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Exchange rate variation and economic growth in Nigeria

Obayori, Joseph Bidemi[1], George-Anokwuru Chidinma Chioma[2]
[1] Department of Economics, Faculty of Social Sciences, Nnamdi Azikiwe University, Awka, Nigeria
[2] Department of Economics, Faculty of Social Sciences University of Port Harcourt, Nigeria

Abstract
The paper examined exchange rate variation and economic growth in Nigeria from 1981-2018. The specific objectives of the paper were to; examine the impact of exchange rate variation on economic growth in Nigeria; and determine the impact of exchange rate on economic growth in Nigeria. To achieve the objectives, secondary data sourced from CBN statistical bulletin was used and the technique of ARDL was applied. The stationarity test via ADF showed that all the variables were stationary prior further estimations to prevent false regressions results. The error correction term in the model has the right negative sign and statistically significant at 5% conventional level with the speed of adjustment at 64.88%. The R^2 value of 66%, showed that the model is a good fit. The ARDL short run results showed that exchange rate variation (EXV) had a negative and significant impact on economic growth. Similarly, exchange rate (ECR) had a negative and significant impact on economic growth. In the short run, the coefficient of lag value of RGDP was positively related with the economic growth but statistically not significant at 5% level. The paper concluded that variation in exchange rate influences economic growth in Nigeria. Thus, if the menace of high rate of exchange is not checked, it will weakened Nigeria naira in relation to other international currencies such as Euros, USA dollar and Pound starlings. Based on these findings, the study recommended amongst others that Nigeria government should diversify her product and export opportunities so as to become price giver and not a price taker in the international market. This will strengthen the value of the naira in relation to other international currencies.

Keywords: ARDL, exchange, rate, variation, economic, growth

1. Introduction

Every country of the world buys and sells what it produces to other countries in order to earn foreign exchange. This process is termed foreign trade. During this trade, payment are made for goods and services bought by exchanging the local currencies with the internationally accepted foreign currencies (Gbanador, 2005; Gbosi, 2015) [8, 9]. Thus, exchange rate is the rate at which a country currency is exchange with the other. It is also the index of competitiveness of currency of any country which will invariably affect economic growth (Arize, 2008) [3]. But, the rate of exchange between countries, varies over time. This rate of change is known as exchange rate variation. The instability of exchange rates makes the exports or imports of goods attaches a high level of insecurity to trade. Quite number of factors such as; variation in relative price levels, exports and political reflections among others influenced variation in exchange rate and this will constantly affect economic growth (Ewubare & Amadi, 2017) [6]. Conversely, economic growth is the rise in the actual output of goods and services in a given period. It is often measured as the rate of change in real Gross Domestic Product (Akpakpan, 2000) [1]. Hence, a strong value of the naira in relation to the international currencies will affect the growth of an economy positively. But the reverse will be the case for weak value of the naira.

Meanwhile, Nigeria has seen numerous attempts by consecutive regimes since independence to stimulate the speed of improvement in order to bring about an improved quality of life for the people by instituting numerous exchange rates administration. For instance, earlier than 1992, a dual exchange rate system was implemented with the view of improving the efficiency of the foreign exchange market. But in-between 1992 and 1993, the deregulated exchange rate system came into being and the fixed exchange rate system was reestablished in 1994. The exchange rate administration system after 1986 could be considered as the managed float in which the Central Bank of Nigeria embarked on a delicate balancing act of controlling volume and price (Ewubare & Amadi, 2017; George-Anokwuru, Obayori & Oriji, 2018) [6, 7].

In all these various regimes of exchange-rate, Nigeria never recorded a desired success due to ineffective management approach for the realization of a stable exchange rate. For instance, the naira has kept on depreciating from N 0.54 in 1980 to N 2.02 in 1986, N7.901 in 1990, all against the one US dollar. The policy of deregulation pegged the naira at N21.886 in 1994, N 86.322 in 1999 and N135.50 in 2004. Thereafter, the exchange rate appreciated to N132.15 in 2005 and N 150.00 in 2009. In 2015 the exchange rate of a US dollar to naira is N165. But after the 2015 general election and the swearing in of President Muhammadu Buhari, the rate of exchange of Nigeria naira to United States Dollar has been alarming. For instance, in October 2016, the exchange rate of one US dollar to naira in the parallel market is around N 500.00 (George-Anokwuru, Obayori & Oriji, 2018) [7]. Similarly, Gbosi (2019) [10] averred that the naira has depreciated against the U.S dollar by more than 113% by the end of 2013 and at the end of 2018 about N363 was exchanged for one U.S dollar. Thus, the weak value of naira to US dollar created distortion in the growth of the economy. Consequently, exchange

