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EXCHANGE RATE AND NON-OIL EXPORTS IN NIGERIA (1986-2021)

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ABSTRACT: *This study ascertained the effect of exchange rate on non-oil exports in Nigeria covering the period 1986-2021. Data for the study were extracted from the Central Bank of Nigeria (CBN) statistical bulletin. The method of data analysis used is the linear regression method with the application of the Error Correction Model (ECM). The major findings of the study reveal that there exists a negative relationship between exchange rate volatility and non-oil exports in Nigeria, there exists a negative relationship between exchange rate and non-oil exports in Nigeria and there is a unidirectional causality relationship between exchange rate volatility and non-oil exports in Nigeria. Hence, exchange rate volatility causes non-oil exports in Nigeria. it is therefore the recommendation of the study that the government of Nigeria should aggressively pursue revenue diversion policies. This will go a long way in driving non-oil exports and also strengthen our currency and monetary authorities should ensure exchange rate stability in order to stem inflationary tendencies in Nigeria which have adverse effects on the growth of non-oil exports.*

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INTRODUCTION

One of the major priorities of any development-aspired country is to be active and buoyant in matters relating to international trade. However, the extent to which this could be achieved is highly dependent on the ability of such a country to increase and sustain exports. The fact still remains that in this globalized world, no nation can survive independently since all economies are directly or indirectly connected through assets or/and goods markets (Ayodele, 2021). This linkage is made possible through international trade and foreign exchange. An economy with more exports than imports will enjoy a favourable balance of payment as it receives more than it pays in its international transactions with the rest of the world (Anderson & David, 2019). Among the factors that determine the volume of international trade, exchange rate plays an important role because it directly affects domestic prices, profitability of trading goods and services, allocation of resources, and investment decisions (Noel, 2019). The stability of the exchange rate is therefore required for a better outcome of international trade and favourable balance of payment.

However, exchange rate volatility was experienced by most countries around the world after the exit of the Bretton Wood system of fixed exchange rate regime in the 70s. The continuous increase in volatility of exchange rates over the years has been a source of concern for both researchers and policymakers around the globe (Hericourt & Poncet, 2018). This development affected the economies of most developing countries especially those with mono-product economies in which Nigeria is inclusive. Fluctuations in exchange rates make international transactions risky such that risk-averse agents tend to reduce export-import activities and re-allocate production to domestic markets. James (2019) argues that higher exchange rate volatility leads to higher costs for risk-averse traders and less foreign trade. In corroboration, Panda and Mohanty (2020) assert that high volatility in exchange rate usually has a negative effect on price discovery, export performance, and sustainability of current account balance. This is possible for a country like Nigeria where the economy depends on the export of crude oil for survival. In this case, the economy is subjected to the vicissitudes and vagaries of the oil market such that shocks in international oil prices were immediately felt in the domestic economy (Omojimite & Akpokodje, 2020).

However, one major concern about the naira exchange rate over the study period is its volatile nature. As the exchange rate is an important factor in determining the value of exports of a country in the global market, there is a need to examine its effect on the volume of Nigeria's non-oil exports. Figure 1 below demonstrates the trend behaviour of Nigeria's exchange rate behaviour over the years.

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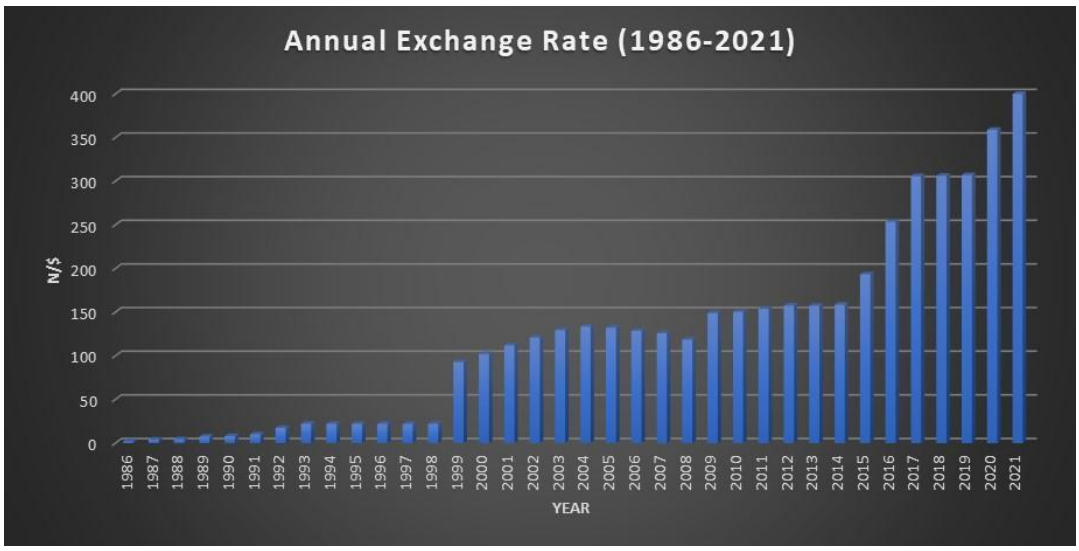
Figure 1: Exchange Rate Behaviour in Nigeria (1996-2021)



