

The Dynamics of Exchange Rate Movements and Economic Growth in Nigeria: Does the Mundell–Fleming Model Stand?

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Abstract
The purpose of this study is to examine if exchange rate fluctuations have an impact on Nigeria's economic performance using annual time series spanning from 1986 to 2020. The Generalised Autoregressive Conditional Heteroscedasticity (GARC) model was used as the study's analytical technique. The result shows that in the long-run, exchange rate depreciation, inflation and the monetary policy rate have a significant long-term impact on the nation's economic performance. By implication, the Naira/USD exchange rate fluctuation affects the economy negatively. Therefore, an appreciation in the value of the Naira relative to the USD will enhance Nigeria's economic performance and vice versa. The net effect of this finding is that a persistent exchange rate fluctuation is detrimental to Nigeria's economic stability and overall performance. With this finding, this study suggests the intervention of the monetary authority to reduce the level of fluctuation and ensure short-term and long-term stability in the exchange rate system. From the fiscal policy perspective, the government should consider trade interdependence and flexibility of production factors when formulating exchange rate policies.
Keywords: Exchange Rate Fluctuations, Monetary Policy Rate, Inflation Rate, Economic Growth, Mundell-Fleming Model, & Nigeria
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1. Introduction

Flexible exchange rate regime is a critical reflection of the free market economic structure (Iheanachor & Ozegbe, 2021). In such a structure, the exchange rate oscillates frequently and such oscillations have a direct or indirect impact on the economy which can be observed through the macroeconomic performances. Therefore, households, firms and the government pay serious attention to the causes and effects of exchange rate fluctuations (Wesseh & Lin, 2018).

Since Nigeria attained political independence in October 1960, successive government through the monetary authorities have adopted different policies to achieve and sustain internal and external balances in a desperate bid to eradicate primary poverty, create employment opportunities, reduce price gyration and ultimately raise the living standard of the citizenry. To achieve the above stated goals, the foreign exchange rate of the nation's domestic currency has been consistently subjected to different degree and patterns of adjustments depending on the prevailing economic condition of the country (Adedoyin *et al.,* 2016; Okorontah, & Odoemena, 2016; Ewubare & Ushie, 2022). However, after all efforts of successive governments to ensure foreign exchange stability, the nation's local currency has continued to experience a high level of fluctuation against the currencies of other countries which have had fatal consequences on the nation's overall economic performance. To address the fatal consequences of exchange rate problems to the economy, the national government introduced the infamous Structural Adjustment Programme (SAP), a component of the Economic Recovery Program (ERP) in 1986. Part of the objective of the policy was the jettisoning of the fixed exchange rates in favour of the free-floating regime in the late 1980s. This reform was implemented based on the expectation that a floating or flexible exchange rate regime would curtail the boom-and-bust syndrome and place the economy on the path of rapid growth and sustainable development (Alagidede& Ibrahim, 2017; Iheanachor & Ozegbe 2021). However, since the policy-makers embraced the flexible exchange rate system in 1986, the domestic currency Naira (₦) has been depreciated and considerably weakened against other major foreign currencies especially the US Dollar (US$), European (Euro €), and the British Pound Sterling (£).

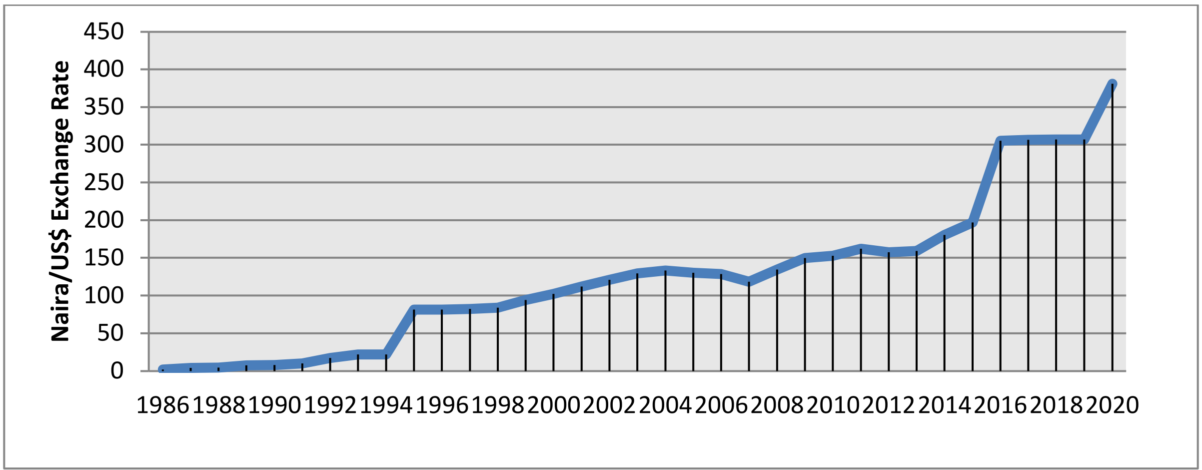


Figure 1: Trends in Naira/US$ Exchange Rate (1986-2020)

For instance, at the inception of SAP, the monetary authority adopted the Second-Tier Foreign Exchange rate System (SFEM) and the exchange rate of the Naira to the US$ stood at ₦2.02k to US$1 in 1986. By 1995, the Autonomous Foreign Exchange Market (AFEM) was introduced as the Naira/Dollar exchange rate stormed to ₦81.2k to US$1. The fluctuation did not abate as the Naira/Dollar exchange rate further jumped to N128.1k to US$1 in 2006, leading to the introduction of the Wholesale Dutch Auction System (WDAS) by the Central Bank of Nigeria. A decade later,the Flexible Exchange Rate Inter-bank Market (FERIM) was introduced by the monetary authority and the Naira/Dollar exchange rate rose to N305.22k to US$1. Several interventions by the Central

Bank have yielded little or no fruits as the exchange rate further galloped to N415.18 to US$1 in the second quarter of 2022.

