

## Do International Trade and Institutional Quality Improve Foreign Exchange Reserves? An Econometric Diagnosis

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### **Abstract**

*This study investigates the effects of international trade and institutional quality on foreign exchange reserves in Nigeria. The study is focused on 1990 to 2022. Foreign exchange reserve of Nigeria is utilised as the dependent variable while international trade and institutional quality are indexed as net oil exports, net non-oil exports, real exchange rate, degree of trade openness and institutional quality index. Annual time-series data employed were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS) Reports and World Development Indicators (WDI). Autoregressive Distributed Lag (ARDL) is the main technique of data analysis applied, and the study found that net oil exports and trade openness had favourable and substantial effects on foreign reserves accumulation in Nigeria, net non-oil exports appeared insubstantial but favourable on foreign reserves in Nigeria, real exchange rate had substantial adverse effect on foreign earnings reserves while institutional quality index had favourable and insubstantial effects on the regressand. The study concluded that international trade and institutional quality are in no small measure imperative contributors to accumulating foreign reserves in Nigeria. The study recommended that government should implement policies that incentivize the non-oil sector, such as providing tax breaks, subsidies, and infrastructure support to boost production for export. Hence, strategic partnerships with global markets can further enhance Nigeria's competitiveness in the non-oil sector, which in the long term would expectedly improve Nigeria's external reserves.*

**Keywords:** International Trade, Institutional Quality, foreign reserves, Autoregressive Distributed Lag, Nigeria

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### **INTRODUCTION**

Foreign exchange reserves, going by other names such as external reserves, foreign reserves, are foreign currencies, foreign deposits and bonds held by Central Banks and monetary authorities of a nation. The phrase encompasses a wide range of assets, comprising physical gold and silver likewise Special Drawing Rights (SDRs) and holdings in the IMF's reserves. 'International official reserves, or foreign exchange reserves', are the 'assets of central banks' kept in major national currencies, such as 'the US dollar, the British pound sterling, the euro, and the Japanese yen'. Official external assets held by monetary authorities for use in direct financing and regulating payment imbalances via intervention in the currency market constitute foreign exchange reserves (Umeora, 2013). The world's reserves of foreign currency have grown substantially in the last several years. The increasing value of countries' foreign currency reserves reflects the paramount importance that

nations have on maintaining adequate levels of these assets. Among the many reasons why countries keep their cash on hand are: safeguarding their currency's value, meeting their international payment obligations (particularly those pertaining to funding foreign trade), building wealth, managing their currency's exchange rate, enhancing their creditworthiness, and protecting themselves from future external shocks (Nteegah & Okpoi, 2016).

However, there are a number of factors contributing to the buildup of external currency reserves, the most important of which are international trade and institutional quality. Central banks and monetary authorities rely on foreign currency reserves to stabilise financial markets, control exchange rate volatility, and guarantee liquidity in international transactions (Adegboyo, Efuntade and Efuntade, 2019). Several variables, as comprising fluctuations in trade and capital flows, changes in monetary policy, and exposure to external vulnerabilities, undermine the buildup of reserves in foreign currency. The most important of these is international commerce, which affects a nation's need for foreign currency and its balance of payments. Trade surpluses are one of the main ways in which international commerce influences the accumulation of foreign currency, as pointed out by Chinn and Prasad (2013). When a nation's exports exceed its importations, it has a trade surplus and receives more money from other countries. A consequence of trade operations is the accumulation of reserves, which central banks may do by intervening in the forex market and buying up surplus reserves. Foreign currency reserves are sought after by nations with more trade openness, as shown by their trade to GDP ratio. Larger reserve buffers are required to manage risks and sustain stability in more open economies, which are characterised by higher trade volumes and greater sensitivity to external shocks (Klein & Olivei, 2008).

### **Statement of the Problem**

Issues with trades across national frontiers and the quality of institutions pose serious threats to Nigeria's ability to accumulate foreign currency. Oil exports, for example, provide a substantial amount of foreign currency for Nigeria's economy. The nation's capacity to amass foreign currency reserves is susceptible to trade imbalances caused by fluctuations in global oil prices. Because of its heavy reliance on oil exports, Nigeria is susceptible to external shocks and price volatility. This puts the nation at risk of depleting its reserves during times of low oil prices. Additionally, natural gas and crude oil make up the bulk of Nigeria's export revenue. Hindrances on reserves building are a result of a lack of export diversification, which makes it difficult for the government to earn enough foreign currency from sources other than oil.

