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Impact of Exchange Rate Volatility on Economic Growth: Evidence from Nigeria.

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ABSTRACT: Foreign exchange management has undergone several challenges in Nigeria since 1960 to date due to some economic and political factors which consequently leaves a negative impact on the Nigerian economy. The principal objective of monetary policy is to ensure the stability of the financial system by determining the exchange rate policy that stabilizes prices and sustains growth in the economy. This research study investigated the impact of exchange rate volatility on economic growth in Nigeria spanning 1981 to 2020. Annual Secondary data used were sourced from the World Bank, Central Bank of Nigeria Statistical Bulletin of various issues. The study employed the ARCH/GARCH model in measuring volatility and ARDL estimation technique. The findings revealed that in the long run, exchange rate volatility has a negative coefficient of -4.84852 while the exchange rate has a positive coefficient of 9.28831 but is not statistically coefficient. However, in the short-run, the effect of exchange rate volatility was positive (with a coefficient of 54.6847) and statistically significant at one percent and the effect of exchange is negative (with a coefficient of 17.0966) and statistically significant at one percent. The study recommends that the Central Bank of Nigeria should sustain the current fluctuation of the exchange rate in Nigeria for the sustenance of the positive short-run effect on Nigerian real GDP per capita growth and continue with the managed float exchange rate system which is already in place. Policies that will improve production and discourage importation should be encouraged to move the economy from consumption to production economy.

KEYWORDS:GDP Growth; Volatility; Exchange Rate; GARCH; ECN; Nigeria.

I. INTRODUCTION

The concept of exchange rate volatility is defined as the persistent fluctuation of the exchange rate (Alagidede and Ibrahim 2016). This simply means a variation in the exchange rate of an economy or a country. According to J. Y. Adeniran (Adeniran, 2014), because of the return to democracy in 1998, exchange rate volatility increased significantly, and the economy adopted a policy of switching from a predetermined or pegged exchange rate to a floating exchange rate in order to mitigate the consequences. Based on the aforementioned, the Nigerian apex bank (CBN) seeks to devalue the naira in order to stabilize exchange rate movements under the floating exchange rate system

According to Broda (2004), an increase in exchange rate volatility leads to uncertainty, which has adverse effect on trade flows. Exchange rate volatility gave rise to the idea of adding a risk premium to traded goods and services which invariably leads to higher prices and results to lower external trade. This has various major consequences on trade relationships in general and poses a threat to the economic growth prospects of countries. One of the macroeconomic disequilibria this has led to, is the balance of payment deficit problem experienced by many countries today.

Consequently, it is important to note that, when a currency's exchange rate is volatile, the degree of price changes over time increases proportionally. When the price increases or falls by extremely wide margins over time, this indicates that the exchange rate is unstable or volatile and the foreign exchange market is said to be experiencing volatility (CBN, 2016). The appreciation of currency happens by an upward movement while a downward movement indicates a loss in value (depreciation) against exchange rate (Anyanwu et al. 2017).

The issue of exchange rate volatility and management in both developing and developed economies has attracted the attention of researchers and policymakers especially due to its impact on macroeconomic indicators: on investment (see, Adelowolan, 2015; Adegboyo, 2019; Bleaney&

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Greenaway, 2001; Rasaq, 2013; Akinwolere, 2021), on export flows (see, Ahmed, 2019; Pino, 2016; Javed, 2009;), on import demand, (see, Odejimi, Isikhuemen, &Edogiawerie, 2020;), on oil prices (see, Osigwe, 2015; Matthew, 2014; Aliyu, 2009;), on gross domestic product and balance of payment (see, Azeez, Kolapo & Ajayi, 2012; Oseni, Adekunle, and Alabi, 2019; Akpan, 2013;), on industrial output (see, Oseni, Adekunle, and Alabi, 2019; Jamil et al, 2012;) , on external reserves (see, Soro& Aras, 2020; Javed, 2009;), on inflation (see, Akinwolere, 2021; Rasaq, 2013;), on the ratio of government expenditure (Chi-Wei-Su, 2012), on general economic growth (Adjei 2019; Karahan, 2020; Katusiima, 2015; Janus, 2015; Barguellil, 2018; Akinwolere, 2021; Odejimi, Isikhuemen, &Edogiawerie, 2020;)

Following the collapse of the Bretton Woods system in 1971, Countries resorted to measures to protect their economies against the raging effects of speculative attacks, and the incessant increase in exchange rates in the global market. Prior to this time, the United States dollar was pegged to gold at the US $35 par ounce while the currencies of other countries especially member states, were pegged to the US dollar according to the International Monetary Fund (IMF) par value recommendation. After major advanced economies launched speculative attacks on the US dollar in the early 1970s, the dollar's value plummeted, resulting in the collapse of the Bretton Woods system. Meanwhile, inflation continued to rise in the United States, which contributed to the depreciation of the dollar and, ultimately, the demise of the Bretton Woods system. As a result of this collapse, authorities in numerous nations were forced to exchange their native currencies at a predetermined rate with foreign currencies, and exchange rate management has since become a major cause of stress and concern for governments all over the world.

Uncertainty and risks are created for individual investors or households, businesses, and the government as a result of excessive volatility in the exchange rate, which has destabilizing implications on the macroeconomic environment. Exchange rate volatility is a source of concern for private sector operators and investors because of the influence it has on their portfolios and the possibility that it could result in capital gains or losses. The Policymakers on the other hand also focus on adverse effects of speculative attacks and or the pervasive effects of exchange rate movements on the economy and macroeconomic policy objectives of price stability, employment, economic growth, and external viability.

An efficient and effective economic management is the ability to design and implement appropriate policies that enhance and facilitate high performance in an economy's gross domestic product (GDP) vis-à-vis the balance of payment. In other words, a policy that drives the economy in a positive direction towards the attainment of the ultimate goals of increased prosperity, sustainability, and general improvement on the standard of living. The instrument of macroeconomic management is either macroeconomic (fiscal, monetary, exchange rate, and external debt policy instrument) or microeconomic (sectoral policy instruments) comprising agricultural, industrial, and social sector development policies (Ojo, 1995).