Data Source: *Central Bank of Nigeria (CBN) Statistical Bulletin*

It can be clearly seen in Figure 1 that from 1986 to 1997, the volatility of the exchange rate was made evident. This is shown in the graph as the bars are moving up and down. This is a clear evidence of volatility even when the Structural Adjust Programme (SAP) of 1986 has been engaged. A critical observation of the Figure 1 graph also clearly shows an oscillating movement in the exchange rate from 1999 to 2008. This period is seen to be bell-shaped meaning the exchange between these periods has been fluctuating. A cursory look at the graph from 2009 to 2021 will appear as though the graph is showing an increasing trend. This trend may be increasing if smoothed but a critical observation will reveal that the exchange rate is still exhibiting volatility. Over the years, Nigeria has been engaged in international trade with other countries. These include both oil and non-oil exports in Nigeria (Christopher, 2019). Figure 2 below shows the magnitude and trend behaviour of non-oil exports and exchange rate in Nigeria for the period 2000-2021.

Figure 2: Non-Oil Exports & Exchange Rate Movement

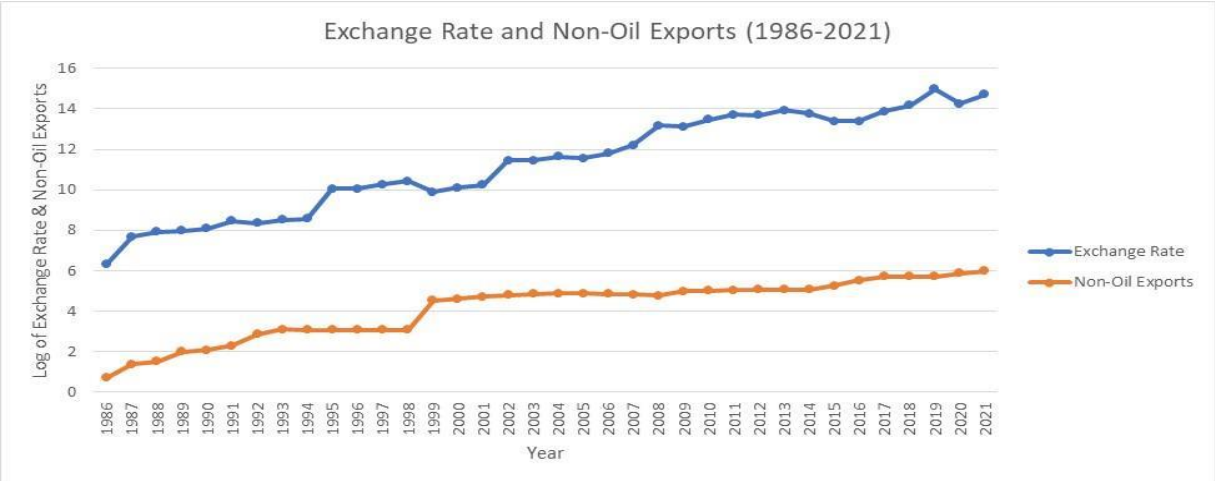


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Figure 2 is a graph showing the logarithmic behaviour of non-oil exports and exchange rate in Nigeria covering the period 1986-2021. The graph clearly shows that non-oil fluctuates upwards from left to right. The non-oil exports are less than the exchange rate series from parallel line measurement. This clearly shows that the annual incremental nature of non-oil exports is just nominal. Smoothening the graph will reveal that non-oil exports are relatively poor. On the other hand, the exchange rate series shows a fluctuating and increasing trend. The fluctuation reveals the volatility behaviour of exchange rate and the increasing trend reveals the progressive weakness of exchange rate in Nigeria.

Although the Nigerian government has over the years engaged in international trade and has been designing trade and exchange rate policies to promote trade (Adewuyi, 2020), the extent to which these policies have been effective in promoting export has remained grossly and minimally ascertained. This is because, despite the efforts put in by the government for the growth of Nigeria's non-oil export, these have not yielded favourable results. On this premise, this study investigates the impact of exchange rate volatility on non-oil exports in Nigeria for the periods 1986- 2021.

Before the era of the Structural Adjustment Programme (SAP), Nigeria implemented the regime of fixed exchange rate like most economies in sub-Saharan Africa. In 1986, Nigeria adopted the SAP to realize a feasible and pragmatic exchange rate, among others, through a flexible procedure. Table 1 clearly shows the data on exchange rates and non-oil exports from 1986-1999.