Because of its heavy dependence on crude oil revenues, Nigeria's foreign currency reserves have fluctuated over the years. There were \$2.4 billion worth of foreign currency reserves in the nation as of 1981. From that point on, the reserve's value plummeted, reaching a record low of \$224.4 million in 1983. Since 1987 (\$7.5 billion), 1994 (\$9 billion), and 2000 (\$9.4 billion), it has been steadily increasing. After rising to a high of \$53 billion in 2008, the reserve fell to \$7.4 billion in 2003. A large part of the extraordinary gain in the reserve came from a rise in exports of goods different from oil. However, by 2009, the reserve volume had dropped to \$42.4 billion, and by 2010, it had dropped even lower to \$32.3 billion, a decrease of almost 21.15 percent. From 2012

to 2016, the reserve fell to \$26.9 billion, its lowest level since 2005. In 2012, it rose to \$43.8 billion again. Reasons given for this decline comprise the destruction of oil infrastructure in the Niger Delta, a drop in international price of the black gold (crude oil), and the imposition of restrictions on 41 products, one of which being toothpicks, by the Central Bank of Nigeria (CBN, 2017). This was the turning moment when the Nigerian economy entered recession. To further develop the foreign currency market and meet all investors' and importers' FX requirements, the CBN subsequently established the Secondary Market Intervention Sales (SMIS) window. In 2018, due to higher oil prices and output, foreign currency reserves surged to \$42.6 billion; however, in 2019, they decreased to about \$38.09 billion.

Nigeria had hoped that its foreign exchange reserves would grow during the trend period due to strong activity in the external sector, the US-China trade deal and high oil prices. However, the global COVID-19 pandemic lowered oil prices, which lowered the reserve's value (Central Bank of Nigeria, 2022). Institutional quality and investor trust are both impacted by Nigeria's struggles with poor governance, which comprise ineffectiveness, corruption, and lax regulatory enforcement. Investment from outside and the accumulation of foreign currency are both hampered by Nigeria's weak governance institutions, which cause regulatory ambiguity, insecure contracts, and increased business risks. Therefore, this research aims to empirically investigate how cross-border trade and quality of institutions influenced accumulation of external reserves in Nigeria in light of the aforementioned context (problem). This research specifically looked at how net oil exports, net non-oil exports, the real exchange rate, the degree of trade openness, and institutional quality implicated on the country's foreign currency reserve level.

## LITERATURE REVIEW

### **Mercantilist Trade Theory**

The Mercantilist Theory provides a compelling explanation for why countries amass foreign currency reserves. The goal of many nations to amass substantial reserves of foreign currency may be better understood through the lens of this economic theory, which has its roots in the 17th and 18th centuries. A contemporary application of mercantilist concepts has helped to explain current activities concerning foreign currency reserves, since the original theory's emphasis was on the acquisition of precious metals. A good trade balance is something that mercantilism tries to promote. To accumulate foreign currency as payment for exports, countries should increase their exports relative to their imports. When a nation has a trade surplus, it brings in more money from outside, which it may put into its reserves. Similarly, under mercantilist theory, a nation's wealth is defined as its stockpile of capital and resources, which comprises its foreign currency reserves. A substantial reserve is seen as an asset to the nation's strength and stability, protecting it from economic downturns and giving it more clout in global politics.

### **Theory of Absolute Cost Advantage**

Adam Smith proposed the theory of Absolute Cost Advantage in his seminal book, *Wealth of Nations* (1776). The arguments against mercantilism give rise to this concept. He thought that all nations should move towards free trade. In line with Smith's views, free trade would enable nations

to buy things that other nations could produce efficiently, allowing them to concentrate on doing things that each nation excels at. A more unified increase in global production would result from nations all over the globe specialising in different aspects of manufacturing. It follows that one nation's gain need not be another's loss; more likely, all nations may reap benefits simultaneously. The basic tenet is that nations should prioritise exporting the kinds of commodities where they have a cost advantage, whether measured in absolute terms or in terms of relative production costs. Conversely, if a nation has a larger cost or absolute cost disadvantage relative to another, it should import that item. Gaining a knowledge of how nations create trade surpluses via 'specialisation and trade' is crucial for applying the notion of absolute cost advantage to the building of foreign currency reserves. By exporting these items more effectively, countries with absolute cost advantages in manufacturing may build trade surpluses. As a nation's exports bring in more foreign currency, its surpluses allow it to build up its foreign exchange reserves. Additionally, export demand rises when a nation's manufacturing is efficient and its prices are competitive. As a consequence, the nation's reserves grow, which acts as a safety net for the economy. By getting involved in the foreign currency markets, countries with substantial reserves may stabilise their currencies and keep their exports priced competitively worldwide.

### **Empirical Review**

Using secondary data from the CBN Statistical Bulletin, Fapetu, Oluwole, Olokoyo, Olabisi, and Owoye (2023) investigated the impact of the currency rate on Nigeria's foreign reserves position from 1994 to 2019. The ECM shows that the exchange rate substantially affects foreign reserves in an adverse way. There is an adverse but negligible correlation between inflation and foreign exchange reserves, but a favourable and statistically substantial correlation between GDP and external reserves.

Using Granger causality test, long term and short term dynamic ARDL regression, quartile regression, and economic growth-carbon emission nexus in Nigeria from 1990 to 2020, Maduka, Ogwu, and Ekesiobi (2022) evaluated the moderating influence of institutional quality. Researchers in Nigeria discovered a strong correlation between carbon dioxide emissions and GDP per capita. Also, contrary to what the EKC theory predicted, the correlation between CO<sub>2</sub> emissions and both long- and short-term economic development takes the form of an N-shaped nexus.