There is ample evidence, however, that the government did not use exchange rate policy effectively and actively to adjust and correct balance-of-payments disequilibrium. This confirms the statement of (Oshikoya, 1990) that "the limited adjustments in the official nominal exchange rate coupled with Nigeria's high inflation rate led to real exchange rates that appreciated by more than 64 percent between 1973 and 1984. The high real appreciation of the Nigerian currency caused imports to be 44 percent cheaper than nontraded goods in 1981 relative to 1972 and also intensified the Dutch disease phenomenon".

For the purposes of adjusting the balance of payments, one of the most significant macroeconomic policy instruments is the foreign exchange rate. It is therefore necessary to investigate the implications and nature of the foreign currency policies formulated, adopted and implemented by the government of Nigeria over the time period under discussion (1981 - 2020), as well as the impact of the fluctuations on the Nigerian economy, in order to better understand the situation. combustion engine valve actuator. Furthermore, in conjunction with variable timing, the piezoelectric control-based pilot allows for direct regulation of other engine valve parameters including variable lift and seating velocity.

II. REVIEW OF LITERATURES

CONCEPTUAL ISSUES ON EXCHANGE RATE POLICY IN NIGERIA

In Nigeria, the first Foreign Exchange Control Bill was enacted in 1962 due to the varying degrees of foreign exchange crisis that occurred during the period, creating a huge negative impact on the balance of payment, especially between 1964 and 1966. Import restrictions and foreign exchange control were first applied in 1964 and tightened in 1967 as a result of the Nigerian Civil

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war. The Nigerian currency was tied to the Pound Sterling until 1967, when the value of the pound fell. After that, it was fixed to the dollar of the United States of America, which it has remained since.

After a complete liberalization of the imports in April 1971 after the civil war, in May 1972, the "Import Quota Committee was set to tighten the issuance of import licenses in order to conserve foreign exchange and to protect local industries. As oil exports became a major foreign cash earner the next year, they were only enforced half-heartedly. It is based on (Agogo M. 1992): But in accordance with the IMF par value system, the Naira was again tied to twelve currencies, most of which were traded with the country's main economic partners, as opposed to seven in 1978. In 1985, this policy was abandoned.

Still, the Nigerian government under the General Ibrahim Badamasi Babangida (GCFR) administration established the Structural Adjustment Program (SAP) in 1986 in an effort to confront the country's economic woes. With the advent of the SAP, a more flexible monetary policy known as "exchange rate deregulation" replaced the previous system of fixed exchange rates in place. Maintaining the value of the Nigerian currency, as well as external and internal balances and attaining macroeconomic targets, are the primary goals of exchange rate policy under SAP.

RETROSPECTIVE REVIEW OF NIGERIA EXCHANGE RATE POLICIES FROM 1960-1980

For a period spanning 1960 to the early 1970s, the exchange rate policy of Nigeria was in conformity with the IMF's par value, which is referred to as a Fixed Exchange Rate System in economic parlance. The Nigerian currency was tied to a basket of seven convertible currencies, which included the British Pound sterling, the United States dollar, the Dutch mark, the Japanese yen, the French franc, the Dutch guilder, and the Swiss franc, amongst other currencies.

The first Foreign Exchange Control Bill was enacted in 1962 due to the varying degrees of foreign exchange crisis that occurred during the period, creating a huge negative impact on the balance of payment, especially between 1964 and 1966. Import restrictions and foreign exchange control were first applied in 1964 and tightened in 1967 as a result of the Nigerian Civil war. After the British Pound Sterling fell in value in 1967, the Naira was linked to the dollar of the United States of America, which remained in parity with the pound until 1970. Imports were completely liberalized during the civil war in April 1971, and the "Import Quota Committee" was established in May 1972 to tighten the issue of import licenses in order to conserve foreign exchange and protect local companies. They were half-heartedly enforced because crude oil exports emerged as a significant foreign exchange earner the following year". (Agogo M. 1992)

But in accordance with the IMF par value system, the Naira was again tied to twelve currencies, most of which were traded with the country's main economic partners, as opposed to seven in 1978. In 1985, this policy was abandoned. It is pertinent to note that throughout the 1970s, except 1976 and 1977, the nominal exchange rate appreciated every year, and the exchange rate policy up to the time of SAP encouraged the overvaluation of the naira as reflected in real exchange rate appreciation, particularly in the 1970s (Obadan, 1993b,1994 and 1995). The main component that led to the increase in value of the foreign currency rate of the Nigerian currency was the foreign inflows from the sale of crude oil. The foreign currency reserves of Nigeria in 1979 rose astronomically from N 1.1 billion to a peak of N 6.3 billion in 1981 as a result of the oil boom and this produced balance of payment surpluses for the economy. The policymakers being confronted with the question of overvaluation considered it as a non-issue even with the emergence of the prevailing foreign exchange crisis which has been brought about by the oil glut in April 1981, the need to adopt a new exchange rate regime or devalue the naira was rejected instead, more stringent controls and import restrictions were adopted to realize and control the foreign exchange. The Naira during this period was left to exhibit strengths against other currencies, especially from 1981 to 1984.

In the words of (Agogo Maw. 1992) "as the export slump deepened and the Naira value was maintained, it required an increasingly extensive import licensing and foreign exchange restrictions to disburse the available foreign exchange. The overvaluation supported by exchange control and import licensing hurt the economy".

RETROSPECTIVE REVIEW OF NIGERIA EXCHANGE RATE POLICIES FROM 1985-1992

The Nigerian government during the Babangida's regime in 1986 introduced of the Structural Adjustment Program (SAP). "The Central Bank of Nigeria (CBN) was instructed by Babangida's regime to manipulate the pegged exchange rate in order to find a realistic value that would correct past distortions, discourage import propensity and strengthen the internal

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competitiveness of Nigerian producers" (Federal Government of Nigeria, 1986; West Africa, 13-19 April 1992).