Against the backdrop of the foregoing, the objective of this study is to examine the impact of exchange rate fluctuations on the performance of the Nigerian economy. Having stated the primary objective of the study, it is imperative to raise the following research questions to guide the investigation. Why is there a persistent exchange rate fluctuation in Nigeria? What are the effects of exchange rate fluctuation on Nigeria's economic performance? Answering these questions will provide essential insights to the various economic agents such as policymakers, public and private investors, and the nexus between exchange rate and economic performance in Nigeria.

The adverse and positive effects of exchange rate volatility have been examined in the developed and developing economies like Nigeria owing to its impact on employment generation (Bakhshi and Ebrahimi, 2016; Fang, 2020; Usman and Elsalih, 2018), inflation (Alagidede & Ibrahim, 2017; Bagheri & Gheisarinejad, 2016), trade (Asteriou *et al.,* 2016; Jadoon and Guang, 2019; Rashid and Waqar, 2017; Senadza & Diaba, 2017), exports (Abdoh et al., 2016; Caselli et al., 2017; Fauceglia, 2020; Vieira & MacDonald, 2016; Vo & Zhang, 2019), investment (Avdjiev et al., 2019; Mostafapour et al., 2020; Zakari, 2017), and economic growth and development (Adewuyi & Akpokodje, 2013; Akinlo & Onatunji, 2020; Iheanachor & Ozegbe, 2021). While the exchange rate volatility has been connected to macroeconomic instability, few attempts have been made to unravel the channels through which exchange rate volatility creates such macroeconomic distortions. Discussions surrounding Nigeria's exchange rate fluctuations are only gleaned from public discourses on the economy with little empirical and theoretical content. As such, to bridge the theoretical and empirical gaps and improve on the weaknesses of the previous studies from the Nigerian context, this study built its theoretical foundation on the IS-LM-BOP theory, propounded by Mundell (1968), and Fleming (1969). The rest of this study is structured as follows: Section two comprises the literature review; section three focuses on the methodology; section four presents the results, while section five concludes the paper by outlining the summary of findings, policy implications, and limitations and future directions.

2. Literature Review

Theoretical Foundation

This study is anchored on the IS-LM-BOP theory also known as the Mundell–Fleming model (MFM). The IS-LM-BOP theory was independently proposed by Mundell (1968) and Fleming (1969). The IS-LM-BOP theory explains the workings of a domestic economy open to cross-border trade in goods and financial assets and provides a foundation for examining the impact of exchange rate fluctuation on economic growth. The IS-LM-BOP theory posits that the effect of exchange rate is a function of the exchange rate system or regime that the country operates. In a flexible exchange rates system, the monetary authority allow the inter-play of the forces of demand and supply to determine the exchange rate. An increase in money supply shifts the Liquidity of Money (LM) curve to the right. This directly reduces the local interest rate relative to the global interest rate. This leads to an increase in capital outflow, which will lead to an increase in the real exchange rate, ultimately leading to an increase in exports, a decrease in imports and an overall increase in income. Under the fixed exchange rate system, the monetary authority manages the foreign exchange market to maintain a specific exchange rate.

Economic growth theory also states that economic growth causes investments in a country and that the effects are more apparent when comparing if economic growth causes foreign capital flows or vice versa (Raza *et al.,* 2021). Thus, higher economic growth in a country would attract more foreign capital inflows and thus lead to a higher demand for the local currency, making the exchange rate more stable. Exchange rate volatility is also said to decrease investments in a country, thus lowering the capital in a particular country (Oseni, *et al.,* 2019).

Empirical Review

Extant studies on the nexus between exchange rate fluctuations on economic growth have produced contrasting findings. For example, several empirical findings revealed that real exchange rate fluctuation have an adverse effect on economic growth. However, some other studies reported contrasting results that suggest a positive relationship between exchange rate fluctuation and economic growth. David *et al.* (2010) examined the impact of exchange rate volatility on Nigeria's manufacturing industry. The study employed multiple regression econometric tools, which revealed a negative association between exchange rate fluctuation and manufacturing sector performance. Rapetti *et al.* (2012) affirmed that real exchange rate fluctuation negates economic performance by causing a decline in productivity and growth in a large sample of advanced and emerging economies. Bristy (2014) used the optimum currency area (OCA) theory to examine the long-term effect of exchange rate fluctuation and financial development on the growth of the Bangladeshi economy. The empirical demonstrates that exchange rate fluctuation has a negative impact on Bangladesh's economic growth. Adelowokan *et al.* (2015) analysed the impact of exchange rate fluctuation on capital formation and economic growth in Nigeria using the vector error correction (VEC) approach. The empirical result indicates that exchange rate fluctuation has an adverse impact on capital formation and economic growth, while exchange rate fluctuations have a direct linkage with interest rate and inflation in Nigeria. Alagidede and Ibrahim (2017) used the vector error correction model (VECM) econometric technique to examine the causes and effects of exchange rate volatility on Ghana's economic performance from 1980 to 2013. The empirical result shows that excessive fluctuation have a negative impact on the growth of the Ghanaian economic. Alasha (2020) investigated the link between exchange rate volatility and its effects on the Nigerian economic growth using trade balance, inflation rate, interest rate and exchange rate as variables and the data used for the analysis was obtained from the National Bureau of Statistics and the Central Bank of Nigeria. The study employed the ordinary least square method (OLS), classical least regression model and other techniques such as the Cointegration and Granger Causality test, Augmented Dickey-Fuller test, to analyse the data. The study revealed that exchange rate and inflation exerted an adverse effect on economic growth, while interest rates have a positive effect on economic growth. Ndu- Okrereke and Nwachukwu (2017) used vector auto regression (VARs) models on the time series data, the result reveal that supply of foreign exchange has a positive and significant relationship with output level of Gross Domestic Product while the demand for foreign exchange has a negative relationship with gross demand product The study in question is the effect of exchange rate fluctuations on the Nigerian economy. The justification for the use of these models was based on the volatility of the exchange rate in impacting on macro-economic variables using a 14- year period. The hypotheses stated will be tested using the two-stage least square (2LS). The statistical properties of the 2LS are contained in the popular Gauss- Markov theorem, which sees the least squares estimators as unbiased linear estimator, having minimum variance. Iheanachor and Ozegbe (2021) used the autoregressive distributed lag (ARDL) technique to examine the consequences of exchange rate fluctuations on Nigeria's economic performance from 1986 to 2019. The study revealed that exchange rate, inflation rate and foreign direct investment has a negative impact on the economic performance in the long-run. However, some previous studies have also revealed that the exchange rate has a significant positive effect on economic growth performance. For instance, Azeez *et al.* (2012) studied the impact of effect of exchange rate volatility on macroeconomic behaviour in Nigeria from 1986 to 2010. The empirical result shows that the exchange rate is positively related to Gross Domestic Product. Aliyu (2011) revealed depreciation in a country's exchange rate would expand export and discourage import, while appreciation of the exchange rate raises imports and reduces exports. Moreover, the depreciation of a country's currency would likely cause a shift of focus from cross-border goods to local goods. As such, it leads to the diversion of income from importing countries to countries exporting through a shift in terms of trade, which has an impact on exporting and importing countries' economic growth. Similarly, Vieira *et al.* (2016) investigated the effect of real exchange rate fluctuations on long-run economic growth for developed and emerging economies over the period 1970 to 2009 and found that high (low) exchange rate volatility positively (negatively) affects economic growth. However, controlling for exchange rate volatility in a model containing levels of exchange rate and exchange rate misalignment renders the variables insignificant, suggesting that exchange rate stability is more crucial in propelling long-run growth than exchange rate misalignment.