Researchers Uzoma, Odungweru, and Chukwuma-Ogbonna (2021) looked at how Nigeria's international commerce and reserves affected the nation. The data employed in this analysis comes from the CBN statistics bulletin and covers the years 1980-2019. This research made use of the Vector Error Correction Model, co-integration, and ADF unit root test. The calculated model demonstrated that all-temporal were one-order stationary. Furthermore, the outcomes of the Vector ECM showed that crude oil and exporting non-oil goods had favourable effect on Nigeria's external reserves, while non-oil exports had no effect at all, also the exchange rate, oil importations, non-oil importations all had adverse effects.

Using panel data spanning 1996–2019, Muftau and Alex (2021) examined how institutional quality impacted economic development in Nigeria and Ghana. The research employed the following tests: unit root, ARDL, and Pedroni's co-integration. “Research showed that anti-corruption efforts were fruitful in Ghana but fruitless in Nigeria, leading to faster economic development in Ghana and slower expansion in Nigeria. Furthermore, research showed that regulatory quality boosted Nigeria's economy while slowing Ghana's.

Utile, Ijirshar, and Sem (2021) employed yearly temporal data from 2001–2019 to analyse the impact of institutional quality on the growth of the Nigerian economy. Every one of the variables was either integrated of I(1) or I(0) after running the data through the ADF unit root test to make sure there were not any unit root difficulties. Institutional Quality (INSQ) substantially inhibits economic development as shown by the employed ARDL model. A statistically substantial adverse error correction term suggests that, in the case of a short-term disturbance, economic development may gradually return to its long-term equilibrium path.

To determine the ideal amount of foreign currency reserves for Nigeria, Oyeniran and Alamu (2020) employed the ARDL method, which is consistent with the 'buffer stock concept' put forward by Frenkel and Jovanovic (1981). Equally, the estimates of long and short term from the buffer stock model demonstrated that Nigeria's foreign reserve holdings were more affected by the cautious motivation than the mercantilists.

Using yearly data from 1979 to 2018, Sule (2020) determined the direction of the influence of institutional quality, contract intensive money, and the effective governance index on economic development in Nigeria. In this investigation, the researchers employed two methods: Johansen Co-integration and OLS. The outcome revealed that, there is a statistically substantial favourable correlation between institutional quality (contract intensive money) and economic development, and the effective governance index had favourable but negligible impact on economic growth.

In their 2020 study, Ogbuabor, Onuigbo, Orji, and Anthony-Orji looked at data from 1981Q1–2016Q4 to reevaluate the correlation between good institutions and economic growth in Nigeria. In an effort to look for a long-term association among the important variables, the research employed the ARDL method, which is as per the unconstrained error correction model (UECM) and uses a limits test methodology. The upshots showed that on both the aggregate and sectoral levels, institutional quality had an adverse but negligible effect on growth in Nigeria.

In period, 1981 and 2017, Adegboyo, Efuntade, and Efuntade (2019) analysed the correlation between Nigeria's foreign exchange reserves and the nation's cross-border trade activities. The research employed the ARDL Bound test, an econometric approach, to examine potential long- and short-term correlations, and the granger causality test, an analytical tool, to determine if there was a causal association. The upshots revealed that non-oil and oil importations both had an adverse stimulus on external reserve, but exchange rate and non-oil exportations had a favourable effect.

Foreign currency reserves of Nigeria were the subject of analysis by Nteegah and Okpoi (2016). The outcomes showed that Nigeria's foreign reserves are substantially affected by international trade, as per data analysis applying the co-integration and Vector ECM, which covered the years 1980 to 2015. The outputs of the causality test show that the order of importance for foreign reserves was as follows: oil exportations, oil importations, non-oil exportations, non-oil importations, and the exchange rate.

Utilising daily data spanning from January 1, 2014, to July 31, 2015, Nwachukwu, Ali, Abdullahi, Shettima, Zirra, Falade, and Alenyi (2016) utilised a Threshold Vector Error Correction Model (TVECM) framework to model the long-term correlation between the exchange rate and external reserves in Nigeria. There is empirical evidence for a TVECM formulation, since the result shows that the series had non-linear long-term correlation. So, when the dispersion of the two variables is beyond the critical point estimate, co-integration takes place.

Between 1990Q1 and 2012Q4, Ajibola (2015) employed the two-regime threshold vector error correction model (TVECM) applying maximum likelihood approach to study the long-term connection between the currency rate and foreign reserves in Nigeria. They verified that the variables in Nigeria do in fact exhibit threshold co-integration. The upshots demonstrated that the exchange rate's error correction co-efficient in the two regimes were not statistically substantial, as evident from the calculated threshold. This suggests that exchange rates did not react to equilibrium error during the estimation period.

Umeora (2013) looked at how keeping foreign currency reserves affected the value of the naira in Nigeria. The CBN Statistical Bulletin is a secondary source for the data. For the two models, we employed Minitab 14 for Windows to do simple linear regression. In the upshots, keeping foreign currency reserves is inversely related to exchange rates. Inflation and foreign exchange reserves are favourably related in the second regression equation. As a result, we must also accept the second alternative hypothesis while rejecting the second null hypothesis. On "Causality between Exchange Rate and Foreign Exchange Reserves in the Indian Context," Gokhale and Raju (2013) conducted research. They established that large foreign exchange reserves do not really show a long-term or short-term correlation with exchange rates, which goes against the modicum of most research.