In September 1986, during the SAP era, the Nigerian policymakers still adopted the fixed or pegged system of the foreign exchange rate. Two-tier exchange rate markets were introduced. The first-tier market functioned as an official market specifically for official transfers and transaction and debt servicing transactions while the second-tier market (SFEM) was used for auctioning of foreign exchange allocations to authorized dealers but the system still could not achieve the set objectives hence, on July 1, 1987, the two markets were merged and became known as the foreign exchange market, FEM. The latter operated according to the same rules as SFEM (West Africa, 13 July 1987). Despite the introduction of the above systems which was geared towards controlling the recession challenges of the economy, the nation rather got deeper into recession.

In 1992, the foreign exchange market of Nigeria was deregulated. With this new policy, authorized dealers in the forex were free to buy and sell foreign exchange freely. The free float system led to the depreciation of the Naira from 80% from N10.55 to N18.00 per US dollar. The obvious effect of the system cannot be overemphasized. This policy was reversed in 1994.

RETROSPECTIVE REVIEW OF NIGERIA EXCHANGE RATE POLICIES FROM 1995 TILL DATE

The Autonomous Foreign Exchange Market (AFEM) was instituted in 1995. The AFEM is characterized by policies that help to determine and manage the demand and supply of foreign exchange resources in Nigeria. On October 25, 1999, the AFEM became the Inter-Bank Foreign Exchange Market (IFEM), a daily, two-way quote market. The Intern-Bank Foreign Exchange Market (IFEM) was charged with responsibility to discourage speculative activities by expanding and deepening the foreign exchange market on a daily basis but the aim was still defeated by corrupt practices. Osaka, Masha, and Adamgbe, (2003) "constant variations in the foreign exchange market framework which was ostensibly aimed at creating better market efficiency, only succeeded in creating instability in the market and by the 1990s, the exchange rate was becoming more and more divergent from economic realities". As depicted by table 1, despite the various exchange rate policies the Nigerian government had adopted since 1960, the relative price of the Naira to the dollar has always demonstrated an astronomical fall. That is to say, the government has not been able to adopt the appropriate policy that will remedy the problems and the effects of exchange rate volatility.

EMPIRICAL REVIEWS

Empirical literature regarding the subject matter in different countries including developed, developing and emerging nations abounds and is still unsettled. This phenomenon is still attracting different researchers and policymakers currently.

Soro and Aras (2020) explored the effect of exchange rate movements on the Nigerian external reserves from 1980 to 2019. The study adopted the ARDL model, and the findings of the study prove that the exchange rate has an asymmetric effect on reserves. They suggested that the exchange rate sum partially differs in magnitude and in relation to reserves in both negative and positive directions. The effect of a negative trend in exchange rate on reserve is statistically insignificant in the long run while a positive shock in the exchange rate on reserves is statistically significant.

Morina, et al. (2020) evaluated impact of real effective exchange rate fluctuation on the economic growth of the European countries, Central and Eastern specifically. The annual data covering the period of 2002 and 2018 of the CEE countries were used in the study. The result of their findings revealed a significant negative effect on real economic growth by adopting the fixed impact estimation for panel data.

Adjei (2019) employed the ARCH and GARCH Models introduced by Engle (1982) and Bollerslev (1986) to examine the effect of exchange rate volatility on economic growth in Ghana. The period covered was twenty-seven years (1983 and 2010). The study adopted five variables of interest which included GDP per capita, Exchange rate volatility, Physical capital stock, Human capital stock, and Trade Openness. The outcome of the analysis showed that both in the short run and in the long run, fluctuations in exchange rates have a considerable negative influence on economic growth within the time period that was the subject of the study.

Oseni, Adekunle, and Alabi (2019) examined the relationship between exchange rate volatility and industrial output in Nigeria. They employed monthly exchange rate data from the period 1986 and 2017. Volatility in NER's growth rate was assessed using the EGARCH(p,q) -AR(k) models, while short- and long-term changes in Nigeria's industrial output were assessed using the

ARDL model. The study found that the RER volatility has a direct impact on industrial output and the availability of foreign exchange gains that resulted from the various export drives during the study period. The capacity utilization ratio was also revealed to be low during the study period.

Dada (2019) examined the effect of asymmetric structure inherent in exchange rate volatility on trade in sub-Saharan African countries from 2005 to 2017 using the GARCH while the asymmetric components of exchange rate volatility are generated using a refined approach of cumulative partial sum developed by Granger and Yoon (2002). The study's findings revealed evidence of a clustering of exchange rate fluctuations that is strictly persistent in the countries of interest in Sub-Saharan Africa. The study also proves that the asymmetric elements being the negative and positive shocks of the exchange rate has a negative and significant impact on trade in the zone. Furthermore, when set side by side with the effect of a positive foreign currency rate shock on commerce, the effect of a negative foreign currency rate shock was greater on trade. Furthermore, the real exchange rate (RER) has a negative and considerable impact on trade in the sub-Saharan African countries under investigation.

Karahan (2020) evaluated the Influence of the exchange rate on the economic growth in the Turkish economy. To evaluate the connection or correlation between economic growth and exchange rate, the researchers examined quarterly data from 2002-Q1 to 2019-Q1 and applied techniques such as the Granger causality test, the Johansen cointegration test, and Innovation Accounting Techniques in analysing the data. Their research findings support the postulate according to structuralist economists that exchange rates have a detrimental impact on economic growth or a negative causal relationship exists between both variables. This view is supported by the data.

Osigwe (2015) studied effect of exchange rate fluctuation on oil prices and economic performance between 1960 and 2010 using ECM. The result of the study revealed that RER has a negative influence on crude prices and a beneficial impact on the economy.

Ebiringa and Anyaogu (2014) investigated the long-run relationship between exchange rate, inflation, and interest rate using secondary data between 1971 and 2010. The data was analyzed with the use of ARDL and the findings revealed exchange rate and inflation have a positive significant short-run and long-run relationship between them. The interest rate on the other hand had a negative relationship which was revealed to be insignificant.

Chi-Wei-Su (2012) The researcher found that negative relationship between the RBM foreign currency rate and the indicators such as the degree of openness, the ratio of government expenditure to GDP, the relative productive activity difference, and the real money supply, existed during the period under study when the researchers investigated the nexus between the rate of exchange and macroeconomic indicators in China for the years, 1994 to 2010.

