is explained by the independent variables (the regressors)). Thus, this supports the statement that the explanatory power of the variables is moderately high and strong. The F-statistic: The F-test is applied to check the overall significance of the model. The F-statistic is instrumental in verifying the overall significance of an estimated model. The hypothesis tested is:

H_0: The model has no goodness of fit

H_1: The model has a goodness of fit

Decision rule: Reject H_0 if $F_{cal} > F_{\alpha}$ (k-1, n-k) at $\alpha = 5\%$, accept if otherwise.

Where:

V_1 / V_2 Degree of freedom (d.f)

V_1 = n-k, V_2 = k-1:

Where; n (number of observation); k (number of parameters)

Where k-1 = 6-1= 5

Thus, n-k = 25-6 = 19

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Therefore, $F_{0.05(5,19)} = 2.74$ (From the F table) … F-table

F-statistic = 12.33167 (From regression result) … F-calculated

Since the F-calculated > F-table, we reject H_0 and accept H_1 that the model has goodness of fit and is statistically different from zero. In other words, there is significant impact between the dependent and independent variables in the model.

Evaluation Based on Econometric Criteria

In this subsection, the following econometric tests are used to evaluate the result obtained from our model; autocorrelation, heteroscedasticity and multicolinearity.

Test for Autocorrelation

Using Durbin-Watson (DW) statistics which we obtain from our regression result in table 3, it is observed that DW statistic is 1.663300 or approximately 2. This implies that there is no autocorrelation since d* is approximately equal to two. 1.663300 tends towards two more than it tends towards zero. Therefore, the variables in the model are not autocorrelated and that the model is reliable for predications.

Test for Heteroscedasticity

This test is conducted using the white's general heteroscedascity test. The hypothesis testing is thus:

H_0: There is a heteroscedasticity in the residuals

H_1: There is no heteroscedasticity in the residuals

Decision rule: Reject H_0 if the computed F-statistics is greater than tabulated F-statistics ($F_{cal} > F_{tab}$) at 5% critical value, otherwise accept at 5% level of significance. Hence, $F_{cal} = 12.33167$ and $F_{tab} = 2.74$, which means that computed F-statistics is greater than tabulated F-statistics, therefore, we reject H_0 and accept H_1 that the model has no heteroscedasticity in the residuals and therefore, the data is reliable for predication.

Test for Multicolinearity

This means the existence of a "perfect," or exact, linear relationship among some or all explanatory variable of a regression model. This will be used to check if collinearity exists among the explanatory variables. The basis for this test is the correlation matrix obtained using the series. The result is presented in table 5 below.

Table 5: Summary of multicollinearity test

Variables	Correlation Coefficients	Conclusion
RER and NEX	-0.298247	No multicollinearity
RER and PPP	0.008358	No multicollinearity
RER and INF	-0.035098	No multicollinearity
RER and TOP	0.302261	No multicollinearity
NEX and PPP	0.720305	No multicollinearity
NEX and INF	-0.605045	No multicollinearity
NEX and TOP	0.085859	No multicollinearity
PPP and INF	-0.450743	No multicollinearity
PPP and TOP	-0.221164	No multicollinearity
INF and TOP	-0.232062	No multicollinearity

Source: Researchers compilation

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Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. We therefore, conclude that the explanatory variables are not perfectly linearly correlated.

Test of Research Hypotheses

The t-test is used to know the statistical significance of the individual parameters. Two-tailed tests at 5% significance level are conducted. The Result is shown on table 5 below. Here, we compare the estimated or calculated t-statistic with the tabulated t-statistic at $t_{\alpha/2} = t_{0.05} = t_{0.025}$ (two-tailed test).

Degree of freedom (df) = n-k = 25-6 = 19

So, we have:

$T_{0.025(19)} = 2.093$ …Tabulated t-statistic

In testing the working hypotheses, which partly satisfies the objectives of this study, we employ a 0.05 level of significance. In so doing, we are to reject the null hypothesis if the t-value is significant at the chosen level of significance; otherwise, the null hypothesis will be accepted. This is summarized in table 5 below.