3. Methodology

3.1 Data and Sources

The study used annual time series data covering the period 1986 to 2020 for the empirical analysis. The annual time series data sets include real GDP, Naira/US dollar exchange rate, inflation rate and monetary policy rate. The dataset was sourced from the Central Bank of Nigeria Statistical Bulletin.

3.2 Model Specification

Based on the Mundell (1968) and Fleming (1969) model, which is the theoretical foundation for this study. The study adapted the empirical model developed by Ihenanchor and Ozegbe (2021) and employed the real GDP as a proxy for economic growth while the official foreign exchange rate (naira to US dollar), inflation rate and monetary policy rate are adapted independent variables.

The functional form of the model is specified as follows:

$$RGDP_t = f(EXR_t, INF_t, MPR_t) \quad (3.1)$$

Where ***RGDP*** = Real GDP, ***EXR*** = Naira/Dollar exchange rate, ***INF*** = Inflation rate and *MPR* = monetary policy rate.

Referring to equation (3.1), the coefficient of the explanatory variables and the error term were incorporated to make the model a standard econometric model, which is expressed as:

$$RGDP = \beta_0 + \beta_1 EXR + \beta_2 INF + \beta_3 MPR + \mu \quad (3.2)$$

$\beta_{0=}$ Constant term of the regression model.

$\beta_{1\text{-}3=}$ Coefficient of explanatory variables.

$\mu=$ Disturbance term

Recognising the divergence in the unit of measurement among the variables, the model in equation (3.2) was transformed into a log-linear model. Real GDP was logged since it is expressed in monetary term (billion naira). The log-linear model is expressed as:

$$LnRGDP = \beta_0 + \beta_1 EXR + \beta_2 INF + \beta_3 MPR + \mu \quad (3.3)$$

Estimation Method

Given that the series exhibit varying pattern of integration, the study employed the ARDL model technique to estimate the model in equation *3.3*.The Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model was also employed to estimate the predicted volatility or fluctuations of exchange rate on economic growth. Post-estimation tests on heteroscedasticity, autocorrelation and normality were conducted to ensure reliability of results.

Hence, the specific ARDL model for this study is expressed:

$$LnRGDP_t = \theta + \sum_{i=1}^{p} \alpha_i RGDP_{t-i} + \sum_{i=0}^{q_1} \beta_{1i} \log(EXR_{t-i}) + \sum_{i=0}^{q_2} \beta_{2i} INF_{t-i} + \sum_{i=0}^{q_3} \beta_{3i} MPR_{t-i} + \varepsilon_t \quad (3.4)$$

Where *p*, q_1, q_2, q_3 and q_4, are the respective maximum lags of the dependent variable (*RGDP*) and the explanatory variables (*EXR, INF, MPR*) while α_i, β_{1i}, β_{2i}, and β_{3i}, are the respective coefficients associated with the dependent variable (*RGDP*) and the explanatory variables at the respective lags.

The ARDL Error Correction Model (ECM) specification is given as:

$$\Delta LnRGDP_t = \theta + \sum_{i=1}^{p} \alpha_i \Delta RGDP_{t-i} + \sum_{i=1}^{q_1} \beta_{1i} \Delta EXR_{t-i} + \sum_{i=1}^{q_2} \beta_{2i} \Delta INF_{t-i} + \sum_{i=1}^{q_3} \beta_{3i} \Delta MPR_{t-i} + \emptyset ECM_{t-i} + \epsilon_t \quad (3.5)$$

In equation *3.5*, the coefficient ($\emptyset$) of the ECM term called the speed of adjustment is expected to be negative in order to restore the model to equilibrium, *i.e.*$\emptyset < 0$.Thus, the long-run coefficients are defined as follows:

$$\varphi_1 = \frac{-\delta_1}{\lambda}, \varphi_2 = \frac{-\delta_2}{\lambda}, \varphi_3 = \frac{-\delta_3}{\lambda}, \quad (3.6)$$

From equation (3.6), the parameters φ_1, φ_2, and φ_3, are the long-run impacts of *EXR, INF and MPR on Real GDP.*

4. Presentation, Analysis and Discussion of Findings

Table 4.1: Summary Statistics

Statistics	RGDP	EXR	INF	MPR
Mean	38574.98	125.51	19.51	13.70
Maximum	71387.83	381.00	72.83	26.00
Minimum	15237.99	2.02	5.39	6.00
Std. Dev.	20476.78	99.62	17.82	3.79
Skewness	0.44	0.81	1.70	0.77
Kurtosis	1.58	3.13	4.55	4.99
Jarque-Bera	4.08	3.87	20.41	9.23
Probability	0.13	0.14	0.00	0.00
Observations	35	35	35	35

Source: Authors' computation using E-VIEWS 10

Table 4.1 shows the summary statistics of the variables under consideration. Real GDP trended between N15.2 trillion and N71.3 trillion in the review period. Official exchange rate of the naira to the US dollar ranged from N2.02 per dollar to N381 per dollar. The high standard deviation of 99.62 suggests that the rate of the naira relative to the US dollar is very volatile.