After China adapted the open economy system from 1982 to 2009, Cetin (2013) employed the granger causality analysis to study the components of foreign exchange reserves and economic growth rates that make up China's external debt. During the time frame of the study, the research discovered that China's total external debts, foreign exchange reserves, and short-term external debts substantially affected her economic growth rates. Her innovation regarding foreign exchange reserves seems to have effect on economic growth rates based on the impulse response and variance decomposition analyses outcomes.

## Literature Gap

This section reviewed literature on Nigeria's foreign exchange reserves as influenced by institutional strength, and international trade. There is a clear need for researching on the topic because, although there are numerous empirical studies on the effects of institutional quality on economic growth and international trade on foreign exchange reserve accumulation in Nigeria, hardly is there any attempted determination of the effects of international trade and institutional quality on foreign reserve accumulation in Nigeria. In addition, the majority of the prior research in this area did not use up-to-date data in their analyses. To address these knowledge gaps, the researcher set out to investigate the impact of international trade and institutional quality on the growth of Nigeria's foreign exchange reserves up to the year 2022, extending the time frame of the study beyond those of previous studies.

## METHODOLOGY

This investigation employed the ex-post-facto technique. The term "ex-post-facto research" describes studies that rely on earlier occurrences to inform their experimental methods and other types of investigative reasoning. Additional annual time-based data comprised in this research spans 1990–2022. The data employed in this analysis came from the CBN statistics report and the World Bank Indicators (WDI).

## Model Specification

Since Absolute Cost Advantage is relevant to this investigation, it will theoretically serve as the foundation for this study's analytical framework. With minor adjustments, this study's empirical model will be adapted to the one of Uzoma, Odungweru, and Chukwuma-Ogbonna (2021). In the light of the above, the research modeled the following functional form:

$$FER = f(NOE, NNE, RER, DTO, IQI) \quad (3.1)$$

The mathematical presentation of the functional correlation in Equation 3.1 is as follows:

$$FER = \delta_0 + \delta_1 NOE + \delta_2 NNE + \delta_3 RER + \delta_4 DTO + \delta_5 IQI \quad (3.2)$$

The explicit form of the mathematical correlation in Equation 3.2 is as follows:

$$FER = \delta_0 + \delta_1 NOE + \delta_2 NNE + \delta_3 RER + \delta_4 DTO + \delta_5 IQI + u_t \quad (3.3)$$

**A Priori Expectations:**  $\delta_1 > 0$ ;  $\delta_2 > 0$ ;  $\delta_3 < 0$ ;  $\delta_4 > 0$ ;  $\delta_5 > 0$ .

Where:  $FER$  = Foreign exchange reserve,  $NOE$  = Net oil export,  $NNE$  = Net non-oil export,  $RER$  = Real exchange rate,  $DTO$  = Degree of trade openness,  $IQI$  = Institutional quality index,  $\delta_0$  = Regression Intercept,  $\delta_1 - \delta_5$  = Parameters of independent variables,  $\mu_t$  = Error term

## Data Analysis Techniques

This investigation applied the 'Autoregressive Distributed Lag (ARDL) estimation procedures', which comprises the 'Augmented Dickey Fuller (ADF) unit root', and the ARDL Bounds co-integration estimations as prescribed by Pesaran, Shin, and Smith (2001) as pre-diagnostic tests. The ARDL approach is typically utilised when the variables contain both the I(0) and I(1) series of integrations. This work also applied post-diagnostic tests subsequent to the estimation procedure. The Ramsey RESET test, stability test, heteroscedasticity test, normal distribution test, and serial correlation test comprised these assessments". As followed

is the construction of the ARDL estimation model that combines the long term and short-term parameters:

$$\begin{aligned} \Delta \ln(SMEO_t) = & \alpha_0 + \alpha_{1i} \Delta \ln(SMEO_{t-1}) + \alpha_{2i} \Delta \ln(GEH_{t-1}) + \alpha_{3i} \Delta \ln(GEE_{t-1}) \\ & + \alpha_{4i} \Delta \ln(GERD_{t-1}) + \sum_{t=1}^p \beta_{1i} \Delta \ln(SMEO_{t-1}) + \sum_{t=1}^q \beta_{2i} \Delta \ln(GEH_{t-1}) \\ & + \sum_{t=1}^q \beta_{3i} \Delta \ln(GEE_{t-1}) + \sum_{t=1}^p \beta_{4i} \Delta \ln(GERD_{t-1}) + \lambda ECT_{t-1} \\ & + \varepsilon_i \end{aligned} \quad (3.4)$$

Where:  $\ln$  = Natural log;  $\Delta$  = Difference operator,  $\alpha_1 - \alpha_4$  = Long term parameter estimates,  $\beta_1 - \beta_4$  = Short term parameter estimates,  $\varepsilon_i$  = Serially uncorrelated stochastic term,  $\lambda$  = Speed of adjustment  $ECT$  = Lagged error correction term