rate variation is a manifestation of economic growth which could also be determine by some critical variables which include; real exchange rate; interest rate and oil export amongst others. In the meantime, the objectives of the study were; to examine the impact of exchange rate variation on economic growth in Nigeria; and determine the impact of the real exchange rate on economic growth in Nigeria.

2. Empirical and Theoretical Findings

There abounds both empirical and theoretical findings on the nexus between exchange rate variation and economic growth in both developed and developing countries. Some of the recent empirical findings include; Akinmulegun and Falana (2018) who used Granger Causality test to examine exchange rate fluctuation and industrial output growth in Nigeria from1986 to 2015. The outcomes of the analysis shown a unidirectional causality from exchange rate to industrial output. Ewubare and Amadi (2017) [6] examined exchange rate volatility and the industrial sector growth in Nigeria from 1980-2014. The econometrics methods of co-integration/ECM and granger causality methods were used. The ADF unit root test showed that all the variables used for the analysis were stationary. Also, the Johansen co-integration test showed that the variables have long run relationship. The Granger Causality Test showed that there is a unidirectional causality between exchange rate volatility, export and industrial sector growth. But an independent causality between import and industrial sector growth. Amassoma and Odeniyi (2016) [2] examined the impact of exchange rate fluctuation on the economic growth in Nigeria from 1970 – 2013. The study employed econometric technique of Error Correction Model (ECM). The result indicated a positive but insignificant impact of exchange rate fluctuation on Nigerian economic growth in both the long run and short run. Okorontah and Odoemena (2016) [11] examined the effects of exchange rate fluctuation on economic growth in Nigeria for the period 1986-2012. The study employed ECM. The result advocated that there is an indirect and significant relationship between exchange rate and economic growth in Nigeria. Also, Azu and Alireza (2015) [4] used VAR method to examine exchange rate fluctuation and economic development in Nigeria from 2004 to 2014. They found out that real exchange rate fluctuation was significantly controlled by its positive relation with real import as well as its negative relation to real GDP and FDI.

Theoretically, George-Anokwuru, Obayori and Oriji (2018) [7] affirms that the Purchasing Power Parity postulated that nominal exchange rate should reflect the purchasing power of one currency against another. Thus, the purchasing power parity theory of exchange rate argued that stable exchange rate is equivalent to the relevant ability to buy of the general currencies involved. Thus, variation in exchange rate threaten the purchasing power of a country which will in turn impact on investment and trade.

According to Oyejide and Ogun, (1995) [12], the Purchasing Power Parity theory expresses two structures of equilibrium. The first is the short run equilibrium exchange rate which defined the rate that would exist under a purely freely floating exchange rate. While the other is the long-run equilibrium that would yield balance of payment equilibrium over a time period in cyclical variations in the balance of payments. Despite the criticism that some of the assumptions of PPP theory are quite unrealistic, for instance the level of efficiency are different in countries as such there are deferent cost functions. But the paper aligned with the PPP theory because it advocated that variation in exchange rate threaten the purchasing power and trade of a country.

3. Methodology

The study used annual time series data obtained from the CBN Statistical Bulletin (2018) [5] and applied the econometric method of ARDL and using data sample that cover the period 1980-2018. Exchange rate variation was measured by differential in real exchange rate between two successive periods, while exchange rate was measured by real exchange rate. Economic growth was measured by real gross domestic product. Meanwhile, preliminary tests via descriptive statistics and stationarity test (ADF unit root test) were carried out to establish both the characteristics and stability of the sample data.