Odejimi, Isikhuemen, and Edogiawerie (2020) examined the exchange rate swing, import demand, and economic growth: evidence from Nigeria. The sample period spanning 2003 to 2017 was analyzed using the Autoregressive Distributed Lag (ARDL). The outcome showed a negative ECM value, indicating a long-term association between the variables. As shown by the relatively significant error correction terms, around 7% of the annual adjustment would be returned to the long-run equilibrium, showing that the adjustment process is slow.

Ahmed (2019) the \researcher used a Bayesian SVAR model to answer this question: Do exchange rate shocks matter for Pakistan’s export performance? According to the report, the major cause of the slowdowns in exports during the period under study in Pakistan were all a result of the shocks. it was also found that exchange rate shocks have a substantial impact on exports.

Kenny (2019) employed the Augmented Dickey-Fuller (ADF) Unit Root Test, Co-integration test, Fully Modified Ordinary Least Square (FMOLS) estimation technique, and diagnostic tests to examine the relationship between exchange rate management and economic growth. The sample period covered 1986 and 2015. According to the FMOLS results, the currency rate, foreign reserve, money supply, and capital input all have a considerable impact on Nigeria's long-term economic growth; however, labour has no long-term impact on the economy. According to the dummy variable result, in the long run, a fixed exchange rate will have a negative impact on Nigeria's economy.

An investigation of the impact of exchange rate volatility on economic growth by Barguellil et al. (2018), the researchers employed a sample of 45 developing and emerging countries between 1985 and 2015, the difference and system generalized method of moments estimators were used to conduct empirical research of these countries. For the measurement of nominal exchange rate and real exchange rate volatility, the

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researcher employed the use of generalized autoregressive conditional heteroskedasticity (GARCH). According to the findings of the academics, this factor inhibits the expansion of the economy. In addition, the impact of foreign currency rate volatility is reliant on the forex rate system or policy and financial openness of countries, put differently, volatility is more damaging when countries embrace floating exchange regime and financial openness.

THEORETICAL REVIEW

THE EXOGENOUS GROWTH MODEL

The exogenous growth model, also known as Solow's Theory, is used in this study. To characterise economic growth, one of the most popular models in economics is Solow's theory. In the model, total factor productivity results can lead to a country's standard of living increasing at an infinite rate. Solow's economic growth model introduced labour as a factor of production and capital output ratios that were not set as in Harrod-model. Domar's According to the Economic Growth Model, the total amount of GDP is determined by factors such as population growth, technological advancement, and consumer spending. It is possible to achieve full employment in this model, with an overall output that shows consistent returns to scale. Solow (2002) combined the supply and demand sides of the economy when analysing the Balami (2006) economic growth cycle. He maintained that the supply side of neo-classical economics, which asserts Q = f (AKL1-), is the best way to look at economic growth. This has led to it being referred to as the "neoclassical" growth model. Exogenous growth or a technological standard would be applied exogenously to the labour force, according to his theory.

When it comes to long-term economic stability, Solow's model states that technological advancement is the only means for sustained growth in the economy. Changes in saving and population increase, according to his theories, have only long-term level effects. Notably, Solow's model implies that developing countries should grow quicker and eventually overtake more developed ones.

According to Robert M. Solow's article published in 1957, the United States' economic growth is primarily driven by technological advancement, not land, capital, or labour (Solow 1957).

III. MATERIALS AND METHOD

SOURCES OF DATA

This study utilizes annual time series data covering the period 1981 through 2020. The models utilised to estimate the variables in this study would be based on annual Nigerian data on some selected macroeconomic indicators, such as GDP, exchange rate, population, capital formation, trade openness and government expenditure which were sourced from the World Bank (WDI), Central Bank of Nigeria (CBN).

MODEL SPECIFICATION

It is necessary to specify the model by determining the dependent and independent variables that will be included in the model during the modelling process. A quantitative relationship between a dependent variable and an independent or explanatory variable is expressed mathematically by the relationship matrix. Following a detailed review of previous studies and improving upon the theory, this study will augment the model of Rateiwa and Aziakpono (2017) and Chikwado, Chioma and Ananwude (2019) as follows;

$$\mathbf{GDPG_t = \alpha_0 + \beta_1 EXR_t + \beta_2 POP_t + \beta_3 CAP_t + \beta_4 EXP_t + \beta_5 OPEN_t + \mu_t} \quad (3.1)$$

Where GDP = Gross domestic product (GDP) growth, EXR = is a vector for exchange rate and its volatility, POP = Population, CAP = Gross Capital Formation, EXP =Government Expenditure, OPEN= Trade Openness, α, β = Coefficients or Regression parameters of the model, μ = Disturbance term or Error Term which captures the effects of other factors or variables on a dependent variable but not included in the model, and t = time.

The GARCH (1,1) Model

In measuring volatility, the researcher will apply the ARCH/GARCH model popularized by Engel (1982) because as Mckenzie (1999) put it, the exchange rate is known to best follow the GARCH process. Traditional standard deviation, coefficient of variance, and ratio analysis are claimed to lack robustness (Kyereboah-Coleman and Agyire-Tettey). This indicates a technical shift from these methods (2018). Thus, volatility is calculated as follows:

$$\ln P_t = \phi + \lambda \ln P_{t-1} + e_t \quad (3.4)$$

where, $e_t \approx (0, \delta_t)$ and:

$$\delta_t = \phi + \omega e^2_{t-1} + \gamma \delta_{t-1} + \mu_t \quad (3.5)$$

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where the conditional variance δ_t is dependent on three terms; viz:

(a) The mean ϕ,
(b) The square error term e^2_{t-1} in the previous lagged period otherwise known as the ARCH term
(c) Previous lag of the conditional variance δ_{t-1} also known as GARCH term.

The sum of $\omega + \gamma$ measures the persistency of volatility.

Most researchers who measured volatility simply used the standard deviation to measure the volatility of exchange rates or oil price. However, Mohammad, Azu, and Oko (2018) noted that standard deviation is a weak instrument for measuring volatility, and recommended ARCH/GARCH (1,1) as a better instrument. This research adopts this instrument in measuring exchange rate volatility.