## DATA ANALYSES AND DISCUSSION OF OUTCOMES

### Descriptive Analysis

The upshots of the descriptive analysis are reported as follows:

**Table 4.1: Descriptive Statistics**

	FER	NOE	NNE	RER	DTO	IQI
Mean	23637.76	5694033.	-4380187.	147.5767	33.59794	4.058485
Median	26054.37	6343280.	-2264241.	129.3600	34.13600	3.960000
Maximum	58472.88	14375237	-36385.20	456.7800	55.02100	9.280000
Minimum	2157.970	100553.4	-16246741	8.040000	17.99800	0.040000
Std. Dev.	17292.70	4738077.	4714089.	118.9502	8.384383	2.215703
Skewness	0.135144	0.243824	-1.105361	0.914842	0.229478	0.222416
Kurtosis	1.547066	1.649369	3.197878	3.180933	2.896734	2.403262
Jarque-Bera	3.003100	2.835254	6.773867	4.648156	0.304293	0.761709
Probability	0.222785	0.242288	0.033812	0.097874	0.858863	0.683277
Sum	780046.2	1.88E+08	-1.45E+08	4870.030	1108.732	133.9300
Sum Sq. Dev.	9.57E+09	7.18E+14	7.11E+14	452772.7	2249.532	157.0988
Observations	33	33	33	33	33	33

**Source:** Computed by researcher (EViews 12), 2024.

The foreign currency reserve (FER) of Nigeria had a low degree of dispersion from the mean of 17292.7 billion Naira from 1990 to 2022, as palpable in Table 4.1. The FER had a highest value of 58472.88 billion Naira and a lowest value of 2157.97 billion Naira per year. The average annual value of Nigeria's net oil exportation (NOE) from 1990 to 2022 was N569403 billion, with a range of N100553.4 billion to N14375237 billion; the standard deviation was N4738077 billion, indicating a small amount of dispersion. Further, the range of values for net non-oil exportation (NNE) was -16246741 billion Naira to -36385.20 billion Naira, with an average value of 4380187



billion Naira. There is little variation around the mean, however, with a standard deviation of 4714089 billion Naira. The real exchange rate (RER) also ranged from a low of N8.04 per US Dollar to a high of N456.78 04 per US Dollar, with a mean value of N147.5767 04 per US Dollar. A standard deviation of N118.9502 04 per US Dollar suggests a rather little amount of variation around the mean, nonetheless. In addition, the degree of trade openness ranged from a low of N17.998 percent to a high of 55.021 percent, with a standard deviation of 8.384 percent indicating a much-dispersed distribution around the mean. Last but not least, the institutional quality index ranged from a low of 0.04 to a high of 9.28, with a standard deviation of 2.2157 indicating a very large dispersion around the mean.

### Pre-Estimation Tests

#### Unit Root Test

To get around this research, an ADF test was utilized to check if the variables' data are stationarity, which means it was looking for a unit root. The table below summarised the outcomes:

**Table 2: Augmented Dickey-Fuller (ADF) Test Results**

Variables	At Levels		At First Difference		Remark Stationary @	Order of Integration
	ADF	Mackinnon Critical Value @ 5%	ADF	Mackinnon Critical Value @ 5%		
FER	-1.6146	-2.9604	-6.4422	-2.9640	1 <sup>st</sup> Diff.	I(1)
NOE	-0.4179	-2.9640	6.5948	-2.9571	1 <sup>st</sup> Diff.	I(1)
NNE	5.4475	-2.9919	-	-	Level	I(0)
RER	2.5949	-2.9571	-3.3880	-2.9604	1 <sup>st</sup> Diff.	I(1)
DTO	-3.2520	-2.9571	-	-	Level	I(0)
IQI	-3.3744	-2.9604	-	-	Level	I(0)

**Source:** *Computed by researcher (EViews 12), 2024.*

As displays in Table 4.2, the ADF's Unit Roots tests signified that non-oil exportation (NNE), degree of trade openness (DTO), and institutional quality index (IQI) were stationary at levels and were therefore integrated at order zero [I(0)]. Conversely, foreign exchange reserve (FER), net oil exportation (NOE), and real exchange rate (RER) were stationary at first difference and were therefore integrated at order one [I(1)]. Consequently, the variables were stationary at both levels and first difference, indicating that they were of mixed integration orders at zero [I(0)] and one [I(1)]. Accordingly, we proceed to establish or ascertain the existence or nonexistence of long-term cointegrating equation among the variables in the model by applying the ARDL's bounds co-integration test.

#### Lag Selection Criteria

The optimum lag selection criteria output is as tabularly obtainable in Table 4.3 below:

**Table 3: Lag Selection Criteria**

Lag	LogL	NNE	FPE	AIC	SC	HQ
0	-1664.092	NA	2.51e+39	107.7479	108.0254	107.8384
1	-1529.508	208.3881	4.55e+36	101.3876	103.3305*	102.0209
2	-1479.033	58.61612*	2.37e+36*	100.4538*	104.0619	101.6299*

**Source:** Computed by researcher (EViews 12), 2024.

Table 4.3 shows that, as selected by the Akaike Info Criterion (AIC), lag two is the suitable optimum lag length that would provide a substantial co-integration result; so, succeeding investigations were conducted applying the ideal lag length two.

