VOLATILITY OF FOREIGN EXCHANGE RATE AND INFRASTRUCTURE DEVELOPMENT: AN ARCH/GARCH ANALYSIS FROM NIGERIA (1986-2020)

Abstract

Living standard of citizen and economic growth depends entirely on infrastructural development and exchange ratestability in a nation, therefore, the foreignexchange rate volatility on infrastructural development in Nigeria, 1986-2020.was examined with contradictory empirical.CentralBank of Nigeria provides the dataset analysed byARCH/GARCH model along-sidewith vector model. Empiricalfindingsrevealed both negative and positive relationship with capital expenditures resulting from exchange rate and total exports on capital expenditures, as total imports have positiveimpact. There is negative impact between external debt service payment and capital expenditures. Co-integrating coefficient revealed a slow adjustment speed parameter of about 21 percent. The ARCH/GARCH estimates revealed that exchange rate is controlled by its own GARCH components rather than ARCH factors or shocks. Therefore, exchange rate volatility determined its own shocks by GARCH. The study recommends that policy inconsistency regarding exchange rate volatility should be discouragedand infrastructural development should be prioritised by the three tiers of government as it is germane to welfare and living standard of the citizen.

Keywords: Capital Expenditures, Exchange RateVolatility, Exports, Infrastructural Development

1.1. Introduction to the Study

Infrastructural development is a pivotal for economic growth that transform and empower the social wellbeing and economic activities of Nigerian communities forbetter, Nedozi et al [2014]. Essentially, infrastructure development is a catalyst and backbone to drives economic buoyance with benefits. Infrastructure is centralfor productions, consumptions and exports as it facilitates accessibility to government indivisibility such as roads,health, education which can reduce accidents and children mortality, Habeeb,[2022].

To achieve rapid economic growth there is needs for the provisions of adequate and functional physical infrastructure (transportation, technology, power, buildings and equipment). The infrastructure demands substantial capital expenditure from government. Fundamentally, infrastructure needs to exist before development. Absence of indispensable infrastructure and services may mere a nation economic growth, Nedozi,[2014] as decays or deficiency of it would lead to economic woe and hardship, sectors inefficiency, higher transportation costs due bad roads, kidnaping, food insecurity and epileptic energy supply leads to higher industrial production costs and exports products which would create challenges to economic growth,[Habeeb,[2022] these challenges are sequent to exchange rate volatility ruling in the economy, Olaseni &Alade,[2012]

Government investment decision in infrastructure would drivespotential foreign investors; leading to economic growth, employment and increases in national incomes,Olufemi et al[2013 cited in Habeeb,[2022].The pitiable condition witnessin Nigeria infrastructural development of late resulted why some companies collapsed or moved out of Nigeria, such as Michelins, Ovation, Empee,Asuwanniand others therefore a viable strategy for long run economic growth require infrastructural repositioning.

Nigeria economy faces exchange rate volatility with variation in macro-economic variables as she operates under floating exchange rate compare to advanced nations that operate stable exchange rate market than developing nations with uncertainty in her macroeconomic variables distort their economy,Ewubare&Ushie, [2022]. Exchange rate volatility has consequential effect on economic activities, Adewuyi&Akpokodje, [2013] and Ehikioya, [2019]

The huge amount budgeted yearlyfor infrastructural development by the three tiersof Nigeriangovernment were wholly eroded by exchange rate misalignment,depriving the citizen thephysicalpresence of infrastructural development, Temidayo,[2022].Government alone providespublic goodsdue to huge capital involvement,Babatunde[2018], however,Temidayo[2022]posited, private sectorassistance is neededin the provision. Theoretically, this study is supported by Agenor, theory and Wagner's Law of increase of State and activities.

Empirically, exchange rate volatility changes macro-economic fundamentals, Ojomolade[2019],it also impacted negativelyon domestic purchasing power and foreign receiptsAkinlo, [2016]; Nnamocha,[2017];Owolabi,[2012].

Exchange rate stability is crucial for economic growth,Olaleye,[2019] and , Ojomolade,[2020].Exchange rate volatility on economic development receivedquite ofliteratureattention recently with less emphasis on infrastructural development inNigeria. There are streams of empiricalwith divergent outcomes on government expenditures on Nigeria economic growth.The empirical showing negative evidences ofcapital expenditure on infrastructure areChandana&Adamu,[2021; Gukat&Ogboru,[2017];Saidu& Ibrahim,[2019]; Segun&Adelowokan,[2015], while thoseshowingpositive side are the worksof:Ahuja &Pandit,[2020]; Nyako&Asomani,et al[,2019];Awode&Akpa,[2018]; Jibir&Aluthge, [2019]; Olayungbo&Olayemi,[2018].

Conflicting outcomes result from differences in methods, scope and data studied.It has been observed that exchange rate volatility might have impacted on capital expenditureleading tothe abandonment of somereal capital projects.