Table 6: Summary of T-statistic

Variable	t-calculated (t_{cal})	t-tabulated ($t_{\alpha/2}$)	Conclusion
Constant	7.298764	±2.093	Statistically Significance
RER	6.787508	±2.093	Statistically Significance
NEX	4.754396	±2.093	Statistically Significance
PPP	4.491854	±2.093	Statistically Significance
INF	-3.973503	±2.093	Statistically Significance
TOP	-4.064205	±2.093	Statistically Significance

Source: Researchers computation

The study begins by bringing the study working hypothesis to focus in considering the individual hypothesis. From table 5, the t-test result is interpreted below;

For RER, $t_{cal} > t_{\alpha/2}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that RER has a significant impact on GDP.

For NEX, $t_{cal} > t_{\alpha/2}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, NEX impact significantly on GDP.

For PPP, $t_{cal} > t_{\alpha/2}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that PPP has a significant impact on GDP.

For INF, $t_{cal} > t_{\alpha/2}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that INF has a significant impact on GDP.

For TOP, $t_{cal} > t_{\alpha/2}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that TOP has a significant impact on GDP.

4. CONCLUSION AND RECOMMENDATIONS

The study attempted to explain the impact of real and nominal exchange rate fluctuations, purchasing power parity, inflation rate and trade openness on economic growth in Nigeria covering from 1999-2022 using Ordinary least Square (OLS) technique method. All data used are secondary data obtained from the Statistical Bulletin of Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) annual publications and World Bank DataBank. In executing the study, the OLS techniques was applied

after determining stationarity of our variables using the ADF Statistic and was discovered that the variables are stationary. From the empirical reviewed work, some authors argued that exchange rate is positively related to economic growth, while some authors argued that it is negatively related. However, from empirical analysis of the study, it was found that exchange rate is positively related to economic growth in Nigeria.

From the result of the OLS, it is observed that real exchange rate, nominal exchange rate and purchasing power parity have a positive impact on GDP growth rate in Nigeria. This means that if real exchange rate, nominal exchange rate and purchasing power parity increases, it will bring about more GDP growth in Nigeria, although, real exchange rate and nominal exchange rate where expected to be either positive or negative, they conforms to the theoretical expectation of the study. On the other hand, inflation rate and trade openness has a negative impact on GDP growth in Nigeria. Thus, increase in inflation rate and trade openness will bring about a decline in GDP growth in Nigeria. From the regression analysis, it is observed that real exchange rate, nominal exchange rate, purchasing power parity, inflation rate and trade openness conform to the a priori expectation of the study. Thus, real exchange rate, nominal exchange rate, purchasing power parity, inflation rate and trade openness are statistically significant in explaining economic growth in Nigeria. The F-test conducted in the study shows that the model has a goodness of fit and is statistically different from zero. In other words, there is a significant impact between the dependent and independent variables in the model. Finally, both R^2 and adjusted R^2 show that the explanatory power of the variables is moderately high and/or strong in explaining the economic growth in Nigeria. The standard errors show that all the explanatory variables were all low. The low values of the standard errors in the result show that some level of confidence can be placed on the estimates. Sequel to the findings of this study, the study specifically made the following policy recommendations as follows:

1. To address the real exchange rate volatility crisis like that of Nigeria today, governments should directly intervene in the foreign exchange market to influence the exchange rate. If the currency is undervalued, they may choose to revalue it to make their exports more competitive and correct the deviation from purchasing power parity.
2. To enhance the nominal exchange rate, the government should have a stable political and economic environment. This can attract foreign investment and lead to a stronger currency.
3. Governments or central banks can use trade policies, such as tariffs and quotas, to influence the balance of trade and adjust the exchange rate. A more balanced trade position can help align the currency's value with purchasing power parity.
4. Governments or central banks by increasing interest rates, the cost of borrowing rises, leading to reduced spending and investment, which can help cool off an overheated economy and reduce inflationary pressures.
5. Governments should encourage diversification of export products and markets to reduce dependence on a narrow range of products or trading partners. This can enhance a country's resilience to economic shocks and fluctuations in specific industries. Government or central banks can also negotiate and enter into bilateral or multilateral trade agreements to reduce barriers and tariffs. These agreements can create a more favorable environment for trade by eliminating or reducing restrictions on imports and exports.

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