### Bounds Co-integration Test

The analytical outcome of the Bounds co-integration test is presented in Table 4.4 below:

**Table 4.4: Bounds Co-integration Test**

<b>H<sub>0</sub> Hypothesis: Long-term Correlations do not Exist</b>			<b>Bounds' Critical Values</b>	
	Value	Significance	I(0)	I(1)
T-statistic				
F-statistic	4.248802	10%	2.08	3
K	5	5%	2.39	3.38
		1%	3.06	4.15

**Source:** Computed by researcher (EViews 12), 2024.

The estimated F-stat. (4.148802) is higher than the upper limit critical value (4.15) at a 5% level of significance, thereby rejecting the null hypothesis (H<sub>0</sub>) based on the outcome in Table 4.4. That the variables are cointegrated is the implication here. Statistical evidence suggests a long-term link or co-integration among the following variables: institutional quality index (IQI), degree of trade openness (DTO), net non-oil exportation (NNE), real exchange rate (RER), and foreign exchange reserve (FER). Fitting the ARDL model, however, requires the presence of long-term correlations together with mixed orders of stationarity. So, we estimated an ARDL to get the short and long terms' coefficients of the models.

### Short term Autoregressive Distributed Lag (ARDL) Analysis

Using the ARDL error correction approach, the researcher calculated the short-term dynamic influence of trade across national boundaries and institutional quality on Nigeria's foreign reserves level. In the short-term ARDL estimates, it showed that net oil exportation substantially and favourably related with Nigeria's foreign currency reserves (Table 4.5). Net oil exportation had a favourable co-efficient value of 0.002535 and a probability-value of 0.0000, which is below 0.05, as obvious. This means that the foreign currency reserve will rise by 0.002535 billion Naira for every billion Naira increase in net oil exportations.

**Table 4.5: Result of Short term ARDL Co-efficient**

Dependent Variable = FER				
Variable	Co-efficient	Std. Error	t-Statistic	Prob.*
D(FER(-1))	0.672260	0.133938	5.019197	0.0001
D(NOE)	0.002535	0.000382	6.628432	0.0000
D(DTO)	0.001734	0.000570	3.040986	0.0062
CointEq(-1)*	-0.757376	0.123945	-6.110583	0.0000

Adjusted R-squared = 0.700455; Durbin-Watson stat = 2.459647

**Source:** Computed by researcher (EViews 12), 2024.

Additionally, Nigeria's foreign exchange reserve is favourably and substantially correlated with the nation's level of trade openness. The degree of trade openness had favourable co-efficient value (0.001734) with its 0.0062 probability-value, which is below 0.05, as indicated. Thus, a 0.001734 billion Naira increase in foreign exchange reserves is the result of a one percent increase in the degree of trade openness.

Additionally, the net oil exportation, net non-oil exportation, real exchange rate, degree of trade openness, and Institutional quality index account for 70% of short-term systematic variation in foreign exchange reserve as obvious from the Adjusted R-squared (Adj. R<sup>2</sup>) value of 0.700455. The error term, which represents unknown factors outside the model, contributed the remaining 30% changes in the model. Finally, when any deviations from the long-term equilibrium are corrected in the current period, the speed of adjustment is 76%, as signified by the co-efficient of CointEq(-1)\* at -0.757376. This signifies that, vagaries of real rate of currency exchange, trade openness degree, net non-oil exportation, net oil exportation, and institutional quality index have a relatively high adjustment effect on foreign exchange reserve.

#### Long term Autoregressive Distributed Lag (ARDL) Analysis

The long-term dynamic effect of international trade and institutional quality on foreign exchange reserve accumulation in Nigeria was estimated applying ARDL approach. The estimates are presented in Table 4.6:

**Table 4.6: Result of Long term ARDL Co-efficient**

Dependent Variable = $InHDI_t$				
Variable	Co-efficient	Std. Error	t-Statistic	Prob.*
NOE	0.004445	0.000546	8.142376	0.0000
NNE	0.000910	0.000978	0.929929	0.3630
RER	-1.325109	0.191580	-6.916730	0.0002
DTO	0.002127	0.000521	4.080304	0.0047
IQI	0.000902	0.000944	0.955378	0.3503
C	-0.962651	0.711606	-1.352787	0.1949