The empirical studies by Saidu and Ibrahim,[2019;] and Gukat and Ogboru, [2017] show mix outcomes as huge government investment on infrastructure hasno physical reflection on the infrastructural development. This means that expenditure increases on infrastructure did not impact significantly on economic growth. Government spending does not have any correlation with infrastructural development.Temidayo et al [2022] reveal positive but insignificant impact of government expenditure on development of education, transportation and communication. It however has positive and significant effect on the growth of agriculture. All variables did not have long run significant on economic growth.

Government interventionsin savingthe naira value from the exchange rate volatility and oil export dependenceto non-oil export, notwithstanding, the naira value slidecontinuously, eroding theefforts government in providinginadequate infrastructure for development.

Exchange rate before Structural Adjustment Program (SAP)1986 was N0.5639 to $1, in 1986; $1/N0.7649 and two years later;1988, it moves to N2.0206 (167.87% increase) since then Naira has not recovered it value.

Majority of the infrastructural developed in the first and fourth National development plans have worn out for over usage by over 180 million populations, and replacement becomes difficult asnaira depreciation continues, Mobolaji&Wale,[2012]. On March 5, 1992,the exchange rate was ₦9.50k to a dollar and it declined further (almost by another 100%) to ₦17.2984kto a dollar at the close oftrading the same day[ojomolade,[2021]. As at 1993, a dollar was selling for ₦43.00 at the black market, and interest rate rose from 45% to 50%,with the deregulation of interest rates,impactingconsiderablyon loanable funds of manufacturing and other sectors.Ojomolade,[2021].

1.2 Research Problem

Increasing debt financing profile and absence of adequate and functional infrastructural development has become a huge problem in Nigeria arising from continuous naira depreciation: 1990s, 2000s and 2010s were ₦35/$, ₦129/$, and ₦235/$ respectively (World Development Indicators, 2020). This has resulted in the dollar estimate of constructing second Niger Bridge, Lagos-Ibadan expressway, East-West road, and Abuja-Kaduna-Kano in naira value to become unimaginablehigh as a result of the volatility in exchange rate.

Nigerian economy, like other economies is suffering from the prolonged infrastructural deficitsand economic growth and development.The scarcity in foreign exchange receipts and naira depreciation bedevilled the capital resources for developmental purposes. Several empirical studiesUbah, [2015]; Ehikioya, [2019]; Idris & Musa, [2019]; Ugwulali et al, [2021]; Akinwolere, [2021];Gukat&Ogboru; [2017]; Ahuja Pandit, [2020]; Nyarko-Asomani et al, [2019];Chandana,[2022]; Temidayo et al. 2022; Wim& David ,[2015]have been carried out with mixed outcomes.

Therefore,on this premisewe would examineforeign exchange rate volatility and infrastructural developmentas empirical investigationmight have not on it been carried out in Nigeria.

1.3 Purposeof the Study

Empirically,the broad objective of the study is to examines volatility of foreignexchange rate volatility and infrastructural development in Nigeria examined. However, specific points are to:

i. Investigate the effect of foreign exchange rate volatility on infrastructural development in Nigeria.

ii. investigate the relationship between foreign exchange rate volatility and infrastructural development in Nigeria.

1.4. Scopeand Limitation of Study: The study covers 35 years ranging between1986 to 2020. The secondary dataset were time series data collected from Central Bank of Nigeria Statistical Bulletin, 2020 edition. The dataset is government capital expenditure as proxy for infrastructural development, nominal exchange rate, external debt service payments, imports and exports. The study is limited to Nigeria only.The model assumed linearity withAgenor model but modify to accommodate the study variables

2. Literature Review

2.1 Theoretical Review: The theories underpinning the work are purchasing power parity and infrastructural development theory

2.1.1 Theory of Purchasing power parity (PPP) John Wheatleyoriginated the theory of Purchasing Power Parity and it popularity started with Gustar Cassel, a Swedish Economist in 1918 who is credited for articulating the Purchasing Power Parity (PPP) as empirically testable. The theory determined countries' currencies inequalityresulting from inflation rate differential between two countries economy. Exchange rate differentials are variations arising in purchasing powers of the relative currency relative to the Base Exchange rates. Arguably,Chile provided most perfect example of purchasing power parity rule by pursuingforceful devaluations throughin 1982 – 1985

2.1.2. Theory of Infrastructural Development: Agenor developed the Infrastructure-Led Development Theory (2010). The idea advocates a long-term economic development based on public infrastructure, usually referred to as "primary growth engine". According to the theory, government investments in agriculture and public infrastructure will boost both commodity productivity and economic growth.