Table 1: Exchange Rate and Non-Oil Exports in Nigeria

Year	**EXCHANGE RATE ($/₦)**	**NON-OIL EXPORTS (₦' Billion)**
1986	552.1	2.02
1987	2152	4.02
1988	2757.4	4.54
1989	2954.4	7.39
1990	3259.6	8.04
1991	4677.3	9.91
1992	4227.8	17.3
1993	4991.3	22.05
1994	5349	21.89
1995	23096.1	21.89
1996	23327.5	21.89
1997	29163.3	21.89
1998	34070.2	21.89
1999	19492.9	92.69

Source: *Central Bank of Nigeria (CBN) Statistical Bulletin*

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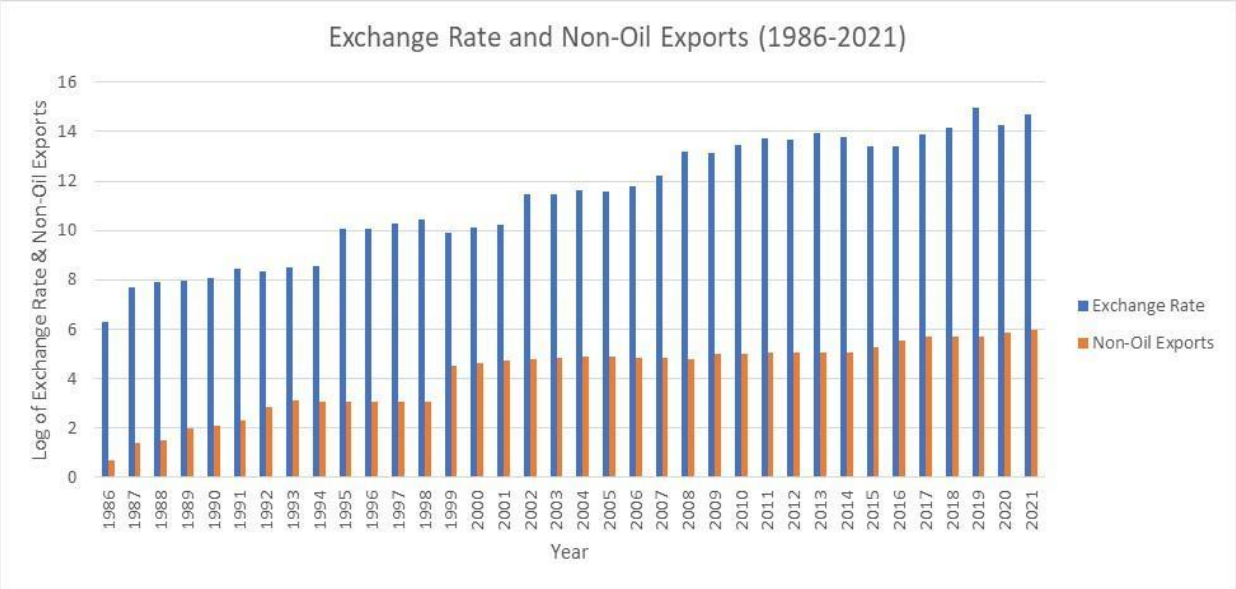
Table 1 shows the time series data on exchange rate with the corresponding level of non-oil exports in Nigeria covering the period 1986-1999. The table shows that, on the average, non-oil exports fluctuated dramatically despite the floating exchange rate.

The government of Nigeria initiated the managed float approach under the flexible regime of the exchange rate to enhance the level of output and motivate economic growth. However, the performance of output in the country falls below expectations (Mordi, 2016). Ever since the SAP was implemented in Nigeria, the level of instability in the exchange rate has been high. There have been numerous attempts by successive governments in Nigeria directed at stabilizing the exchange rate. Some of the measures include the Second-tier Foreign Exchange Market (SFEM), Foreign Exchange Market (FEM), Autonomous Foreign Exchange Market (AFEM), Dutch Auction System (DAS), Inter-bank Foreign Exchange Market (IFEM), the Wholesale Dutch Auction System (WDAS) and the Retail Dutch Auction System (RDAS) (Yakub, Sani, Obiezue, & Aliyu, 2019). Figure 2 clearly shows the trend relationship between exchange rate and non-oil exports in Nigeria from 1996-2021.



Source: *Central Bank of Nigeria (CBN) Statistical Bulletin*

Regardless of the numerous institutional frameworks, strategies of management and measures of exchange rate stability adopted by successive governments in Nigeria to stabilize the exchange rate, enhance exports, and thus economic growth, the performance of exports leaves much to be desired. Nevertheless, exchange rate uncertainty has continued to persist. It is against this backdrop that this study contributes to the unending debate on the impact of exchange rate volatility on exports in Nigeria. The question to answer in this study is: What is the impact of exchange rate on exports in Nigeria? The main thrust of this study is to investigate the impact of exchange rate on exports in Nigeria.

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LITERATURE REVIEW

Conceptual Reviews

The Concept of Exchange Rate

The exchange rate refers to the value of one currency (the domestic currency) in relation to another (foreign currency). It can also be defined as the price at which one unit of a country's domestic currency is exchanged for any other country's currency in the world. Osiegbu and Onuorah (2019) posit that the exchange rate plays a key role in international economic transactions because no nation can remain in isolation due to varying factor endowment. Movements in the exchange rate have ripple effects on other economic variables such as interest rate, inflation rate, import, export, output, etc. These facts underscore the importance of exchange rate to the economic well-being of every country that opens its doors to international trade in goods and services. The importance of exchange rate derives from the fact that it connects the price systems of two different countries making it possible for international trade to make direct comparisons of traded goods. In other words, it links domestic prices with international prices. Through its effects on the volume of imports and exports, exchange rate exerts a powerful influence on a country's balance of payments position.