**Source:** Computed by researcher (EViews 12), 2024.

Table 4.6 displays the empirical outcomes of the long-term ARDL, which show that Nigeria's foreign currency reserve is favourably and substantially affected by net oil exportations. Because the net oil exportation co-efficient is favourable (0.004445) and the probability-value is below 0.05 (0.0355), this is clearly the case. Thus, a 0.004445 billion Naira gain in foreign currency reserves is the result of a one billion Naira increase in net oil exportations. The association between Nigeria's foreign currency reserve and net non-oil exportation is favourable but not statistically substantial. The fact that the probability-value (0.3630) is larger than 0.05 and the co-efficient value (0.000910) of net non-oil exportation is favourable proves this. Therefore, a 0.000910 billion Naira rise in the foreign currency reserve will result from a one billion Naira increase in the net non-oil exportation. In addition, Nigeria's foreign currency reserve is adversely and substantially affected by the real exchange rate. Its co-efficient of -1.325109 and a probability-value of 0.0002 being below 0.05, prove this to be true. It follows that there will be a drop of 1.325109 in the foreign exchange reserve for every one unit rise in the Naira rate to the US Dollar. Furthermore, Nigeria's foreign currency reserve is favourably and substantially affected by the nation's level of trade openness. The degree of trade openness had a favourable co-efficient value of 0.002127 and a probability-value of 0.0047, which is below 0.05, indicating interpretation. Thus, a 0.002127 billion Naira rise in foreign currency reserves is the result of one percent increase in the degree of trade openness. Finally, the institutional quality score favourably affects Nigeria's foreign currency reserve, however this impact is not statistically substantial. The favourable co-efficient value (0.000902) with probability-value (0.3503), which higher than 0.05, demonstrate this. If the institutional quality index goes up by one unit, the foreign exchange reserve will go up by 0.000902 billion Naira and if it goes down by one unit, the foreign exchange reserve will go down by 0.000902 billion Naira.

### Post-Estimation Tests

In an effort to establish the validity and reliability of the study's outcomes discussed above, this research performed post-diagnostic tests. The following are the outcomes of the diagnostic procedures:

#### Normality Test

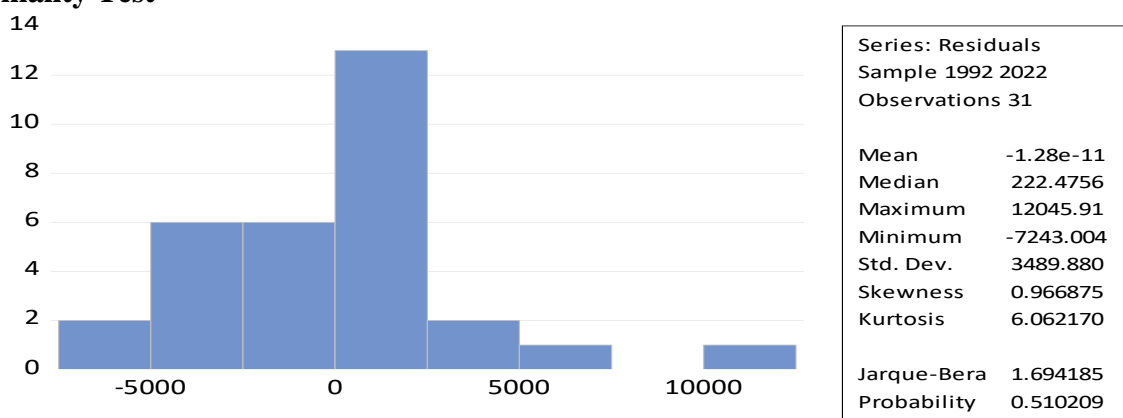


Figure 4.1: Normality Test Result

To determine whether the data model's variables are collectively normally distributed, Jarque-Bera statistics test was conducted. The null hypothesis is preserved and inference drawn that the estimate's residuals followed a normal distribution since the probability-value (0.510209) of Jarque-Bera statistics is higher than 5% in Figure 4.1.

### Serial Correlation Test

**Table 4.7: Breusch-Godfrey Serial Correlation LM Test Result**

F-statistic	DF	Probability-value	Decision
2.613052	Prob. F(2,19)	0.0994	The null hypothesis of no serial correlation is retained

**Source:** *Computed by researcher (EViews 12), 2024.*

At the 5% level of significance, the Breusch-Godfrey Serial Correlation LM test to see whether there was any serial correlation was conducted. Obtaining that the prob-value (0.0994) of the Breusch-Godfrey's Serial correlation LM analysis is higher than 5%, thus, the null hypothesis is maintained, and it is concluded that the estimates do not exhibit serial correlation issue.

### Heteroscedasticity Test

**Table 4.8: Breusch-Pagan-Godfrey Heteroscedasticity Test Result**

F-statistic	DF	Probability-value	Decision
1.126259	Prob. F(9,21)	0.3879	The null hypothesis of homoscedasticity is retained

**Source:** *Computed by researcher (EViews 12), 2024.*

For this diagnosis, the Breusch-Pagan-Godfrey Heteroscedasticity Test to examine the possibility value of heteroskedasticity at a 5% level of significance was applied. The model does not suffer from heteroskedasticity, since the prob-value (0.3879) of the Breusch-Pagan-Godfrey Heteroscedasticity statistics is higher than 5%. Consequently, we maintain the null hypothesis that the model is outcome is homoscedastic.