GDP = f (AINP, PINF) ..... (1)

GDP stands for Gross Domestic Product, AINP for Agricultural Input, and PINF for Public Infrastructure, respectively. According to the hypothesis, a substantial shift towards infrastructure spending will only provide acceptable outcomes if the degree of efficiency of public investment is sufficiently high.The theory asserted that low levels of infrastructure debars producers from adopting advanced technology rather than relying on the inefficient one resulting in pitiable and low productivity,in the absence of energy no choice of reversal to new and advanced technology, machines or equipment either it would be profitable or not.

2.1.3 Wagner's law of increase of state activities: Infrastructure inadequacy promotes inefficient technologies among producers, resulting in poor and low productivitiesas Wagner studies government expenditure and economic progression. Theoretically, country's income increases likewise as the government spending. The government extension activities and programs lead to an increase in government expenses.This theory presumes economic development if the expenditure grow equates with economic growth, this is fall short in Nigeria due tovolatility of exchange rate not considered, deterred government from providing adequate infrastructure to growth the economy due to monetary misconception.

2.2. Conceptual Review

2.2.1 Nominal exchange rate: The rate at which one country currency is exchanged for another. In monetary hypothesis, exchange rate is being determined fundamentally by economic variable, money supply and level of output in a country. The relative price will be the demand for and supply of goods and services, Akinwolere, [2021]

2.2.2 Infrastructure. It is observed in United Nation,[2015] that investment in infrastructure (transport, roads and telecommunications) is crucial to transform the nation and her citizen for better but Habeeb,[2022]says despite huge investment, infrastructure is falling. [Babalola,

[015]discloses that government expenditure has no potential effect on economic development in Nigeria**.**

2.2.3 Volatility; it measures the rate and level of price changes around a trend. It details the movements of actual observed price fromits normal or expected value. Exchange volatility may be historical or stochastic in nature which is measure by GARCH generalised autoregressive conditional heteroscedasticity.

2.2.4Instabilityof Exchange Rate or Exchange Rate Movements

The dataset of Central Bank of Nigeria [2020] revealed unplanned exchange rate movements in naira against dollar in pitiable manner except in the period of1981 and 1985 whenNominal Exchange Rate in Nigeria hovers from ₦0.64/$1 to ₦0.96/ $1, showing superiority of naira againstdollar.Nigeriacurrency started depreciating against dollar from 1988.It experienced an appreciation in value from about ₦132/$ in 2004 to about ₦128/$ in 2008. However, in 1990 it was $1/N8.0378 and slide into N21.8861 to a dollar in 1995 and further depreciated to N102.105 in year 2000. This moved from N132.147 in 2005 to N150.298; N193.279; and N 258.81 in 2010,2015 and 2020 respectively. As at December2021 and 2022,the exchange rate wasN314.52and N423.7166 correspondingly. The movements in exchange rate depreciation volatility is significant, which is affecting the naira purchasing power relative goods and services. Exchange rate volatility refers movements in currency value either upward or downward (depreciating or appreciating)over a period of time. It measures how far the actual observed price differs from the predicted value,Pindyck, [2002];.Kashif, Slade & Blaze [2010] .and measured using the standard deviation of the asset return. Shiller and Radikoko, [2014].

Table 1. Exchange rate movements and volatility in percentage 1981-2022

	$/N	Volat..%

1981	0.6	9,091
1985	0.8938	9.7933
1990	8.0378	159.86
1995	21.8861	34.46
2000	102.105	73.31
2005	132.147	5.88
2010	150.298	2.75
2015	193.279	5.72
2020	258.81	6.78
2021	314.52	21.53
2022	423.7166	34.72

Source: Authors' Computation, 2022

2.2.5Foreign exchange rate policy

Exchange rate policy is the mechanismthat the Central bank use to manage exchange rate in a country. Nigeria has used various exchange rate policiesbefore and after the adoption of SAP,Orji, Ogbuabor, Okeke& Anthony-Orji, [2018]. Some of the policiesare:Flexible, Fixed,Crawling, Dirty float, Dutch Auction and others. Olaleye[2019,2020]

2.2.6. Infrastructural Development

Infrastructure development contributes to a country's economic progression, and lack of it impedesadvancementOke, [2013], and on this superstructure,other institutions are made Kumar, Kumar &Vivekadhish, [2016] consequently,KodongoandOjah,[2018]concluded that African countries including Nigeria need adequate and new infrastructure for improvement. Batuo[015]test significant impact of infrastructure on economic development in African countries using panel data model. Accordingly, Pradhan et al[2015], information technology and economic advancementareintertwined. Infrastructure, according to Mohmand, Wang, and Saeed [2017] , improves trading and underdevelopedregionsto attain full potential at future period.

2.2.7Volatility in Exchange Rate and Infrastructural Development in Nigeria

Infrastructure are funded directly from government budgeted expenditure. Lack of finances and exchange rate volatility aptly lead to unimaginable infrastructure development deficits.