The exchange rate is the price of a unit of foreign currency in terms of the domestic currency (Nydahl, 1999). Exchange rate serves as the basic link between the local and the overseas market for various goods, services and financial assets (Reid & Joshua, 2004). Using the exchange rate, one is able to compare prices of goods, services, and assets quoted in different currencies. Exchange rate fluctuations can affect actual inflation as well as expectations about future price fluctuations (Omagwa, 2005).

Concept of Exchange Rate Volatility

The volatility of exchange rates is the source of exchange rate risk and has certain implications on the volume of international trade and consequently on the balance of payments. Theoretical analyses of the relationship between higher exchange rate volatility and international trade transactions have been conducted by Ayo (2018) and some other economists. The argument is that higher exchange rate volatility leads to higher costs for risk-averse traders and to less foreign trade. This is because the exchange rate is agreed on at the time of the trade contract, but payment is not made until the future delivery actually takes place. If changes in exchange rates become unpredictable, this creates uncertainty about the profits to be made and hence reduces the benefits of international trade.

Exchange rate risk for all countries is generally not hedged because forward markets are not accessible to all traders. Even if hedging in the forward markets were possible, there are limitations and costs. For example, the size of the contracts is generally large, the maturity is relatively short, and it is difficult to plan the magnitude and timing of all international transactions to take advantage of the forward markets. On the other hand, recent theoretical developments suggest that there are situations in which the volatility of exchange rates could be expected to have either negative or positive effects on trade volume (Drake, 2018).

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Theoretical Literature

Optimal Currency Area Theory (OCAT)

The earliest and leading theoretical foundation for the choice of exchange rate regimes rests on the optimal currency area (OCA) theory, developed by Mundell (1961) and McKinnon (1963). This literature focuses on trade and stabilization of the business cycle. It is based on concepts of the symmetry of shocks, the degree of openness, and labor market mobility. According to the theory, a fixed exchange rate regime can increase trade and output growth by reducing exchange rate uncertainty and thus the cost of hedging, and also encourage investment by lowering currency premium from interest rates. However, on the other hand, it can also reduce trade and output growth by stopping, delaying or slowing the necessary relative price adjustment process.

Later theories focused on financial market stabilization of speculative financial behaviour as it relates particularly to emerging economies. According to the theory, a fixed regime can increase trade and output growth by providing a nominal anchor and the often needed credibility for monetary policy by avoiding competitive depreciation, and enhancing the development of financial markets.

On the other hand, however, the theory also suggests that a fixed regime can also delay the necessary relative price adjustments and often lead to speculative attacks. Therefore, many developing and emerging economies suffer from a fear of floating, in the words of Calvo and Reinhart (2002), but their fixed regimes also often end in crashes when there is a ‘sudden stop’ of foreign investment (Calvo, 2003) and capital flight follows, as was evident in the East Asian and Latin American crises and some sub-Saharan African countries.

Not surprisingly, there is little theoretical consensus on this question of regime choice and subsequent economic growth in the development economics literature as well. While the role of a nominal anchor is often emphasized, factors ranging from market depth (or the lack of it), political economy, institutions and so on often lead to inclusive suggestions as to which exchange rate regime is appropriate for a developing country.

Absolute Purchasing Power Parity (PPP)

The absolute PPP theory propounded by Cassel (1918) postulates that the equilibrium exchange rate between currencies of two countries is equal to the ratio of the price levels in the two nations. Thus, prices of similar products of two different countries should be equal when measured in a common currency as per the absolute version of PPP theory. So the PPP theory, in its strict version, should say that the real exchange rate is exactly equal to a ratio of two sets of prices: the domestic and the foreign. There is one crucial assumption, namely that the ‘Law of One Price’ rules, that is to say, once free trade opens up between any two countries, the price of any given commodity is the same for both countries (measured in either currency) by virtue of supply and demand operating in both markets at the same time. In the relative version of the PPP theory, the very type of price index to be utilized has been a subject of debate. So, the relative version of PPP implies, in fact, various different theories depending on the indicator being used: product-price (GDP price indices), cost of living (consumer or wholesale price indices), or cost-parity (unit factor costs or unit labour costs).

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Relative Purchasing Power Parity

The relative form of PPP theory, as propounded by Fredrick Taylor in 1975, is an alternative version which postulates that the change in the exchange rate over a period of time should be proportional to the relative change in the price levels in the two nations over the same time period. Relative purchasing parity requires that a change in the nominal exchange rate is offset by a change in the price differential in the two respective countries. If the nominal exchange rate (expressed as the price of foreign currency in domestic currency) increases, the domestic price level must increase similarly relative to the foreign price level.

Purchasing Power Parity Theory (PPPT)

The PPPT, as propounded by Professor Gustav Cassel of Sweden in 1918, asserts that if the price level rises, the purchasing power of the currency would fall; hence, its value in terms of foreign currency (that is, its rate of exchange) would also fall. On one hand, if the price level in a country falls, the purchasing power of the currency would rise and consequently, its rate of exchange would also rise. Thus, the proponent of this purchasing power parity theory declared that movement in internal price level brings about a proportionate change in the external purchasing power of currencies or the rate of exchange.