DYNAMIC ARDL MODEL SPECIFICATION

In economics research, there are numerous econometric methods for data analysis that can be used. Nevertheless, the Autoregressive Distribution Lag (ARDL) will be used in this project due to the fact that it is robust and consistent in time series analysis. Pesaran et al (2001) and Banerjee et al (1998) popularise the use ARDL technique for time series estimation. When it comes to determining long- and short-term covariances of estimated parameters, its robustness is one of its many advantages. To diagnose the dynamic interaction between variables that are both dependent and independent, the ARDL technique can be used (0). Using this method, it is possible to estimate a parameter in the long and short term simultaneously. In Pesaran et al (2001) and Pesaran and Shin (1999), it was revealed that the F-test can be applied to test the level of cointegration. For this, we examine the joint significance of the lagged levels of all variables in the ARDL model, as explained above. Variables can be given varied leg lengths based on their attributes when they enter the model. The estimated F-stat must be greater than the crucial values for the lower and upper bounds of the distribution in order to demonstrate co-integration as a fundamental condition. This research work will be using the EViews 10 for all the necessary estimation in this project work. In the lasted EViews, it was revealed that not only should the F-stat condition be applied, the T-Test should also be adopted following a similar analytical view.

Again, giving an alternative method of justifying the existence of co-integration in the model, Banerjee et al (1998) illustrate that a negative and significant error-correction term (ECM) could be a different measure to define the long-run relationship among variables. These multiple ways of determining the existence of cointegration are one reason researchers termed it robust. It is possible to report multiple coefficients for lagged variables once more.

It is important to note that all of the variables in below ARDL Model remain the same as they were previously described, with the exception that represents the difference (or change) in the respective variables and (-) representing the lag sign. To satisfy the long-run relationship, ARDL bound test requires a null hypothesis for no co-integration HO: $\beta1 = \beta2 = \beta3 = \beta4 = \beta5 = \beta6 = \beta7 = \beta8 = 0$; for equation (3.2).

There is a plethora of models to pick from while performing this type of investigation. A model's track record of use, reliability, efficacy, and finally suitability for the research being done should be taken into consideration. In addition to its relative robustness and efficiency, the autoregressive distributed lag error correction model has the added benefit of assisting in the development of inferential information regarding the variable's dynamic nature.

Equation (3.1) could be rewritten in the following way to represent the Auto-regressive Distributed Lag Model (ARDL) in its broad form:

$$\Delta GDPG_t = \beta_0 + \beta_1 GDPG_{t-i} + \beta_2 EXR_{t-i} + \beta_3 EXRV_{t-i} + +\beta_5 POP_{t-i} + \beta_6 CAP_{t-i} + \beta_7 GXP_{t-i} + \beta_8 OPEN_{t-i} + \sum_{i=0}^{p} \beta_9 \Delta GDPG_{t-i} + \sum_{i=0}^{p} \beta_{10} \Delta EXR_{t-i} + \sum_{i=0}^{p} \beta_{11} \Delta EXRV_{t-i} + \sum_{i=0}^{p} \beta_{13} \Delta POP_{t-i} + \sum_{i=0}^{p} \beta_{14} \Delta CAP_{t=i} + \sum_{i=0}^{p} \beta_{15} \Delta GXP_{t-i} + \sum_{i=0}^{p} \beta_{16} \Delta OPEN_{t=i} + ECM + \mu_t \quad (3.2)$$

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TABLE 1 SUMMARY STATISTICS

	GDPG	VOL	LNEXC	LNPOP	LNEXP	LNGCF	LNOPN
Mean	0.401307	7.084227	3.536865	18.63861	25.52821	24.44618	-1.150546
Median	0.999350	9.333627	4.666806	18.63441	25.31125	24.41280	-1.076647
Maximum	12.45747	11.88166	5.882795	19.14406	26.96541	25.71376	-0.465926
Minimum	-15.45036	-0.956072	-0.481739	18.13885	23.98030	23.23665	-1.78579
Std. Dev.	5.310222	4.005519	1.995947	0.300556	0.970209	0.661795	0.316028
Skewness	-0.809604	-0.785298	-0.795428	0.021633	0.171066	0.102368	-0.273006
Kurtosis	4.569662	2.343725	2.347041	1.812998	1.485817	1.891462	2.321642
Jarque-Bera	8.476126	4.829114	4.928626	2.351409	4.016339	2.117956	1.263830
Probability	0.014436	0.089407	0.085067	0.308601	0.134234	0.346810	0.531573
Sum	16.05229	283.3691	141.4746	745.5446	1021.128	977.8471	-46.02183
Sum Sq. Dev.	1099.740	625.7233	155.3683	3.523031	36.71093	17.08093	3.895074
Observations	40	40	40	40	40	40	40

Source: Author's Computation Using Eviews 10

IV. RESULTS AND DISUSSION

SUMMARY STATISTIC AND CORRELATION

When attempting to determine the impact of the exchange rate and exchange rate volatility on real GDP per capita, the estimation process begins with summary statistics, correlation, and unit root tests, which are then followed by the cointegration test to determine whether the variables under consideration are stationary and whether they have a long-run relationship. The ARDL techniques is adopted for the purpose of the analysis due to the robustness of the outcome of the short-run result using the technique.

The descriptive statistics of the relevant variable that was included in the research were calculated in this study. Unless otherwise noted, all of the values in Table 4.1 are in natural logarithm, and the real GDP per capita growth, which is a dependent variable in the study, is represented by the total number of observations as well as by mean, median, maximum, and minimum, as well as standard deviation and sum of square deviation. The real GDP per capita growth shows a mean value of 0.401307 and a low of -15.45036, high of 12.45747 and standard deviation of 5.310222 which is relatively higher compared to the other variables. The reason being that the real GDP per capita growth was not converted to natural logarithm. From the Table 4.1, it could be seen that all the value has a positive mean. Median value as well as the skewness. The correlation results are reported in Table 4.2 which indicates that some variables are highly correlated. However, the use of ARDL would be able to correct any kind of multicollinearity by choosing different lags for each variable.