Budget expenditure estimates for maintaining existing infrastructures in Nigeria through 1977-1986, 1997-2006 and 2007-2014, were as follows: transportation increased to 79.6% from a negative point of 1.84 before sliding back to 7.03 %. Education, health, and construction infrastructure increased from 8.78 %, 11.1 %, and 18.8 % to 33.1 %, 44.1 %, and 57.1 % respectively whilebuildinginfrastructure stood at 13.3%, 13.3 %and 4.96 %, between 2007 and 2014 respectively. From 2015 to 2020, transport, communication and construction increased to 10.55% and 7.84% correspondingly, while education and health fell to 9.46% and 11.02% respectively between 2015 to 2020.The physical present of infrastructure did not reflect the huge amount budgeted yearly due to exchange rate volatility coupled with the increasing cost of infrastructures over the years.

Table 2: Estimated growth of Nigeria's recurrent and capital budgets for infrastructure (%)

Year	**1987-1996**	**1997-2006**	**2007-2014**	**2015-2022**
Transport & Communication	49.2	79.6	7.03	10.55
Education	48.4	33.1	13.3	9.46
Health	38.9	44.1	13.3	11.02
Construction	27.0	57.4	4.96	7.84

Source: Author's Computation; CBN Statistical Bulletin and Financial and Economic Reports data (2022).

Above table 2 reveals insignificant contributions of the various sectors toNigeria growth.

The sectors contributed about 0.005 %, 0.001 %, 0.001 %, 0.0003 %, 0.002, 0.001 and 0.001 % respectively, between 1981 and 1990. Between 1991 to 2000, this increased to about 0.1 %, 0.02

%, 0.02 %, 0.03 %, 0.02 %, 0.01 %, and 0.01 % respectively. Also, between 2001 and 2010, these infrastructures' contributions to growth rose insignificantly to about 0.3 %, %, 0.2 %, 0.2 %, 0.01 %, 0.1 %, 0.1 %, and 0.2 respectively. Finally, between 2011 to 2020, these infrastructures' contributions to growth rose insignificantly to about 0.6 %, 0.4 %, 0.4 %, 0.1 %, 0.2 %, 0.04 %, and 0.2% respectively. Insignificant growth in infrastructure contribution to economic growth observed owing to exchange rate volatility.

Table 3: Infrastructural Contributions to NigeriaEconomic Growth, 1981-2020 (%)

Year	**Infrastructural Components (% of GDP)**						
	Social &Communication Services			***Economic Services***			
	Education	***Health***	***Others***	***Agriculture***	***Road Construct***	***Tran&comm***	***Others***
1981-1990	0.0046	0.0012	0.0009	0.0003	0.0016	0.0007	0.0008
1991-2000	0.0734	0.02	0.02	0.03	0.02	0.01	0.0104
2001-2010	0.2686	0.15	0.15	0.05	0.10	0.09	0.231
2011-2020	0.616	0.38	0.43	0.07	0.20	0.04	0.1799

Source: Author's Computation.CBN and Financial and Economic Reports (2020).

2.2.8 **Theoretical Framework**

This study adopts the theory of infrastructural development, Agenor model of ,2010 which emphases public infrastructure as economic engine to attain higher economic growth. Therefore, government must endeavour to invest in public infrastructural development to promote and improve the economic sustainability and social welfares. Insufficient of it debars producers from adopting advanced technology rather relying on old method that thus not enhance their production competitively.

2**.3. Empirical Review**

The following empirical were reviewed who have examined studies on exchange rate volatility and economic growth

Secondary time series of panel were collected from 42 Sub-Sahara Africa nations within 1980 to 2017 examine econometric relationship between infrastructure expansion and exchange rate by Akplehey[2020)]It observed that short- and long-term run relationship existed between the variables when Panel Vector Auto-regression was applied

Likewise, in order to investigate how exchange rate volatility impact on economic progressin Nigeria by Akinwolere[2021]for 34 years (1986 to 2019) he used Vector Error Correction Modelthe dataset collected and he find that exchange rate volatility impacted economic growth significantly.

Changes in the exchange rate and growth was examinedby Ribeiro, McCombie, &Lima (2017), exchange Rate volatility influenced and harmed exports and imports at short and long run.

To examine determinants of Foreign Exchange Rate Volatility and Non-Oil Export in Nigeria for 36 years Ojomolade, Adejuwon, and Akinjide[2021]useARCH and GARCH models. It was revealed that non-oil export has a positive link with the variablesconsidered.

In a related study,Ehikioya [2019] utilise Generalised Autoregressive Conditional Heteroscedasticity (GARCH) and Generalized Method of Moments technique to carry investigation onexchange instabilityand economic growthin Nigeria. It was observed;exchange instability impacted negatively on the economy.