Empirical Reviews

Innocent *et al.* (2022) investigated the impact of exchange rate volatility on exports in Nigeria utilizing data from 2005Q1 to 2020Q4. The ARCH model and nominal effective exchange rate were employed to measure exchange rate volatility. The Autoregressive Distributed Lag Bounds test methodology was used to examine the short-run and long-run effects of exchange rate volatility on exports. The findings validated the presence of exchange rate volatility. In addition, the results revealed that exchange rate volatility had a negative and insignificant impact on exports. The study thus recommends that the government of Nigeria through the Central Bank of Nigeria should foster stable regimes of exchange rate through the implementation of appropriate policies of the exchange rate. Also, an enabling environment for the production of exportable goods should be provided by the government.

Altintaş, Cetin, and Öz (2019) utilized the methodologies of Multivariate cointegration and Error Correction Model (ECM) from 1993Q3 to 2018Q4 to examine the short-run and long-run relationships among exchange rate volatility, relative prices, exports, and foreign income in Turkey. The results showed that foreign income and real exchange rate volatility had a positive and significant impact on exports in Turkey in the long run. However, relative prices exerted a negative and significant effect on exports in the long run. The short-run result revealed that exchange rate volatility had a positive and significant impact on exports in Turkey. However, relative prices have a negative and significant effect on exports in Turkey in the short run.

Yusoff and Sabit (2020) used panel data of ASEAN original five-member countries' exports to China from 1992-2019 and the Generalized Method of Moments (GMM) to investigate the effect of exchange rate volatility, real exchange rates and real GDP of China on ASEAN member nations bilateral exports to China. The results revealed that the real GDP of China used as a proxy for the income of China had a positive impact on ASEAN exports to China. Exchange rate volatility exerted a negative impact on ASEAN exports to China. Furthermore, the real exchange rate had a positive impact on ASEAN exports to China.

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Safuan (2019) utilized the Seemingly Unrelated Regression (SUR) methodology and data from 1996-2018 to investigate the effect of exchange rate volatility on exports of Indonesia to Japan, China, and the United States (US) employing aggregate and disaggregated data. The findings showed that exchange rate volatility exerted a negative impact on exports. Based on estimations using disaggregated data, the effect of exchange rate volatility on exports remained negative. However, it differs among industries in the countries investigated.

Chaudhry and Yuce (2019) used the ARDL cointegration approach in a similar study to examine the relationship among exchange rate volatility, total exports of Canada, exports to the United States of America (USA), total imports and imports from the USA utilizing data from 1997M04 to 2017M08. The results showed the absence of a long-run equilibrium relationship between exchange rate volatility and total exports of Canada, exports from the USA, total imports and imports from the USA. The findings showed that exchange rate volatility had a negative and significant impact on total exports, exports to the USA and total imports. However, it had a negative and insignificant relationship with imports of Canada from the USA. The Toda and Yamamoto test results revealed a bidirectional causal relationship between exchange rate volatility and total exports of Canada, exchange rate volatility and exports to the USA, exchange rate volatility and total imports of Canada, and exchange rate volatility and Canadian imports from the USA in the short term.

Havi (2019) employed the Vector Error Correction Model (VECM) and data from 2000M01 to 2016M12 and examined the impact of real exchange rate volatility on exports and imports in Ghana. The results showed that real exchange rate and real exchange rate volatility had a positive and significant effect on exports. Also, industrial output exerted a positive and significant impact on exports. However, the result of the tested hypotheses showed that a real effective exchange rate had a significant effect on the growth of exports in Ghana. On the other hand, the real exchange rate had a positive and insignificant impact on imports. Also, real exchange rate volatility exerted a positive and significant effect on imports. However, industrial output had a negative and significant impact on imports. The results of the tested hypotheses showed that the real effective exchange rate had no significant impact on the growth of imports in Ghana.

Using the ARCH model and its extensions of GARCH and EGARCH and utilizing data from 2013M01 to 2019M06, Rahman, Majumder, and Hossain (2020) in a similar study investigated the effect of exchange rate volatility on trade in Bangladesh. The findings, based on the GARCH model, showed that exchange rate volatility exerted a negative impact on trade. However, the estimates from the EGARCH model showed the absence of leverage effect in the country studied.

Njoroge (2020) utilized a panel gravity model in another study and data from 1997-2019 to investigate the impact of exchange rate volatility on exports in COMESA member countries. The findings, based on the application of two different measures of exchange rate volatility, showed that exchange rate volatility depresses intra and extra COMESA trade.

Oyovwi and Ukavwe (2019) applied the ECM to examine the nexus between exchange volatility and international trade in Nigeria from 1970-2018. The results revealed that exchange rate volatility had a positive and insignificant impact on imports. However, it had a positive and significant impact on exports.

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In another similar study and applying the OLS, Granger Causality test, ARCH model, and its GARCH extension, Umaru et al. (2020) examined the impact of exchange rate volatility on exports in Nigeria. The results revealed that exchange rate volatility had a positive impact on exports. The causality result revealed that there is a unidirectional causal relationship between exchange rate and exports in Nigeria.