Inflation rate ranged between 5.39 percent and 72.83 percent, averaging 19.51 percent within the review period. On the other hand, the monetary policy rate averaged 13.7 percent, trending between 6 percent and 26 percent. All the variables are positively skewed. This indicates that the data distribution of the variables under focus occurs more on one side of the scale with the long tail on the right side. Only real GDP has a negative kurtosis as its value of 1.58 is below the benchmark value of 3.0, which indicates real GDP data distribution has flat and thin lines.

Table 4.2: Correlation Matrix

	RGDP	EXR	INF	MPR
RGDP	1			
EXR	0.89	1		
INF	-0.42	-0.38	1	
MPR	-0.42	0.29	-0.38	1

Source: Authors' computation using E-VIEWS 10

As shown in Table 4.2, Real GDP is negatively correlated with inflation rate (r= -0.42) and monetary policy rate (r= -0.42), while there is a positive association between Real GDP and exchange rate (r=0.89). There is no perfect relationship between the explanatory variables. This suggests the absence of multicollinearity in the model.

Table 4.3: Unit Root Test

	Level			First Difference			Second Difference			
Series	ADF Test Statistic	0.05 Critical Value	Prob. Value	ADF Test Statistic	0.05 Critical Value	Prob. Value	ADF Test Statistic	0.05 Critical Value	Prob Value	Order of Integration
LnRGDP	-1.20	-2.95	0.66	-2.86	-2.95	0.06	-7.65	-2.95	0.00	I (2)
EXR	1.36	-2.95	0.99	-5.14	-2.95	0.00				I (1)
INF	-4.54	-2.95	0.00							I (0)
MPR	-3.22	-2.95	0.02							I(0)

Source: Authors' computation using E-VIEWS 10

As shown in Table 4.3, the result showed that inflation rate (INF) and monetary policy rate (MPR) are stationary at level. While exchange rate (EXR) achieved stationarity at first order difference, real GDP was integrated at second order difference Since the order of integration was different among the variables, the study proceeded to Autoregressive Distributed Lag Model (ARDL) to estimate the cause-effect relationship between exchange rate volatility (alongside other variables) on economic growth.

Table 4.4: ARDL Bound Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	5.300353	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Authors' computation using E-VIEWS 10

Table 4.4 presented the ARDL bound test. The value of the F-statistics stood at 5.3 while the lower and upper bound values were 3.23 and 4.35 at five percent critical value. Since the F-statistic (5.3) exceeded the upper bound, it can be posited that cointegration exists between Real GDP and the explanatory variables. As such, there is a long-run equilibrium relationship between exchange rate and economic growth.

Table 4.5: Short-run and Long-run Impact of Exchange Rate Volatility on Economic Growth

Co-integrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR)	-0.000104	0.000110	-0.944993	0.3554
D(INF)	-0.001557	0.000431	-3.610988	0.0016
D(MPR)	-0.001675	0.001696	-0.987512	0.3346
CointEq(-1)	-0.062530	0.028182	-2.218822	0.0377

Cointeq = LOG(RGDP) - (-0.0017*EXR -0.0478*INF -0.0712*MPR + 13.3554)

Long-Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-0.001660	0.002415	-0.687406	0.4993
INF	-0.047759	0.018761	-2.545633	0.0188
MPR	-0.071201	0.028401	-2.506958	0.0205
C	13.355387	1.223727	10.913700	0.0000

Source: Authors' computation using E-VIEWS 10

Table 4.5 presented the short-run and long-run estimation result. The coefficient of the error correction model is negative and statistically significant, an indication of the existence of long-run relationship among the variables. The short-run ARDL result showed that the coefficient of the error correction term stood at -0.062. This implies that shocks in the model in the short-term will be corrected at a rate of 6.2 percent yearly to ensure convergence in the long run. The short-run result showed that the exchange rate period in the current period is negatively related to real GDP in the current period. For context, a unit decline in the official naira to US dollar rate is associated with a 0.0001 percent decline in real GDP on average ceteris paribus assumption. However, the magnitude of impact is not statistically significant at five percent. The coefficient of inflation stood at -0.0016, indicating that a percent increase in general price level is expected to lead to a 0.0016 percent dip in real GDP on average ceteris paribus assumption. The magnitude of the impact is statistically significant. In furtherance, the result showed that a percent increase in monetary policy rate is expected to lead 0.002 percent decline in real GDP.

The long-run estimation result showed that the exchange rate has a negative but negligible impact on real GDP. A unit decline in exchange rate should lead to a 0.002 percent decline in real GDP. MPR and inflation rate have a significant impact on real GDP. A percent rise in both variables is associated with 0.05 percent and a 0.07 percent decline in real GDP on the average ceteris paribus.