Public expenditure and infrastructural development in Nigeria was studied in 2020 by Temidayo et al, using (ARDL) autoregressive distributed lag for analysis between democratic and military regimes. The outcomesreveal transportationandagriculture impacted positively on economic growth in short run

Amassoma, Nwosa, and Ajisafe, [2019] examined linkages between components of government spending and economic growth in Nigeria, 1970-2010. Expenditure on agriculture had influence

on economy while on education, health and transport had insignificant influence from the resultsreviewed.

Likewise, effect of Government expenditure for 36 years on Nigeria critical sectors were examined by Aremu et al [2020] Observed resultsays government expenditure on defence impact negatively and transportation did notimpact on the economy.

The system estimator was used for analysing data gathered from 45 emerging nations for 31 years (1985 to 2015) in order to examine impact of currency rate fluctuation and economic growth, Guellil et al [2018].He found exchange rate volatility having negativeinfluence on the economy.

Eke et al [2017] look how infrastructure stimulates industrial sector growth in Nigeria. The appropriate regression analysis was used to examine the data survey for 1990-2015. According to their findings positive but not substantial influence electric infrastructure on industrial sector growth with negative relationship of gross capital formation and public spending on industrial sector, in similar vein, Omotoso [2019] revealed positive influence of power and real time communication infrastructure on economic in Nigeria.Infrastructural investment

Public expenditure on education and economic growth for 1971-2012 was statistically significant and positive as discovered in Chude&Chude ([013]

Gap in the Literature: All empirical studied concentrate most on exchange rate volatility and economic growth or infrastructure development and economic growth, noneof the empirical work on volatility of exchange rate and infrastructural development in Nigeria, this is not relevant to advanced nations since they operate under stable exchange rate market. On this premise, this study examines the effect of volatility of exchange rate on infrastructural development in Nigeria for 35 years.

3.**Methodology**

3.1 Introduction: The research design used ex-post factor method, the fact is thatdataset for the study cannot be influenced, they have already existed and generally available for ascertainment by anybody.

3.2 **Source of Dataset and Description:**The data for the study werecollected fromStatistical Bulletin 2020 edition of Central Bank for the period ranging from 1986 to 2020which is government official document. The data is for the generality of users. The cause and effect existing between the independent and dependent variables can be scrutinised by the research design.

The dataset analysed in the study is time series collected from secondary source over the 35 years

3.3 Explanation of Variables:

i. Government capital expenditure (uncontrolled variable): the total amounts expended on long term fixed assets by government which can be constrained by income generated within a year and exogenous factors such as inflation and exchange rate fluctuation.

ii. Nominal Exchange Rate: is the exchange rate that has not be subjected to inflation. Exchange rate is the price at which one currency of a country exchange for another. Negative direction when it fluctuates.

ii. Total Exports (control variable). These are goods and services {tradeable goods and services) exported. The exports of a nation have two effects either positive or negative on the economy. The negative impacted on the ability of the government to effect adequate infrastructure.

iv. Total Imports (control variable). The goods and services imported from other nations which impacted on the economy if it is greater than exports. Negative – effects on economy

v. External Debt Service Payment (control variable). This is the amount used to service debt obligations received from other countries. The higher the service payments the higher the negative effect on the economy and infrastructural development.

3.4 Model Description and Justification:

A linear model is built in order to examine the impact of volatility of exchange rate on infrastructural development. Two variables were specified in the study, independent and dependent variables.Dependent variable is infrastructural development proxy with government capital expenditure and independent variables as nominal exchange rate, total exports, imports and external debt service payment. The capital expenditure refers to Nigeria capital stocks such as roads, transportation, electricity detail as infrastructural development.

The model adopted is that of Agenor model cited in [Ekiran and Olasehinde, 2019] as in equation 1 above, with specify modification as

CEXP = f (EXCR, EXPT, IMPT, EDSP) . ----------Equation .2

The model is rewriting in equation 3 in a linear estimable form:

$CEXP_t = a_0 + \beta_1 EXCR + \beta_2 EXPT_t + \beta_3 IMPT_t + \beta_4 EDSP_t + er$ ----------equation 3

Where,

CEXP= Total Government Capital Expenditures (proxy for infrastructural development in Nigeria)

EXCR = Nominal Exchange Rate,

EXPT = Total Exports (control variable),

IMPT = Total Imports (control variable),

EDSP = External Debt Service Payment (control variable),

A is constant

$\beta 1 < 0$; $\beta 2 > 0$; $\beta 3 < 0$; and $\beta 4 < 0$

where;

B_1, B_2, B_3, B_4 are the coefficient of the parameter estimate

er = Stochastic term

The unpredictabilityof foreign exchange rate is measured by ARCH/GARCH model as infrastructural development proxy by total government capital expenditures (CEXP) is explicitly expressed in this study based on the model ofAgenor[2010] and Doki et al. [2021].

3.5 A *Priori* Expectation:

The foreign exchange generated would have positive effect on Nigeria economic growth. Exchange rate would have negative impact on infrastructural developmentdue to its volatility strand.It would be expected that imports would impact negatively oninfrastructural development while exports would positive relationship with infrastructural development. External debt service payments would have negative relationship with infrastructural development in Nigeria.