In another related study, Duke, Audu, and Aremu (2020) employed quarterly data from 1981-2019 and the VECM to investigate the impact of exchange rate uncertainty on non-oil exports in Nigeria. The results showed that exchange rate volatility had a positive and significant impact on non-oil exports. Equally, Adaramola (2016) used the Johansen Multivariate Method of cointegration and the ECM to investigate the impact of real exchange rate volatility on the volumes of exports in Nigeria from 1970Q1 to 2014Q4. The results signaled a positive and significant impact of real exchange rate volatility on trade volume in Nigeria.

RESEARCH DESIGN AND METHODOLOGY

Research Design

The investigation employed the *Ex Post Facto* design given that it is targeted at analyzing the impact of some independent variables on a specified dependent variable. This study makes use of econometric procedures in estimating exchange rate volatility and non-oil exports in Nigeria. It is also very important to note that the research design will adopt the quantitative approach based on the fact that it will give room for statistical and econometric analysis of the model.

Unit Root Test

In order to avoid spurious regression estimates, a time series data should be examined for stationarity or order of integration. Time series data is accepted to be stationary if "it exhibits mean reversion in that it fluctuates around a constant long-run mean, has a finite variance that is time invariant and has a theoretical correlogram that diminishes as the lag length increases" (Asteriou, 2006).

There are many tests trying to find the order of integration of series and among them, Dickey-Fuller, Augmented Dickey-Fuller and Phillips and Perron tests are the most widely used ones in testing the presence of unit roots. Dickey-Fuller (DF) test is based on the follow (3.7)

The model can also be expressed as:

$$\Delta\psi_t = \varpi\psi_{t-1} + \varepsilon_t \qquad (3.8)$$

where $\varpi = (\lambda - 1)$. This model is called a pure random walk model. Null hypotheses are $H_0 : \lambda = 1$ for model (3.7) and $H_0 : \varpi = 0$ for model (3.8). The corresponding alternative hypotheses are $H_a : \lambda < 1$ and $H_a : \varpi < 1$ respectively. If DF test statistic (t-statistic of lagged dependent variable) is less than the critical value, we reject the null hypothesis and conclude that the series is stationary (there is no unit root). Model (3.8) can be extended by including a constant term and/or the trend.

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The corresponding models are called random walk with drift and random walk with drift and time trend:

$$\Delta\psi_t = \alpha_0 + \Omega\psi_{t-1} + \varepsilon_t \qquad (3.9)$$

$$\Delta\Psi_t = \alpha_0 + \beta_2 t + \Omega\Psi_{t-1} + \varepsilon_t \qquad (3.10)$$

where: $\Omega = (\lambda - 1)$. The two models have the same testing procedures as the random walk model.

However, Equation (3.9) does not consider autocorrelation. Augmented Dickey-Fuller (ADF) test is used to test existence of unit root when there is autocorrelation in the series and lagged terms of the dependent variable are included in the equation. The following three models represent pure random walk, random walk with drift and random walk with drift and trend used in Augmented Dickey Fuller tests:

$$\Delta\psi_t = \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t \qquad (3.11)$$

$$\Delta\psi_t = \alpha_0 + \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-i} + \varepsilon_t \qquad (3.12)$$

$$\Delta\psi_t = \alpha_0 + \Omega\Psi + \beta_2 t + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t \qquad (3.13)$$

Decision Rule

Where: $\Omega = (\lambda - 1)$, the null hypothesis is $H_0 : \Omega = 0$ and the alternative hypothesis is $H_a : \Omega < 0$. If the ADF test statistic (t-statistic of lagged dependent variable) is less than the critical value, we reject the null hypothesis and conclude that the series is stationary (there is no unit root).

Co-integration Test

The co-integration technique allows for the estimation of a long-run equilibrium relationship. Simply put, one can argue that various non-stationarity time series are cointegrated when linear combinations are stationary. One of the most popular tests for cointegration has been suggested by Engel and Granger (1987). The process is demonstrated thus: given a multiple regression $y_t = \beta' x_t + \mu_t, t = 1,...,T,$ where $x_t = (x_{1t}, x_{2t},..., x_{kt})'$ is the k-dimensional I(1) regressors. For y_t and x_t to be cointegrated, μ_t must be I(0). Otherwise, it is spurious. Thus, a basic idea is to test whether μ_t is I(0) or I(1).

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Decision Rule

If the ADF statistics of residual series is absolutely greater than the critical values at 5% level of significance, then there exists a long-run relationship between the variables and if otherwise, there exists no long-run relationship among the variables.

The Model

The model used by Innocent *et al.* (2022) serves as a mirror to the present study. The model they adopted is made up of the following functional relationship:

$VEXP$ = f (GDP, $ERVOL$, $INDPROI$). The present study adjusted the model by removing the volume of exports (VEXP) as the dependent variable and replacing it with the volume of non-oil exports, and then adding crude oil price (COP) as part of the explanatory/control variables to reflect the gap observed in the present study.