Model Specification

In order to put the variables on the same scale, the log-linear formulations of the long run ARDL model was estimated as follows:

$$\Delta \ln RGDPt = a0 + a1LnRGDPt + a2LnEXVt + a3LnECRt + \sum_{i=1}^{n} + \Delta a11 \mathrm{Ln} RGDPt - 1 + \sum_{i=1}^{n} \Delta a2 \mathrm{lLn} EXVt - 1 + \sum_{i=1}^{n} \Delta a3 \mathrm{lLn} ECRt - 1 + + \mathrm{Ut} \quad (1)$$

Meanwhile, the ECM which determine the short run model was carried out in equation (2) as stated below;

$$\Delta \mathrm{LnRGDPt} = a0 + a1\mathrm{LnRGDPt} + a2\mathrm{LnEXVt} + a3\mathrm{LnECRt} + \sum_{i=1}^{n} \Delta a11 LnRGDPt - 1 + \sum_{i=1}^{n} \Delta a2 \mathrm{lLn} EXVt - 1 + \sum_{i=1}^{n} \Delta a3 \mathrm{lLn} ECRt - 1 + \Pi ECM + \mathrm{Ut} \quad (2)$$

Where; RGDP is Real Gross Domestic Product, EXV is Exchange Rate Variation, ECR is Real Exchange Rate, $a_{0,}$ $a_1 - a_3$ are the estimate parameters, U is the error term, t is time lag, Ln is Log is logarithm to base ten and ∏ is the coefficient of ECM

4. Results and Discussion

Table 1: Descriptive Statistics for Variables

Variable &Measurement	RGDP	EXV	ECR
Mean	470934.4	9.850270	87.51005
Std. Dev.	283424.8	34.07622	93.88204
Skewness	0.757462	4.722324	1.367895
Jarque-Bera	4.882367	928.7627	18.27003
Probability	0.087058	0.000000	0.000108
Observations	38	38	38

***Source*:** Authors' Computation from E-view 10

The descriptive statistics reported in Table 1 showed that on the average real gross domestic product (RGDP), exchange rate variation (EXV) and exchange rate (ECR) are N470934.4billion,

N9.85027billion, and N87.5billion respectively. In response, the standard deviation of real gross domestic product (RGDP), exchange rate variation (EXV) and exchange rate (ECR) are; 283424.8, 34.07 and 93.88 respectively. From the analysis, the standard deviation of the variables were higher than their respective mean except that of RGDP. The skewness result showed that all the variables are positively skewed. The probability of Jarque-Bera statistics for all the variables except RGDP is less than 0.05 critical value. This suggested that the alternative hypothesis of normal distribution for all the variables were accepted except RGDP. Meanwhile, since the standard deviations of some of the variables were not within their respective, the series are not normally distributed. Thus, there is the need for stationarity test to achieve normal distribution of the time series.

Table 2: Result of Augmented Dickey Fuller Unit Root Test at Level and First Difference

Variables	ADF @ Level	5% Critical Value	Decision	ADF @ 1st Diff	5% Critical Value	Decision
RGDP	-0.0703	-2.9484	Not stationary	-3.5819	-2.9484	Stationary I (1)
EXV	-5.9878	-2.9484	Stationary I(0)			
ECR	0.8778	-2.9484	Not stationary	-5.9144	-2.9484	Stationary I (I)

***Source*:** Authors' Computation from E- view 10

The ADF unit root test of stationarity result presented above showed that only exchange rate variation (EXV) was stationary at order zero (at level). The non-stationary variables (RGDP and exchange rate) at level were differenced once and they became stationary at first difference prior to estimations of the ARDL to prevent false regressions results and arrived at a result which validate economic theory and hence use for policy formulation.

Table 3: ARDL Bounds Test for Co-integration Model

Model		**F-Statistic** = 13.2756
(RGDP, EXV, ECR)		K = 3
Critical Values	Lower Bound	Upper Bound
10%	2.27	3.77
5%	3.32	4.35
1%	4.92	5.61

***Source*:** Authors' Computation from E-view 10

The ARDL bound test result presented in Table 3 showed clearly that there is a long run relationship amongst the variables (RGDP, EXV and ECR). This is because the computed F-statistic of about 13.2756 is higher than the upper critical bounds at 5% critical value. Therefore, the null hypothesis of no co-integration at 5% significance level for the model was rejected. Following the establishment of long-run co-integration relationship among the variables, the long-run and short-run dynamic parameters for the variables were obtained.