4. Data Analysis and Discussion ofResults

Table .4. Descriptive Statistics

	GCEXP	*EXCR*	*EXPT*	*MPT*	*EDSP*
Mean	573.5119	118.6706	6446164.	5075944.	1.69E+09
Median	438.6965	126.4800	3087886.	1987045.	1.43E+09
Maximum	2288.996	381.0000	23516824	24153674	8.80E+09
Minimum	6.372500	3.180000	8920.600	5983.600	2.52E+08
Std. Dev.	554.7450	104.0424	6894639.	6386737.	1.73E+09
Skewness	1.157144	0.806998	0.861133	1.441577	2.700277
Kurtosis	4.062618	2.927046	2.684795	4.425982	10.99296
Jarque-Bera	9.457422	3.806697	4.470600	15.08792	135.7028
Probability	0.008838	0.149069	0.106960	0.000529	0.000000

Source: compiled by the author using E-view 10

The descriptive statistics revealed that capital expenditure (GCEXP) has meanvalue of₦534billion and that of exchange rate (EXCR) ₦119/$. The average value of total exports (EXPT) is N645billion, while that of total imports and external debt service are N508billion and ₦1.69billion respectively. Kurtosis statistics provide values that is more that 5% significance level. Three of the variables have probability that are significant while two are not significant.The variables

distributions are positively skewed. Jarque-Bera statistic shows that none of the variables indicated departure from the normality.

4.1 Unit Root Tests

The results from Unit Roots test,Augmented Dickey-Fuller (ADF) and Phillips-Perron (P-P) specifiedthat all variablesintegrated at level and zero respectively.As a result of the stationarity of the variables, the Johansen andVector Correctionmethods wereused.

Table 5. Johansen Test

No. of Corrected errors(s)	**Test Statistic**	**Critical Value 0.05**	**Prob.****
Panel A: Trace Statistic			
None *	116.8231	69.81889	0.0000
At most 1 *	70.14337	47.85613	0.0001
At most 2 *	37.75190	29.79707	0.0049
At most 3*	16.50559	15.49471	0.0351
At most 4*	5.347141	3.841466	0.0207
Panel B: Max-Eigen Statistic			
None *	46.67975	33.87687	0.0009
At most 1 *	32.39148	27.58434	0.0111
At most 2*	21.24631	21.13162	0.0482
At most 3	11.15845	14.26460	0.1465
At most 4*	5.347141	3.841466	0.0207

Source: compiled by the author using E-view 10

The Johansen Co-integration results revealed long run association among variables.

Table 6. Vector Error Correction Model

The adjustment coefficient in the short run is represented by Error Correction Term, capturing short run forces to the long run. ECT is -0.207111 signifies deviation from the long run equilibrium which is currently corrected at an adjustment speed of about 21%. The ECT is negative and statistically significant since t-statistic value is higher than the rule 2. The coefficient

of determination (R^2) indicates 53% of GCEXPand adjusted R-Square is 34% growth in the GCEXP attributed to the explanatory variables at 5% degrees of freedom in the model.

The current year value of GCEXP is negatively affected by the lagged of prior years' value of GCEXP. Table 6 A percentage increase in the one-year lagged value of GCEXP, D(LNGCEXP (-1)), leads to about 0.1% decrease in the current level of GCEXP in Nigeria, which is insignificant as value of the t-statistic of DLNGCEXP is less than 2. Whereas a percentage increase in the two-year lagged value of D(LNGCEXP (-2)) decreases current level of GCEXP by about 0.08 percent, which was also insignificant at value less than two.

The coefficient of D(LNEXCR(-1)), one period lag EXCR, is -0.403069 and it depicts a negative effect on the current rate of GCEXP. Hence, a one percent increase in DLNEXCR(-1) leads to about 0.4% decrease in capital expenditures. This finding is not in conformity with economic theory which says,home currency depreciation is consequential on foreign exchange rate increases, hence, less increase in international competitiveness and export earnings. The 2-period lag of LNEXCR impacted positively and insignificantly on capital expenditures in Nigeria. This is in conformity as toDoki et al 2021.

The coefficient of total exports is 0.261965,signifying 1% increase in export, increase government capital expenditure by about 0.3%. The coefficient of one-year lagged of import is 0.170637; a 1% increase in import would increase capital expenditures on infrastructures by about 0.2% The 2-period lag coefficient of import is 0.121861. a 1% increase in import would increase capital expenditure by about 0.12%. the impact is insignificant similar to the on-period value coefficient.