Table 4.6 Post-estimation test

Test	Test-Statistic	P-Value	Null Hypothesis	Conclusion
Breusch-Godfrey Correlation LM Test	0.2993	0.7447	H_0: No serial correlation	Accept H_0
ARCH Test - Heteroskedasticity	0.3348	0.7185	H_0: Homoscedasticity	Accept H_0
Normality Test	0.2978	0.8617	H_0: Normal distribution	Accept H_0

Source: Authors' computation using E-VIEWS 10

The results of the diagnostic tests are shown in Table 4.6. The serial correlation of the residuals was tested through the Breusch-Godfrey Serial Correlation LM Test. The null hypothesis of no serial correlation was accepted because the probability value of 0.74 was less than five percent significance level. Under the Jarque-Bera Normality test, the probability value was larger than the chosen significance level of five percent. This suggests that the errors were normally distributed, and the null hypothesis of normal distribution is accepted. The result of the ARCH test provided sufficient evidence to retain the null hypothesis of homoscedasticity (constant variance) given that the probability value of 0.72 exceeded the 0.05 significance level.

Discussion of Findings

This current study revealed that exchange rate depreciation, inflation, and monetary policy rates have negative impacts on real GDP in both short and long-run. This revelation is consistent with extant empirical findings (Adewuyi & Akpokodje, 2013; Alagidede & Ibrahim, 2017; Iheanachor & Ozegbe, 2021). Exchange rate has been volatile because of continued dependence on oil for revenue and foreign exchange earnings (Ndu-Okereke & Nwachukwu, 2017). Therefore, the fate of the local currency is largely determined by the international oil environment. This is coupled with the fact that foreign exchange inflows from other sources – non-oil exports, FDI, remittances has significantly declined in recent years (Adedoyin *et al.,* 2016). Exchange rate fluctuations portends serious risk for macroeconomic stability, undermines developmental planning, poses severe risks on ease of doing business, deters investor confidence, and leads to acceleration in production costs and general prices given the country's import-dependent nature (Raza *et al.,* 2021). Similarly, inflation has a negative impact on real GDP both in the short-run and long-run. Nigeria is a highly inflationary environment. Inflation rate averaged 19 percent in the review period. High inflation rate hurts consumer purchasing power, erodes real income, affects corporate and business profitability and poses risks to both direct and portfolio investments (Usman & Musa, 2018).

Conclusion

This inquiry ascertains if exchange rate fluctuations have an impact on Nigeria's economic performance from 1986 to 2020. The study revealed that exchange rate depreciations occasioned by constant fluctuations had a significant negative impact on Nigeria's economic performance within the period under review. Using the Generalised Autoregressive Conditional Heteroscedasticity (GARC) model, the result shows that in the long-run, exchange rate depreciation, inflation and the monetary policy rate have a significant long-term impact on the nation's economic performance. By implication, the Naira/US$ exchange rate fluctuation affects the economy negatively. Therefore, an appreciation in the value of the Naira relative to the US$ will enhance Nigeria's economic performance and vice versa. The net effect of this finding is that a persistent exchange rate fluctuation is detrimental to Nigeria's economic stability and overall performance. With this finding, this study suggests the intervention of the monetary authority to reduce the level of fluctuation and ensure short- and long-term stability in the exchange rate system. To attain the above stated goal, the monetary authority should focus on instruments of intervention such as foreign exchange reserve and effectiveness in the regulation of the bureau de change operators. Furthermore, on the fiscal side, the government should consider trade interdependence and flexibility of production factors when formulating exchange rate policies. The adoption of fixed exchange rate regimes in resolution of the exchange rate crisis is confirmation of the inherent failures in the market mechanism. Therefore, it is pertinent to implement flexible exchange rate policy with a good strategy for adjustments where necessary.

References

Abdoh, W. M. Y. M., Yusuf, N. H. M., Zulkifli, S. A. M., Bulot, N., & Ibrahim, N. J. (2016). Macroeconomic factors that influence exchange rate fluctuation in ASEAN countries. *International Academic Research Journal of Social Science*, *2*(1), 89-94.

Adedoyin, L. I., Oluwafunke, A. I., Victor, A., &Asaleye, A. (2016). Exchange rate fluctuation and the Nigeria economic growth. *EuroEconomica*, *35*(2).

Adelowokan Oluwaseyi, A., Balogun Oluwakemi, D., &Adesoye, A. B. (2015). Exchange rate volatility on investment and growth in Nigeria, an empirical analysis. *Global Journal of Management and Business Research*.

Adewuyi, A. O., & Akpokodje, G. (2013). Exchange rate volatility and economic activities of Africa's sub-