TABLE 2 CORRELATION MATRIX

	GDPG	VOL	LNEXC	LNPOP	LNEXP	LNGCF	LNOPN
GDPG	1	0.490554	0.493054	0.345589	0.064492	-0.247374	0.282406
VOL	0.490553	1	0.999916	0.938474	0.586105	0.189709	0.160235
LNEXC	0.493054	0.999916	1	0.937000	0.584192	0.186034	0.162764
LNPOP	0.345589	0.938474	0.937000	1	0.793396	0.443133	-0.070226
LNEPN	0.064492	0.586105	0.584192	0.793396	1	0.871996	-0.414053
LNGCF	-0.247375	0.189709	0.186034	0.443133	0.871996	1	-0.556120

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LNOPN	0.282406	0.160235	0.162764	-0.070226	-0.414053	-0.556120	1

Source: Author's Computation using EViews 10

TABLE 3 EXCHANGE RATE VOLATILITY INDEX

Variable	Coefficient	Std. Error	Z-Statistic
Φ	1.476773	3.739623	0.411819
lnV_{t-1}	0.867996***	0.018111	52.42093
Variance Equation			
Φ	21.79029***	3.945275	4.892553
ARCH (-1)	-0.018411***	0.010269	-75.86136
GARCH (-1)	1.018412***	0.003573	379.7738
R-squared	0.937714	Akaike info criterion	8.448763
Adjusted R-squared	0.913378	Durbin-Watson stat	1.898954

Note: The asterisks *** denote statistical significance at the 1% level. Estimation was based on the ML-ARCH-Normal distribution following the BFGS/Marquardt procedures.

The following equations can be substituted for equations 4.1 and 4.2 using the GARCH (1,1) model equations:

$$lnP_t = 1.476773 + 0.867996\lambda lnP_{t-1} \quad (4.1)$$

$$\delta_t = 21.79029 + -0.018411e^2_{t-1} + 1.018412\delta_{t-1} \quad (4.2)$$

TABLE 4 AUGMENTED DICKEY-FULLER (ADF) UNIT ROOT TEST

Variables	Level t-statistics	p-value	Ist. difference t-statistics	p-values	Order of integration
LNRGDP	-4.014519	0.0037	-10.72888	0.0000	1(0)
LNEXC	-3.184803	0.0295	-7.189677	0.0000	1(0)
LNEXV	-3.791406	0.0096	-4.002618	0.0040	1(0)
LNEXP	-2.460282	0.1336	-7.326294	0.0000	1(1)
LNPOP	3.369994	1.0000	-3.173332	0.0317	1(1)
LNGCF	-1.630525	0.4555	-3.730998	0.0086	1(1)
LNOPN	-2.106961	0.2431	-6.598111	0.0000	1(1)

Note: * indicates stationery at 10 %, ** means stationery at 5% and *** means stationery at 1%. Unit root test was based on Augmented Dickey-Fuller (ADF) technique following Schwarz Info Criterion (SIC) which was automatically selected by Eview 10.

MEASURING VOLATILITY INDEX

Table 4.3 displays the findings of an estimated volatility index, which reveals that the exchange rate conforms to the protocols stated for GARCH (1,1) and is rather steady over the course of time. From the conditional variance equation, it can be seen that the mean (ϕ) is statistically significant at the one percent level and has a positive co-efficient (21.79029), indicating that conditional variance has been classified appropriately. Despite the fact that the ARCH element is negative, the sum of + is very close to 1, demonstrating the persistence of volatility.

STATIONARITY TEST AND LAG SELECTION CRITERIA

The augmented dickey fuller test was used to obtain the unit root results presented in Table 4.4. We decided to go with this particular test due to the fact that it is very popular and the findings that it produces are regarded as being accurate. The findings revealed that all variables are stationary at the first difference and that none of the variables is stationary at either the first difference or at the level of the first difference. At the one-percent level of significance, the exchange rate, exchange rate volatility, and real GDP per capita growth are all stationary over time, while government expenditure, Population, gross capital formation and trade openness are stationarity at first difference. As can be seen in Table 4.4, the stationarity of each of the

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variables is greater than the critical value that is associated with that particular variable.This result supports the decision to use the ARDL estimation technique.

With the ARDL model, lag selection is very essential and according to Baek (2014), lag selection is very sensitive such that the result of the F-statistic could be affected. As a result, in order to implement a lag selection criterion, this research will follow in the footsteps of Muhammad et al (2018), Azu and Abu-Obe (2016). To that end, lag one was chosen in this study using the VAR Lag selection criteria, where lag one is chosen because the sign occurs on lag three. Appendix III contains the results of this study.

TESTING THE HYPOTHESIS

This subsection tested the hypothesis and commences with establishment of long-term relationship.

TABLE 5 COINTEGRATION BOUND TESTS RESULT

F-statistic	8.669982	EC_{M-1}	-0.719727***	(-10.32993)
Significant level		10%	5%	1%
F-Bounds Test	Lower bound	1.99	2.27	2.88
	Upper bound	2.94	3.28	3.99

Note: *** indicates 1 percent level of significance, and F-statistics is calculated with restricted constants and no trend, as indicated by the number in parenthesis.