The coefficient of external debt service payment (LNEDSP) is -0.023449. therefore 1% increase in external debt service payment lead to 0.02 % decrease in the current capital expenditures

'Table6. Heteroskedasticity Test ARCH

statistic	.051898	Prob. F(1,30)	.0321

Obs*R-squared	.612039	Prob. Chi-Square(1)	.0317

Source: compiled by the author using E-view 10

The result from table above, the prob. Chi-Square (1) indicates that β_1 is statistically significant at 5% level withProbability value of 0.032, hence, no ARCH effects is rejected.

Table 7ARCH/GARCH Model

Variable	*Coefficient*	*Std. Error*	*z-statistic*	*Prob.*
C	5.355877	8.123721	0.659289	0.5097
CEXP	0.072548	0.018795	3.860007	0.0001
EDSP	1.27E-09	3.80E-09	0.334276	0.7382
EXPT	7.14E-07	5.02E-06	0.142236	0.8869
IMPT	1.25E-05	5.76E-06	2.176284	0.0295
Variance Equation				
C	-1.686082	22.14117	-0.076151	0.9393
RESID(-1)^2	0.567252	0.373439	1.518992	0.1288
GARCH(-1)	0.745948	0.184627	4.040299	0.0001
R-squared	0.738224	*Adjusted R-squared*	0.703321	

Source: compiled by the author using E-view 10

Table above shows that GARCH is statistically significant, implying that volatility of preceding years influencescurrent year exchange rate. Findings show that the Nigerian exchange is controlled byGARCH components rather than ARCH factors or shocks. As a result, we can deduce that Nigeria's currency rate volatility is mostly determined by its own shocks, such as GARCH.

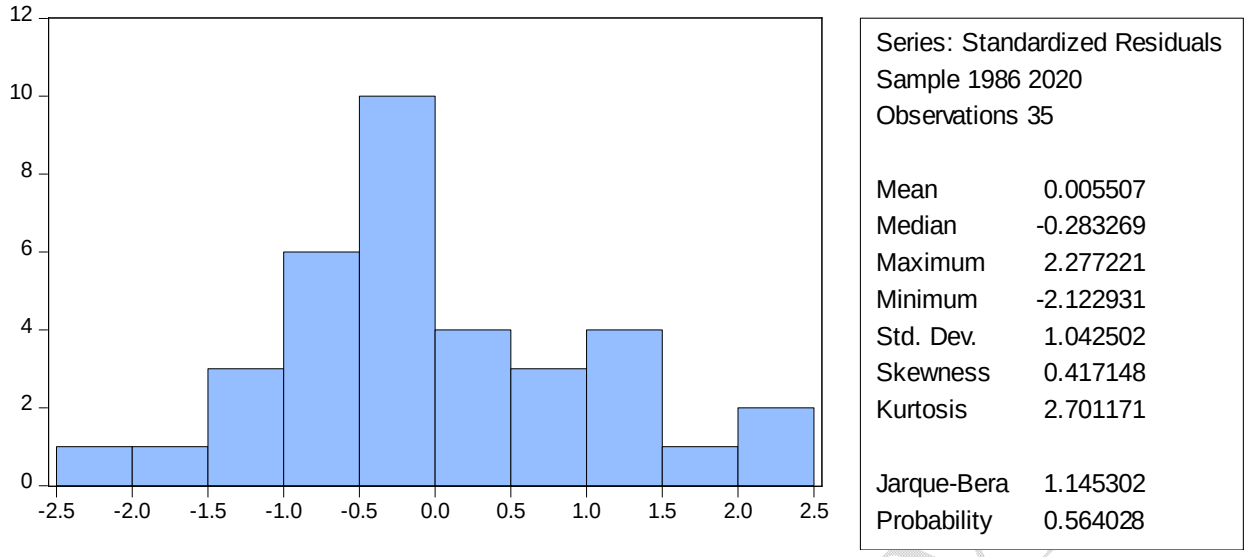

Figure 1: Normality test

Source: Author's computation (2022)

Fig 1shows probability of 0.54028, greater than 5% significant leveland Jarque-Bera is 1,145, therefore, residuals are normally distributed.

4.3. Discussion of Findings

The findings from the analysid ECT value displays negative and statistically significant value, that is, with economic theory (literature review). Hence, it means that preceding deviation is currently corrected through adjusted speed of about 21 % from the long run equilibrium

The coefficient of one period lag EXCR is negative and insignificant. Finding not in conformity, with economic theory (literature review or a priori expectation) as naira depreciation against dollar occasioned by exchange rate instability, hence, decrease in export earnings and international competitiveness. The implication of finding local currency depreciation does not significantly boost government revenues vis-à-vis government capital expenditures (infrastructural development) in Nigeria.

The coefficient of total exports is positive and statistically significant, finding is in conformity with a priori expectation (literature review or a priori expectation) that an increase in export would increase revenues and government capital expenditures. The implication of this finding is that export promotion would significantly stimulate government revenues vis-à-vis government capital expenditures (infrastructural development) in Nigeria.