groups. *The International Trade Journal*, *27*(4), 349-384.
Akinlo, A. E., & Onatunji, O. G. (2020). Exchange rate volatility and domestic investment: Evidence from twelve ECOWAS countries. *African Journal of Economic Review*, *8*(2), 176-189.
Alagidede, P., & Ibrahim, M. (2017). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, *18*(2), 169-193.
ALASHA, R. U. (2020). *THE IMPACT OF EXCHANGE RATE FLUCTUATIONS ON ECONOMIC GROWTH IN NIGERIA* (Doctoral dissertation, BAZE UNIVERSITY).
Aliyu, S. U. (2012). Reactions of stock market to monetary policy shocks during the global financial crisis: The Nigerian case. *CBN Journal of Applied Statistics*, *3*(1), 17-41.
Asteriou, D., Masatci, K., & Pılbeam, K. (2016). Exchange rate volatility and international trade: International evidence from the MINT countries. *Economic Modelling*, *58*, 133-140.
Avdjiev, S., Bruno, V., Koch, C., & Shin, H. S. (2019). The dollar exchange rate as a global risk factor: evidence from investment. *IMF Economic Review*, *67*(1), 151-173.
Azeez, B. A., Kolapo, F. T., & Ajayi, L. B. (2012). Effect of exchange rate volatility on macroeconomic performance in Nigeria. *Interdisciplinary journal of contemporary research in business*, *4*(1), 149-155.
Bagheri, M., & Gheisarinejad, H. (2016). THE IMPACT OF EXCHANGE RATE FLUCTUATIONS AND INFLATION ON THE AMOUNT OF DEPOSIT OF CUSTOMERS (CASE STUDY: BANK SADERAT, HORMOZGAN PROVINCE). *IIOAB JOURNAL*, *7*, 270-276.
Bakhshi, Z., & Ebrahimi, M. (2016). The effect of real exchange rate on unemployment. *Marketing and Branding Research*, *3*, 4-13.
Bristy, H. J. (2014). Impact of financial development on exchange rate volatility and long-run growth relationship of Bangladesh. *International Journal of Economics and Financial Issues*, *4*(2), 258-263.
Caselli, M., Chatterjee, A., & Woodland, A. (2017). Multi-product exporters, variable markups and exchange rate fluctuations. *Canadian Journal of Economics/Revue canadienned'économique*, *50*(4), 1130-1160.
David, O., Umeh, J. C., &Ameh, A. A. (2010). The effect of exchange rate fluctuations on the Nigerian manufacturing sector. *African journal of business management*, *4*(14), 2994-2998.
Ewubare, D. B., &Ushie, U. A. (2022). Exchange Rate Fluctuations and Economic Growth in Nigeria (1981-2020). *International Journal of Development and Economic Sustainability*, *10*(1), 41-55.
Fang, Y. (2020). Research on the Impact of RMB Exchange Rate Fluctuation on Employment in my country. *Academic Journal of Business & Management*, *2*(6).
Fauceglia, D. (2020). Exchange rate fluctuations and quality composition of exports: Evidence from Swiss product-level data. *The World Economy*, *43*(6), 1592-1618.
Iheanachor, N., & Ozegbe, A. E. (2021). The consequences of exchange rate fluctuations on Nigeria's economic performance: An autoregressive distributed lag (ARDL) approach. *International Journal of Management, Economics and Social Sciences (IJMESS)*, *10*(2-3), 68-87.
Jadoon, A. U., & Guang, Y. (2019). The effect of exchange rate fluctuations on trade balance of Pakistan. *International Journal of Economic Sciences*, *8*(1), 68-80.
McKinnon, R. I. (1963). Optimum currency areas. *The American economic review*, *53*(4), 717-725.
Mostafapour, Y., Tehranchian, A. M., Jafari Samimi, A., &Rasekhi, S. (2020). The study of threshold effects of exchange rate fluctuations on private investment in Iran. *Quarterly Journal of Applied Theories of Economics*, *7*(1), 91-116.
Mundell, R. A. (1961). A theory of optimum currency areas. *The American economic review*, *51*(4), 657-665.
Ndu-Okereke, O. E., & Nwachukwu, R. T. (2017). A study of volatility of exchange rate fluctuations on the Nigerian economic growth. *International Journal of Economics and Financial Management, 2 (3)*, 27-50.
Okorontah, C. F., & Odoemena, I. U. (2016). Effects of exchange rate fluctuations on economic growth of Nigeria. *International Journal of Innovative Finance and Economics Research*, *4*(2), 1-7.
Oseni, I. O., Adekunle, I. A., & Alabi, M. O. (2019). Exchange rate volatility and industrial output growth in Nigeria. *Journal of Economics & Management*, *38*, 129-156.
Rapetti, M., Skott, P., & Razmi, A. (2012). The real exchange rate and economic growth: are developing countries different?. *International Review of Applied Economics*, *26*(6), 735-753.
Rashid, A., & Waqar, S. M. (2017). Exchange rate fluctuations, firm size, and export behavior: An empirical investigation. *Small Business Economics*, *49*(3), 609-625.
Raza, S. A., Shah, N., & Arif, I. (2021). Relationship between FDI and economic growth in the presence of good governance system: Evidence from OECD Countries. *Global Business Review*, *22*(6), 1471-1489.
Romer, D. (2012). *Advanced macroeconomics, 4e*. New York: McGraw-Hill.
Senadza, B., & Diaba, D. D. (2017). Effect of exchange rate volatility on trade in Sub-Saharan Africa. *Journal of African Trade*, *4*(1-2), 20-36.
Solow, R. M. (1956). A contribution to the theory of economic growth. *The quarterly journal of economics*, *70*(1), 65-94.

Usman, O., & Elsalih, O. M. (2018). Testing the effects of real exchange rate pass-through to unemployment in Brazil. *Economies*, *6*(3), 49.

Usman, O., & Musa, M. S. (2018). Revisiting exchange rate pass-through to consumer price inflation in Nigeria: A cointegrated vector autoregressive approach. *Academic Journal of Economic Studies*, *4*(1), 60-67.

Vieira, F. V., & MacDonald, R. (2016). Exchange rate volatility and exports: a panel data analysis. *Journal of Economic Studies*.

Vo, D. H., Vo, A. T., & Zhang, Z. (2019). Exchange rate volatility and disaggregated manufacturing exports: Evidence from an emerging country. *Journal of Risk and Financial Management*, *12*(1), 12.

Wesseh Jr, P. K., & Lin, B. (2018). Exchange rate fluctuations, oil price shocks and economic growth in a small net-importing economy. *Energy*, *151*, 402-407.

Zakari, M. (2017). The impact of exchange rate fluctuations on foreign direct investment in Nigeria. *Journal of Finance and Accounting*, *5*(4), 165-170.

Appendix

Descriptive Statistics

	RGDP	EXR	INF	MPR
Mean	38574.98	125.5057	19.51238	13.70000
Median	31709.45	121.0000	12.55496	13.50000
Maximum	71387.83	381.0000	72.83550	26.00000
Minimum	15237.99	2.020000	5.388008	6.000000
Std. Dev.	20476.78	99.62375	17.82654	3.798607
Skewness	0.438826	0.811901	1.703080	0.766874
Kurtosis	1.576326	3.132317	4.547383	4.994409
Jarque-Bera	4.079136	3.870771	20.41130	9.231320
Probability	0.130085	0.144369	0.000037	0.009896
Sum	1350124.	4392.701	682.9332	479.5000
Sum Sq. Dev.	1.43E+10	337446.3	10804.71	490.6000
Observations	35	35	35	35

CORRELATION MATRIX

	RGDP	EXR	INF	MPR
RGDP	1.000000	0.899299	-0.416353	-0.419016
EXR	0.899299	1.000000	-0.381493	-0.292270
INF	-0.416353	-0.381493	1.000000	0.380151
MPR	-0.419016	-0.292270	0.380151	1.000000