TABLE 6 LONG RUN ESTIMATION

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOL	-4.84852	3.84263	-1.462034	0.1675
LNEXC	9.28831	6.14044	1.474652	0.1641
LNPOP	-1.37681	2.70906	-3.600844	0.0032
LNEXP	2.31598	9.13150	2.443846	0.0296
LNGCF	-6.10435	5.56762	-1.096401	0.2928
LNOPN	-0.76355	2.60287	-0.29335	0.7739
C	1680.852	471.1307	3.567699	0.0034

Case 2: Restricted Constant and No Trend. Source

BOUND TEST FOR COINTEGRATION TEST ANALYSIS

Before attempting to estimate either the long run or the short run associations between the variables, it is essential to determine whether or not there is a long run link between the variables in the first place. This is a prerequisite for the estimation process. In this study, according to the kind of analysis employed, it is required to conduct a bound test for cointegration using the ARDL approach, which is described in detail below. The outcome of this experiment is shown in Table 4.5. If we follow the assumptions and criteria that Banerjee et al. (1998) outlined for creating long-run in ARDL, we find that the model entirely satisfies them. The model has a reported negative ecm-1 of -0.719727, and it is significant at the one percent level. The results presented in Table 4.5 also met the criteria established by Pesaran et al (2001), which suggested that the F-statistics do not fall within the lower and upper bounds of the respective significant levels for any of the significant levels in the respective significant levels. According to our findings, the F-statistics is higher than the upper bound at the 1% level of significance, which indicates that there is a long-term link between the dependent variable and the independent variables. This was determined by comparing the F-statistics to the upper bound. All things considered; one can conclude that the rate of adjustment toward long-term equilibrium is 71.97 percent. To put it another way, convergence to a long-run requires an average speed of 71.97 percent

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in order to meet up with a statistically significant long-run relation.

THE SHORT-RUN AND LONG RUN ANALYSIS

The long-run and short-run results are presented in Tables 4.6 and 4.7, respectively, for your convenience. On a long-term basis, the correlation coefficient of exchange rate volatility is negative (-4.84852), but it is not statistically significant. This implies that exchange rate volatility has the potential to have a negative impact on economic growth, but that such an effect is not statistically significant at this time. The short-run effect of currency rate volatility on economic growth in Nigeria has been researched, and the results indicate that it has a beneficial impact on the economy. This finding supports previous research that found that exchange rate volatility contributes to economic growth. The short-run coefficient for exchange rate volatility is 54.6847 and statistically significant at one percent. This result is at lag one which is consistent with results at lag two. At the granular level, it has a negative correlation coefficient, although it is not statistically significant. As a result, it suggests that for every one percent rise in exchange rate volatility, real GDP per capita growth will increase by 54.68 percent, assuming that all other factors remain constant. With this result, the first hypothesis which states that HO1: "there is no significant short or long-run effect of exchange rate volatility on economic growth in Nigeria" is hereby rejected. However, there is a significant short-run effect but not in the long-run, though not robust too.

TABLE 7 ARDL ERROR CORRECTION REGRESSION

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPG(-1))	0.293479	0.10628	2.761385	0.0162
D(GDPG(-2))	0.314194	0.084927	3.699586	0.0027
D(VOL)	-1.481556	6.233706	-0.237669	0.8158
D(VOL(-1))	54.6847	53.88843	10.08908	0.0000
D(VOL(-2))	19.9016	87.33849	2.208666	0.0458
D(LNEXC)	7.722418	12.63096	0.611388	0.5515
D(LNEXC(-1))	-17.966	18.1962	-10.0555	0.0000
D(LNEXC(-2))	-31.6077	74.7999	-2.24032	0.0432
D(LNEXP)	26.32474	7.443246	3.536729	0.0036
D(LNPOP)	-49496.86	6329.209	-7.820386	0.0000
D(LNPOP(-1))	75199.3	10358.95	7.259354	0.0000
D(LNPOP(-2))	-35066.55	4945.941	-7.089964	0.0000
D(LNGCF)	-9.306227	2.442758	-3.809722	0.0022
D(LNGCF(-1))	-2.032694	2.029887	-1.001383	0.3349
D(LNGCF(-2))	-7.320418	1.733443	-4.223052	0.0010
D(LNOPN)	1.075939	1.751749	0.614209	0.5497
D(LNOPN(-1))	6.62913	1.775526	3.733615	0.0025
CointEq(-1)*	-0.719727	0.114205	-10.32993	0.0000

Case 2: Restricted Constant and No Trend

When one examines the relationship between the exchange rate and economic growth, one will see that the outcome is significantly different from the relationship between the exchange rate and volatility. This means that the real exchange rate flow and its volatility have different effects on the economy and have different consequences. The correlation coefficient of the exchange rate is positive (9.28831) but not statistically significant over the long run. As a result, while exchange rate volatility has the potential to have a positive impact on economic growth, the evidence to support this claim is not statistically significant at this time. When looking at the short-run effect of the exchange rate, it becomes clear that the country's economic growth

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is being hampered by the exchange rate. -17.966 is the short-run correlation coefficient for exchange rate volatility, and one percent of the time it is statistically significant. This result is at lag one which is consistent with results at lag two. It has a positive coefficient at the level studied, although it is not statistically significant. Thus, it indicates that as exchange rate increases by one per cent, real GDP per capita growth was decrease by -17.966 per cent, all things being equal.

Therefore, the second null hypothesis, HO2: there is no significant short or long-run effect of exchange rate on economic growth in Nigeria is hereby rejected.

Again, if one were to examine the causal relationship between exchange rate volatility and economic growth in Nigeria, one would expect a bidirectional relationship to be observed. The result is reported in Appendix III. The assertion VOL does not Granger Cause GDPG is reject due to the level of significance which posted a p-value of 0.8124. Likewise, the assertion GDPG does not Granger Cause VOL cannot be affirmed as level of significance (p-value= 0.2553). In other words, real exchange rate volatility does granger cause the Nigerian real GDP per capita growth while also Nigerian real GDP per capita growth does not granger cause exchange rate volatility. With this therefore, the third null hypothesis, HO3: Exchange rate volatility has no causal relationship with economic growth in Nigeria is hereby rejected. An indication of a causal association that is bidirectional between real exchange rate volatility and real GDP and vice versa has been found.

EFFECT OF OTHER VARIABLES ON ECONOMIC GROWTH

Other variables included in the analysis include; the lag of GDP growth, gross capital formation, population (as a proxy for labour force). Given that ARDL is a dynamic approach, it was able to accommodate the lag of the dependent variable. From Table 4.7, the estimated result reveals that the lag of GDP growth is positive at both lags one and two. The coefficients are reportedly 0.293479 at lag one and 0.314194 at lag two, and statistically significant at five percent and one percent respectively. In other words, one percent increase in lag one GDP growth will attract 0.29 percent increase in the current GDP growth, and one percent increase in lag two GDP growth will cause 0.31 percent increase in current GDP growth all things being equal. This shows that the result is robust in the short-run. There is long run estimation for lag of the dependent variable as the dynamic nature of the model is only experienced in the short run.