### Ramsey RESET's Test

**Table 4.9: Ramsey RESET's Test Result**

F-statistic	DF	Probability-value	Decision
0.004156	20	0.9967	The null hypothesis of the model being correctly specified is retained

**Source:** *Computed by researcher (EViews 12), 2024.*

At the 5% level of significance, the null hypothesis of proper model specification was tested applying the Ramsey RESET test. The output indicated that, the null hypothesis is sustained, and

assert that the model is appropriately specified since the probability-value (0.6982) of the Ramsey RESET statistics is higher than 5%.

### Stability Test

The study utilised the cumulative sum (CUSUM) measure to ascertain whether or not the ARDL specification is outcomes are stable. It is apparent that the co-efficient estimations are considered valid since the displayed CUSUM statistics fall under the 5% significance threshold. As shown in Figure 4.2, the CUSUM plot (the two red lines) is considered substantial at the 5% level. Thus, the model is considered trustworthy and stable.

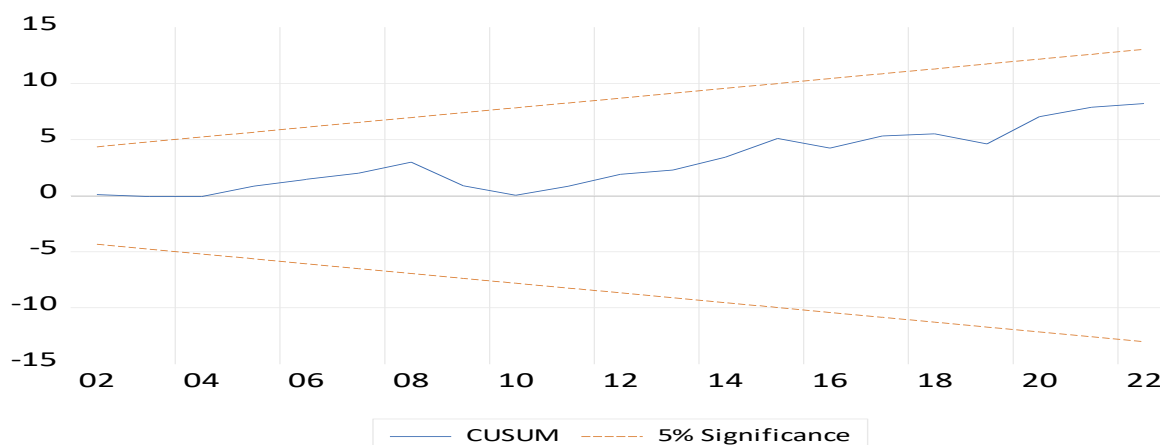


Figure 2: Cumulative sum (CUSUM) test

### Discussion of Empirical Outcomes

This study found that net oil exports favourably and substantially affected Nigeria's external reserve in both short and long terms as can be seen in the empirical analysis of this research. This discovery is associated with previous research by Uzoma, Odungweru, and Chukwuma-Ogbonna (2021). Their research established a clear correlation between Nigeria's net oil exportation and the nation's foreign currency reserve. Additionally, Nigeria's foreign currency reserve is favourably and non-substantially correlated with the nation's net non-oil's exports in both short and long terms. The result was in agreement with what Uzoma, Odungweru, and Chukwuma-Ogbonna had previously discovered in 2021. Their research established clear influence of Nigeria's net oil and net non-oil exports on the nation's foreign currency reserve. Conversely, there is an adverse correlation between Nigeria's foreign exchange reserve and the real exchange rate in the short term, but no such correlation in the long term. The outcome was in agreement with what Ajibola had previously found in 2015. There is a robust and favourable correlation between Nigeria's currency rate and the nation's foreign reserves, in congruent with research by Ajibola (2015). The foreign exchange reserve of Nigeria is favourably and substantially affected in the short term by the degree of trade openness. Empirical outcomes from Kruskovic and Tina (2014) are relevant to this discovery. Economic development is favourably and substantially impacted by trade openness, as found by Kruskovic and Tina (2014). Finally, institutional quality index favourably affects

Nigeria's foreign currency reserve in the short and long term, however this impact is not statistically substantial. There is a connection between this result and what Muftau and Alex found in 2021, stating that institutional quality index contributes to Nigeria's GDP growth.

## **CONCLUSION AND RECOMMENDATIONS**

### **Concluding Remarks**

This research has taken an empirical look at how transnational trade indicators and institutional quality affect Nigeria's foreign currency reserve buildup. The research found that trading across national boundaries and high-quality institutions are reasonably helpful in enhancing Nigeria's foreign currency reserves.

### **Policy Recommendations**

Sequel to the research outcomes, the succeeding recommendations proffered:

To begin, the government should establish policies that encourage industries other than oil to increase output s export by means of tax cuts, subsidies, and infrastructural assistance. Thus, Nigeria may intensify its competitiveness in non-oil industries via smart alliances with international markets.

Secondly, the CBN should implement more accommodating exchange rate system, letting the market determine the Naira's value within controlled limits. The need for foreign reserves to maintain currency stability will diminish as a result of periodic changes that are in accordance with macroeconomic realities.

Nigeria should safeguard its vital local industry while still advocating for trade liberalisation. Concurrently, the government should minimise trade obstacles, improve trade agreements, and slash tariffs on export-oriented industries to boost trade gains.

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