Unit Root
RGDP at Level
Null Hypothesis: LOG(RGDP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.196278	0.6642
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(RGDP))
Method: Least Squares
Date: 06/07/22 Time: 11:14
Sample (adjusted): 1988 2020
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RGDP(-1))	-0.012588	0.010523	-1.196278	0.2410
D(LOG(RGDP(-1)))	0.565621	0.154419	3.662893	0.0010
C	0.150850	0.109628	1.376016	0.1790

R-squared	0.324597	Mean dependent var	0.046158
Adjusted R-squared	0.279570	S.D. dependent var	0.037094
S.E. of regression	0.031484	Akaike info criterion	-3.992136
Sum squared resid	0.029738	Schwarz criterion	-3.856090
Log likelihood	68.87025	Hannan-Quinn criter.	-3.946361
F-statistic	7.208958	Durbin-Watson stat	2.016025
Prob(F-statistic)	0.002776		

RGDP at First Difference

Null Hypothesis: D(LOG(RGDP)) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.861727	0.0608
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(RGDP),2)
Method: Least Squares
Date: 06/07/22 Time: 11:14
Sample (adjusted): 1988 2020
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RGDP(-1)))	-0.444322	0.155264	-2.861727	0.0075
C	0.020153	0.009124	2.208754	0.0347

R-squared	0.208971	Mean dependent var	-0.000640
Adjusted R-squared	0.183454	S.D. dependent var	0.035084
S.E. of regression	0.031703	Akaike info criterion	-4.006142
Sum squared resid	0.031157	Schwarz criterion	-3.915445
Log likelihood	68.10135	Hannan-Quinn criter.	-3.975625
istic	8.189481	Durbin-Watson stat	1.927579
Prob(F-statistic)	0.007483		

RGDP at second Difference

Null Hypothesis: D(LOG(RGDP),2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.654014	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOG(RGDP),3)
Method: Least Squares
Date: 06/07/22 Time: 11:15
Sample (adjusted): 1989 2020
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RGDP(-1)),2)	-1.297178	0.169477	-7.654014	0.0000
C	-0.002304	0.005813	-0.396298	0.6947

R-squared	0.661338	Mean dependent var	-0.003146
Adjusted R-squared	0.650049	S.D. dependent var	0.055575
S.E. of regression	0.032876	Akaike info criterion	-3.931686
Sum squared resid	0.032425	Schwarz criterion	-3.840077
Log likelihood	64.90697	Hannan-Quinn criter.	-3.901320
F-statistic	58.58392	Durbin-Watson stat	2.003772
Prob(F-statistic)	0.000000		

EXR AT LEVEL

Null Hypothesis: EXR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.358365	0.9984
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR)
Method: Least Squares
Date: 06/07/22 Time: 11:16
Sample (adjusted): 1987 2020
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR(-1)	0.061074	0.044961	1.358365	0.1838
C	3.940328	6.649136	0.592608	0.5576

R-squared	0.054518	Mean dependent var	11.14647
Adjusted R-squared	0.024971	S.D. dependent var	23.67064
S.E. of regression	23.37323	Akaike info criterion	9.198082
Sum squared resid	17481.85	Schwarz criterion	9.287868
Log likelihood	-154.3674	Hannan-Quinn criter.	9.228702
F-statistic	1.845156	Durbin-Watson stat	2.062764
Prob(F-statistic)	0.183848		

EXR AT FIRST DIFFERENCE

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.147577	0.0002
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR,2)
Method: Least Squares
Date: 06/07/22 Time: 11:16
Sample (adjusted): 1988 2020
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR(-1))	-1.043920	0.202798	-5.147577	0.0000
C	11.82947	4.634037	2.552735	0.0158

R-squared	0.460847	Mean dependent var	2.183333
Adjusted R-squared	0.443455	S.D. dependent var	32.63570
S.E. of regression	24.34687	Akaike info criterion	9.281376
Sum squared resid	18375.88	Schwarz criterion	9.372073
Log likelihood	-151.1427	Hannan-Quinn criter.	9.311893
F-statistic	26.49755	Durbin-Watson stat	1.796607
Prob(F-statistic)	0.000014		

INF AT LEVEL

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.539566	0.0013
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 06/07/22 Time: 11:17
Sample (adjusted): 1994 2020
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.472236	0.104027	-4.539566	0.0003
D(INF(-1))	-0.038250	0.141909	-0.269541	0.7906
D(INF(-2))	0.223136	0.134291	1.661587	0.1139
D(INF(-3))	0.216038	0.118955	1.816136	0.0860
D(INF(-4))	-0.053910	0.107654	-0.500769	0.6226
D(INF(-5))	-0.262452	0.107275	-2.446527	0.0249
D(INF(-6))	0.167910	0.087556	1.917749	0.0712
D(INF(-7))	0.194361	0.094593	2.054718	0.0547
C	6.191394	2.315538	2.673847	0.0155

R-squared	0.797649	Mean dependent var	-1.628343
Adjusted R-squared	0.707715	S.D. dependent var	10.64176
S.E. of regression	5.753299	Akaike info criterion	6.598625
Sum squared resid	595.8081	Schwarz criterion	7.030571
Log likelihood	-80.08144	Hannan-Quinn criter.	6.727066
F-statistic	8.869278	Durbin-Watson stat	1.979143
Prob(F-statistic)	0.000069		

MPR AT LEVEL

Null Hypothesis: MPR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.222687	0.0272
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MPR)
Method: Least Squares
Date: 06/07/22 Time: 11:17
Sample (adjusted): 1987 2020
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR(-1)	-0.480490	0.149096	-3.222687	0.0029
C	6.657925	2.128214	3.128409	0.0037