Another variable that was used as a control variable was the amount of money spent by the government. When looking at the long term, the coefficient of government expenditure is positive at 2.31598, and it is statistically significant when looking at five percent. This means that if government expenditure grows by one percent, economic growth in Nigeria will increase by 2.32 percent, according to the formula. When looking at the short-run effect of government expenditure, it becomes clear that the country's economic growth is being influenced positively by the government. When it comes to government spending, the short-run coefficient is 26.32474 and it is statistically significant at five percent. To put it another way, assuming that there is no change in any other factor, a percentage increase in government spending will lead to a 26.32 percentage point increase in economic growth. This result has reached a level that is in line with what one would expect to see in the long run. According to economic theory and aprori expectation, this finding is likewise compatible with the expected outcome as well. Also, gross capital formation is another control variable which was adopted for its necessity in economic growth theory. Table 4.6 reveal the effect of gross capital formation on economic growth is negative (-6.10435) but not statistically significant. This implies that gross capital formation has the potential to influence economic growth negatively, but not statistically significant. When looking at the short-run effect of gross capital formation, it becomes clear that the country's economic progress is being hampered by the phenomenon in question. The coefficient for gross capital formation in the short run is -9.306227 and statistically significant at one percent in the short run at the level of the economy. This coefficient is consistent with the result at lag one but not statistically significant. In contrast, at lag two, the coefficient is negative (-7.320418), which is consistent with the level-of-confidence results and statistically significant at one percent confidence intervals. This implies that if gross capital formation increases by one percent, economic growth will reduce by 9.3 percent and 7.3 percent at level and lag two respectively, all things being equal. This is at variance to expectation.

Finally, when looking at the relationship between trade openness and economic growth, the estimated coefficient is 1.075939, however it is not statistically significant at the level. During the first-time lag, the coefficient is positive and statistically

significant at one percent. This means that for every one percentage point rise in trade openness, economic growth grows by 1.08 percentage points, assuming all other factors remain constant. In the long run, the coefficient of trade openness is negative (-0.76355) but not statistically significant. This implies that trade openness has the potential to influence economic growth negatively, but not statistically significant.

V. CONCLUSION AND RECOMMENDATIONS

Foreign exchange management or policy of any country has a very broad and significant impact on the economic activities and macro-economic aggregates. A drastic swing(s) in the exchange rate would have a severe impact on incomes, prices, investment and production, and the balance of payments. A change in the exchange rate policy in an economy by the policy-makers results from the prevailing economic situation of the country or a significant change in the relative prices, investment and production, structure of income levels, and balance of payments position which could either be a surplus and or deficit positions.

There is a clear distinction between the short-term and long-term repercussions of fluctuations in exchange rates. In the long term, the coefficient of exchange rate volatility is negative, but it is not statistically significant because of the small sample size. There is some evidence that fluctuations in the exchange rate can dampen economic growth, although there is no proof that this has happened statistically. Foreign currency rate volatility appears to have a positive short-term influence on Nigeria's economic growth, which is in line with past research. The short-run correlation coefficient for exchange rate volatility is 54.6847, and it is statistically significant at one percent (one percentile standard deviation). This result was obtained at lag one, and it is compatible with the data obtained at latency two. The experiment yields a negative coefficient, but statistical significance is not established. So, it shows that when exchange rate volatility increases by one percentage point, real GDP per capita growth increases by 54.68 percentage points, assuming that all other factors are similar.

There is a significant difference between the results when examining the association between exchange rate volatility and economic growth when looking at the flow of exchange rates. In addition, the long-run and short-run effects are distinct. During the long term, the exchange rate correlation coefficient is positive, but it is not statistically significant. Therefore, although exchange rate volatility may benefit economic growth, this effect is not statistically significant at the present moment. exchange rate volatility. Within a very short period of time, the effect of the exchange rate appears to show that it has a detrimental influence on the expansion of the economy in Nigeria. The short-run coefficient for exchange rate is -17.966 and statistically significant at one per cent. This result is at lag one which is consistent with results at lag two. It has a positive coefficient at the level studied, although it is not statistically significant. Accordingly, when the exchange rate increases by one percent, real GDP per capita growth decreases by -17.966 percent, assuming that all other factors are equal.If one were to investigate the possible links between fluctuations in the value of the naira and the rate of economic expansion in Nigeria, one might anticipate discovering that the two factors are connected in both directions. In other words, changes in the real exchange rate do not granger cause increases in Nigeria's real GDP per capita, and increases in Nigeria's real GDP per capita do not Granger cause changes in the real exchange rate. An indication of a causal association that is bidirectional between real exchange rate volatility and real GDP and vice versa has been found. Taking into account the findings of this study, we have come up with these proposals to help the Nigerian economy continue to grow and prosper.

(i) The CBN should sustain the current fluctuation of the exchange rate in Nigeria for the sustenance of the positive short-run effect on Nigerian real GDP per capita growth.

With exchange rate volatility influencing a positive effect on the Nigerian economy, it is therefore advisable that the forces of demand and supply be allowed to play its role in the international market.

(ii) Managed Float System: To get the best of both worlds, the country can profit from free-floating currencies while still having the ability to intervene and mitigate the risks. For example, if a currency's value rises or falls too quickly, the central bank may opt to act in order to mitigate the potentially detrimental repercussions.

(iii) Economic initiatives at home such as increasing employment and decreasing poverty should be supported or supplemented by exchange rate policy. As a result, the future of Nigeria's exchange rate system is inextricably linked to the question of financial liberalization and capital mobility outside. Exchange rate policy, when viewed from a pro-poor economic viewpoint, should encourage domestic production and exports, as well as manufacturing or import substitution. For the sake of preserving foreign exchange, a high

degree of domestic production and consumption is essential. Improved agricultural processing, health care, telecommunications and transportation as well as increased water supply in rural regions all have the potential to significantly reduce poverty, boost economic growth, and provide benefits to the poor.

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