Model Specification

In implicit form: VNOEXP = f (GDP, $ERVOL$, $INDPROI$, CPI)……. (3.1)

Transforming Equation 3.1 into an explicit and logarithmic econometric form, we have:

LVNO$EXPt = \beta 0 + \beta 1$LER$t + \beta 2LERVOLt + \beta 3LINDPROIt + \beta 4CPIt$ + μ .. (3.2)

Where:

$LVNOEXP_t$ = Log of the volume of non-oil exports at time t

LER_t = Log of Real Exchange Rate at time t

$LERVOL_t$ = Log of Exchange Rate Volatility

$LINDPROI_t$ = Log of Industrial Production Index at time t

$LCPI_t$ = Log of Consumer Price Index at time t

μ = Stochastic Error Term

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RESULTS AND DISCUSSION

Unit-Root Test Result

Table 4.1: *Unit Root Test Result*

VARIABLE	ADF STAT.	CRITICAL VAL.	ORDER
Non-Oil Exports	-4.373292	-1.954414	I(1)
Exchange Rate	-3.117017	-1.951000	I(1)
Exchange Rate Volatility	-8.823493	-1.951000	I(1)
Industrial Production	-4.689031	-3.548490	I(1)
Consumer Price Index	-5.587228	-2.951125	I(1)

Source: *Author's Computation Using E-views 10*

It can be seen in Table 4.1 that all the variables are stationary at first difference. This means that the variables have unit root until differenced in the first order.

Cointegration Analysis (Johansen Methodology)

Table 4.2: Cointegration Test Result

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.871529	145.2144	69.81889	0.0000
At most 1 *	0.685549	75.44472	47.85613	0.0000
At most 2 *	0.498390	36.10915	29.79707	0.0082
At most 3	0.263292	12.65147	15.49471	0.1282
At most 4	0.064373	2.262298	3.841466	0.1326

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Johansen method of cointegration was used for the study because all the variables are stationary at first difference. The Johansen result as displayed in Table 4.2 clearly shows evidence of cointegration as the trace statistics test indicates 3 cointegrating equations. This entails that there is a long-run relationship among the variables under investigation.

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Regression Results

Table 4.3: Error Correction Model
Dependent Variable: Non-Oil Exports

Variable	Coefficient	T-Statistics	Probability Value
Exchange Rate	-4000.426	-1.800421	0.0822
Exchange Rate Volatility	-11.51334	-1.347145	0.1884
Industrial Production	75.31182	4.912327	0.0000
Consumer Price Index	266.3294	0.100314	0.9208
ECM	-0.747646	-7.040525	0.0000
F-Statistics	17.14535		
F-Probability	0.000000		
R-Squared	0.747225		

Source: *Researcher's Computation Using E-view 10*

The parsimonious ECM of the non-oil export model result presented in Table 4.3 above gives the final and more precise estimation result when compared with the OLS level series model. However, all the variables are not correctly signed as predicted and measured by their regression coefficients. The exchange rate numerical coefficient yielded a negative value at the magnitude of -4000.426. This entails that the exchange rate contributes negatively to non-oil exports in Nigeria.

The exchange rate volatility series derived through the ARCH technique yielded a negative numerical coefficient at the magnitude of -11.51334. This entails that there is an inverse relationship between exchange rate volatility and non-exports in Nigeria. Hence, exchange rate volatility contributes negatively to non-oil exports in Nigeria.

Industrial production yielded a positive numerical coefficient at the magnitude of 75.31182. This conforms to economic a priori expectation given that an increase in industrial production is expected to increase exports generally, which includes non-oil exports.

It can be seen from the regression output that inflation measured with consumer price index (CPI) yielded a positive numerical coefficient (266.3294). This entails that inflation contributes positively to non-oil exports. This conforms to economic a priori expectations as producers increase their level of production so as to increase their profit margins during high prices.

The F-statistics, which is employed to test for the statistical significance of the entire regression plane, yielded 17.14535 with a corresponding probability value of 0.000000 < 0.05. This entails that the test is statistically significant at the entire regression plane.

The coefficient of determination (R^2), which measures the explanatory power of the independent variables, yielded 0.747225. This implies that approximately 75% of the variations in non-oil exports are explained by changes in exchange rate volatility and other control variables as used in this study. This is however relatively high and significant.

The error correction mechanism (ECM), which measures the speed of the adjustment of the variables at which equilibrium is restored, yielded -0.747646. This is correctly signed (negative) at a 5 percent level and therefore confirms our earlier proposition that the variables

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are cointegrated. The speed suggests that non-oil exports in Nigeria adjust relatively fast to the long-run equilibrium changes in the explanatory variables and it gives the proportion of the disequilibrium error accumulated in the previous period that is corrected in the current period. The speed of adjustment is specifically at 74% annually.