R-squared	0.245029	Mean dependent var	0.044118
Adjusted R-squared	0.221436	S.D. dependent var	3.723630
S.E. of regression	3.285593	Akaike info criterion	5.273994
Sum squared resid	345.4438	Schwarz criterion	5.363780
Log likelihood	-87.65789	Hannan-Quinn criter.	5.304613
F-statistic	10.38571	Durbin-Watson stat	2.136441
Prob(F-statistic)	0.002918		

ARDL BOUND TEST

ARDL Bounds Test
Date: 06/07/22 Time: 11:20
Sample: 1990 2020
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.300353	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

SHORT AND LONG RUN

ARDL Cointegrating And Long Run Form
Dependent Variable: LOG(RGDP)
Selected Model: ARDL(1, 0, 4, 1)
Date: 06/07/22 Time: 11:42
Sample: 1986 2020
Included observations: 31

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR)	-0.000104	0.000110	-0.944993	0.3554
D(INF)	-0.001557	0.000431	-3.610988	0.0016
D(INF)	0.001329	0.000581	2.288140	0.0326
D(INF)	0.000233	0.000516	0.451552	0.6562
D(INF)	0.001110	0.000402	2.761631	0.0117
D(MPR)	-0.001675	0.001696	-0.987512	0.3346
CointEq(-1)	-0.062530	0.028182	-2.218822	0.0377

Cointeq = LOG(RGDP) - (-0.0017*EXR -0.0478*INF -0.0712*MPR + 13.3554)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-0.001660	0.002415	-0.687406	0.4993
INF	-0.047759	0.018761	-2.545633	0.0188
MPR	-0.071201	0.028401	-2.506958	0.0205
C	13.355387	1.223727	10.913700	0.0000

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.299334	Prob. F(2,19)	0.7447
Obs*R-squared	0.946936	Prob. Chi-Square(2)	0.6228

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 06/07/22 Time: 11:27
Sample: 1990 2020
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RGDP(-1))	-0.002784	0.029432	-0.094577	0.9256
EXR	7.17E-06	0.000114	0.062726	0.9506
INF	6.70E-05	0.000470	0.142423	0.8882
INF(-1)	-0.000158	0.000628	-0.251671	0.8040
INF(-2)	0.000119	0.000622	0.191611	0.8501
INF(-3)	-0.000103	0.000551	-0.186577	0.8540
INF(-4)	5.99E-05	0.000424	0.141375	0.8891
MPR	-0.000435	0.001856	-0.234064	0.8174
MPR(-1)	6.17E-05	0.001776	0.034718	0.9727
C	0.033465	0.320051	0.104562	0.9178
RESID(-1)	0.077908	0.242743	0.320947	0.7518
RESID(-2)	-0.187648	0.257259	-0.729412	0.4746

R-squared	0.030546	Mean dependent var	-7.48E-16
Adjusted R-squared	-0.530716	S.D. dependent var	0.020866
S.E. of regression	0.025815	Akaike info criterion	-4.191041
Sum squared resid	0.012662	Schwarz criterion	-3.635949
Log likelihood	76.96114	Hannan-Quinn criter.	-4.010095
F-statistic	0.054424	Durbin-Watson stat	2.052234
Prob(F-statistic)	0.999991		

ARCH EFFECT FOR HETEROSCEDASITICTY

Heteroskedasticity Test: ARCH

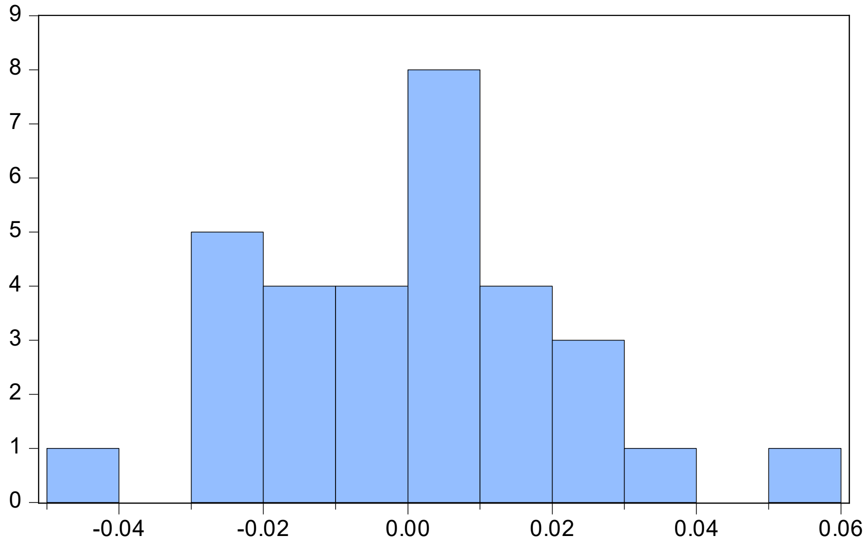
F-statistic	0.334843	Prob. F(2,26)	0.7185
Obs*R-squared	0.728200	Prob. Chi-Square(2)	0.6948

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/07/22 Time: 11:28
Sample (adjusted): 1992 2020
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000384	0.000156	2.462982	0.0207
RESID^2(-1)	-0.085820	0.177822	-0.482615	0.6334
RESID^2(-2)	0.101092	0.176369	0.573184	0.5714

R-squared	0.025110	Mean dependent var	0.000390
Adjusted R-squared	-0.049881	S.D. dependent var	0.000535
S.E. of regression	0.000549	Akaike info criterion	-12.08091
Sum squared resid	7.82E-06	Schwarz criterion	-11.93947
Log likelihood	178.1732	Hannan-Quinn criter.	-12.03661
F-statistic	0.334843	Durbin-Watson stat	2.036269
Prob(F-statistic)	0.718490		

NORMALITY TEST



Series: Residuals	
Sample 1990 2020	
Observations 31	
Mean	-7.48e-16
Median	0.001160
Maximum	0.050673
Minimum	-0.041837
Std. Dev.	0.020866
Skewness	0.221794
Kurtosis	2.816261
Jarque-Bera	0.297769
Probability	0.861669