The coefficient of the one-year lagged import is negative and insignificant with literature review, an increase in importation would reduce indirectly government capital expenditure by the reduction in government revenues. Given that imports constitute a capital outflow. To this end, the implication of this is that imports do not significantly impact government.

From the result, the coefficient of external debt service payment indicates adverse butinconsequential effect on findingsfrom literature reviewed (economic theory), is that an increase in debt payments would reduce government receipts and hence government capital expenditures. The implication of this is that debt service payment is regressive in nature and hence would not significantly stimulate government capital expenditures (infrastructural development) in Nigeria.

Finally, the ARCH or GARCH of preceding year's information on exchange has no bearing on current volatility, implying that volatility of the prioryear’s influences current year exchange rate. Findings are in line with literature review in that that the Nigerian exchange rate is characterized by volatility which could result from both internal and external shocks affecting the economy.

5. CONCLUSION AND RECOMMENDATIONS

The theory of purchasing power parity argued inequality between countries' currencies arose fromexchange rate differentials due tovariationsin currenciesas relate to the Base Exchange Rates.Value of the exchange rate at the foreign market is affected by transactions on a country's current account. ojomolade,[2021] Exchange rate differential between naira and dollar currency leads tonegative infrastructure development; Akinwolere[2021]The government should consistently improve on the management of exchange rate and exports goods which can reduce the vulnerability of naira to other currencies thereby enhance the capacity of the government to provide infrastructure.

Infrastructure theory advocates government investments inpublic infrastructure as it enhances economic growth and empower producers to adopt advanced technology.Long-term economic development is based on public infrastructure, called"primary growth engine" needs to be enhanced. The implication is that if government did not invest adequately in infrastructure the economic productivity and growth would be impaired and living standard of the citizen affected,[Agenor, 2010]. Infrastructural development is germane in economic development,showing as economic and living standard indicators, Temidayo, [2022];Chandana [2021]Chandana [2021] claimed that capital expenditure impacted positively and significantly on economy,whileGukat and Ogboru[2017,Aremu et al [2020] says capital expenditure has negative impact on economy. Exports have positive and substantial impact while exchange rate, imports and debt service payments have negative impact on capital expenditure with adverse subsequent on infrastructural development,Akinwolere [2021].Government should pursues aggressively exchange rate stability policy and non –oil exportsto earn more foreign receipts and reduce import consumption to safe the face of naira.

Ethical Approval

None

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Table 8. Vector Error Correction Estimates Appendix

ointegratingEq:	ointEq1		
NGCEXP(-1)	.000000		
NEXCR(-1)	.334558).43571) 0.76784]		
NIMPT(-1)	.892639).29008) 3.07720]		
	6.99404		
ror Correction:	(LNCEXP)	(LNEXCR)	(LNIMPT)
pintEq1	.207111).07344) 2.82024]	.152426).07870) 1.93690]	.275096).06130) 4.48741]
(LNGCEXP(-1))	.066515).20292) 0.32779]	.264465).21745) 1.21622]	.291751).16939) 1.72235]
(LNGCEXP(-2))	.083832).15927)).52634]	.134678).17068) 0.78908]	.363064).13296) 2.73068]
(LNEXCR(-1))	.403069).18188) 2.21612]	.131188).19490) 0.67310]	.175052).15183) 1.15295]

(LNEXCR(-2))	.232719	.278680	.030989
	0.21092)	0.22602)	0.17607)
	1.10335]	1.23297]	0.17600]
(LNIMPT(-1))	.170637	.117064	.488475
	0.18760)	0.20103)	0.15660)
	0.90959]	0.58232]	3.11920]
(LNIMPT(-2))	.121861	.001512	.214793
	0.17906)	0.19189)	0.14948)
	0.68054]	0.00788]	1.43695]
	.283364	.442560	.459384
	1.99294)	2.13564)	1.66366)
	1.64750]	2.08020]	2.07938]
NEDSP	.023449	.023410	.062205
	0.07369)	0.07896)	0.06151)
	0.31822]	0.29646]	1.01125]
NEXPT	.261965	.312816	.339706
	0.11554)	0.12381)	0.09645)
	2.26735]	2.52657]	3.52215]

-squared	.531295	.287567	.645965
dj. R-squared	.339552	.003883	.501132
ım sq. resids	.645401	.889458	.146604
E. equation	.273479	.293061	.228295
statistic	.770870	.986677	.460081
og likelihood	.077998	.134900	.856864
kaike AIC	.495125	.633431	.133946
:hwarz SC	.953168	.091474	.591988
ean dependent	.164561	.133303	.216530
D. dependent	.336516	.292493	.323223

Determinantresid covariance (dof adj.)	.000293
Determinantresid covariance	.52E-05
Log likelihood	1.93874
Akaike information criterion	.316329
:hwarz criterion	.827869
Number of coefficients	3