Serial Correlation LM Test Result

Table 4.4: Serial Correlation Test Result

Breusch-Godfrey Serial Correlation LM Test:

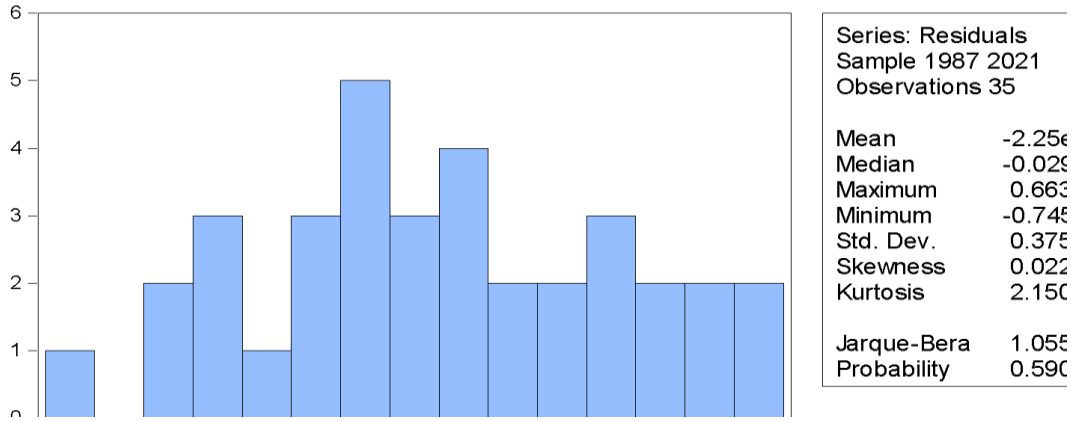
F-statistic	8.727241	Prob. F(2,27)	0.0012
Obs*R-squared	13.74230	Prob. Chi-Square(2)	0.0010

Source: *Author's Computation Using E-views*

The Breusch-Godfrey Serial Correlation LM Test was used to carry out the test of autocorrelation. It is clearly seen that the Obs*R-squared which follows the computed Chi-Square distribution yielded 13.74230 and it is clearly greater than the Chi-Square probability which yielded 0.0010. This compels us to accept the null hypothesis that there is no serial correlation of any order. Hence, there is no presence of an autocorrelation problem in the model.

Normality Test Result

Table 4.4: Normality Test



Source: *Author's Computation Using E-views*

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The normality test was carried out to ascertain if the residuals were normally distributed. The probability value of the Jarque-Bera yielded 0.590078 which is obviously greater than 0.05. This compels us to accept the null hypothesis of normal distribution. Hence, we conclude that the residuals are normally distributed.

Heteroskedasticity Test

Table 4.5: Heteroskedasticity Test Result

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.387396	Prob. F(5,29)	0.8533
Obs*R-squared	2.191368	Prob. Chi-Square(5)	0.8221
Scaled explained SS	0.865552	Prob. Chi-Square(5)	0.9727

Source: *Author's Computation Using E-views*

The heteroscedasticity test was carried out to ascertain the presence of homoscedasticity in our model. The probability of the Chi-Square yielded 0.8221 > 0.05 and this means that there is no evidence of heteroscedasticity in our residuals. This is good and desirable.

Granger Causality

Table 4.6: Granger Causality Test Result

Pairwise Granger Causality Tests
Date: 10/18/23 Time: 09:56
Sample: 1986 2021
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCHRATE does not Granger Cause NOEXP	34	6.64758	0.0042
NOEXP does not Granger Cause EXCHRATE		2.44545	0.1044
EXCHRATEVOL does not Granger Cause NOEXP	34	3.95435	0.0303
NOEXP does not Granger Cause EXCHRATEVOL		0.80335	0.4575

It can be seen clearly from Table 4.6 that exchange rate volatility granger causes non-oil exports in Nigeria for the period under analysis. The null hypothesis of exchange rate volatility non-granger causing non-oil export is rejected given the value of the probability value that yielded 0.0303 < 0.05.

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5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

Summary of Findings

This study empirically investigated the impact of exchange rate volatility on non-oil exports in Nigeria covering the period 1986-2021. The major findings of the study are:

1. There exists a negative relationship between exchange rate volatility and non-oil exports in Nigeria,
2. There exists a negative relationship between exchange rate and non-oil exports in Nigeria.
3. There is a unidirectional causality relationship between exchange rate volatility and non-oil exports in Nigeria. Hence, exchange rate volatility causes non-oil exports in Nigeria.

CONCLUSION

This study has been able to empirically investigate the impact of exchange rate volatility on non-oil exports in Nigeria covering the period 1986-2021. It is evident from the results of this study that the exchange rate is volatile and has a negative significant impact on non-oil exports in Nigeria. This could be attributed to the underdeveloped financial system and overreliance on crude oil as a major export product which exposed the economy to external shocks that caused the present economic crisis. The study concludes that collaborative efforts by all agents are required to ensure an enabling environment that will support current economic diversification in the face of the dwindling fortunes of crude oil. The study also concluded that there is a unidirectional causality relationship between exchange rate fluctuations and non-oil exports in Nigeria, with causality flowing from exchange rate volatility to non-oil export.

RECOMMENDATIONS

The following recommendations were suggested based on the findings of the study:

1. The government of Nigeria should aggressively pursue revenue diversion policies. This will go a long way in driving non-oil exports and also strengthen our currency.
2. Monetary authorities should ensure exchange rate stability in order to stem inflationary tendencies in Nigeria which have adverse effects on the growth of non-oil exports.
3. Government should prioritize ensuring stability in macroeconomic variables and employ such growth-oriented and stabilization policies especially at the macro level which will induce growth and development of the Nigerian economy.

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