Table 4: Estimated ARDL for Long Run Coefficients of the Model

Regressors	Coefficient	t-Statistic	P-Value
EXV	0.389719	2.097908	0.0471
ECR	-0.000314	-4.12875	0.0083
C	57.783751	12.718154	0.0000

***Source*:** Authors' Computation from E-view 10

The estimated ARDL long run coefficient of exchange rate variation has a positive and significant relationship with economic growth. The long run result also revealed that exchange rate has negative and significant relationship with economic growth. Given the significant relationship of the two independent variables, it is therefore concludes that, there is a long run equilibrium relationship between exchange rate variation exchange rate and economic growth in Nigeria during the period under review.

Table 5: Discussion of ARDL Error Correction Model

Regressors	Coefficients	t-Statistic	P-Value
D (RGDP (-1)	0.535407	0.492475	0.2899
D (EXV)	-0.252870	-2.38794	0.0038
D (ECR)	-0.02046	-4.15308	0.0012
ECM (-1)	-0.648851	-3.372113	0.0026
R^2 = 0.6563	f-stat=4.4570	Prob (f-stat)=0.0081	DW Stat=2.1039

***Source*:** Authors' Computation from E-view 10

Table 5 showed the result of the short-run dynamic coefficients associated with the long-run relationships obtained from the ECM equation. The error correction term in the model has the hypothesized negative sign and statistically significant at 5% conventional level. This indicated it adjustment from short run equilibrium to long-run equilibrium in the dynamic model. This implies that deviations from the long-term economic growth adjust quickly to long run equilibrium at a speed of 64.88%. The R^2 value of 66%, showed that the model is a good fit. The Durbin Watson (DW) value of 2.1039 which is not too far from 2.0 DW bench mark, suggested that the model is free from autocorrelation problem.

Meanwhile, in the short run, the coefficient of lag value of RGDP is positively related with the economic growth but statistically not significant at 5% level. Exchange rate variation (EXV) in the short- run has a negative but significant relationship with RGDP. This means that increase in fluctuation of the naira in relation to the international currency particularly, US dollar enhanced reduction in RGDP in the short-run. Also, exchange rate fluctuation impacted on RGDP during the period of study as the probability value of 0.0038 in absolute term is less than the 5% p-value. Thus, the alternative hypothesis which states that there is a significant relationship between exchange rate variation and economic growth was upheld. The finding here substantiates the empirical study of Akinmulegun and Falana (2018) who asserted that there is a significant difference between exchange rate fluctuation and output growth in Nigeria.

Similarly, in the short- run exchange rate (ECR) has a negative and significant relationship with RGDP. This means that increase in the naira rate of exchange in relation to the US dollar enhanced reduction in RGDP in the short-run. Also, exchange rate impacted on RGDP during the period of study as the probability value of 0.0012 in absolute term is less than the 5% p-value. Thus, the alternative hypothesis which states that there is a significant

relationship between exchange rate and economic growth was upheld. The finding validated the empirical work of Okorontah and Odoemena (2016) [11], who examined the effects of exchange rate fluctuation on economic growth of Nigeria and affirms an indirect and significant relationship between exchange rate and economic growth.

Table 6: Post Estimation Tests for the Estimated Model

Test Type	Test Stat.	p-value	Critical Value
Serial Correlation	Chi Square (X^2)	0.4132	0.05
Heteroscedasticity	Chi Square (X^2)	0.0676	0.05
Normality	Jarque-Bera	0.731492	0.05

***Source*:** Authors' Computation from E-view 10

Table 6 showed the post estimation test for the estimated model. The serial correlation test result showed that in the model, serial autocorrelation is not a problem in the ARDL model. This is because the chi-square (X^2) probability values of 0.4132 exceed the 0.05 critical value. Thus, the null hypothesis of no serial autocorrelation was upheld. Similarly, the Autoregressive Conditional Heteroskedasticity (ARCH) result showed that in the model, heteroskedasticity is not a problem as a result of the fact that the Chi-square p-value of 0.0676 is greater than the 5% convectional p-value. Meaning that the variance of the residual is homoscedastic or constant over the sampled period. The normality test in the model showed that the error terms are normally distributed. This is because the probability values of the Jerque-Bera statistic which was 0.7314 is greater than 0.05 critical value. Thus, it was concluded that the sample data fit a standard normal distribution.

From the analysis above, the result of the post estimation tests are welcoming as they meet the statistical criteria and authenticate the reliability of the estimated model for policy formulation and recommendation.

5. Concluding Remark

The study used the ARDL model to examine the nexus between exchange rate variation and economic growth in Nigeria. Secondary data was sourced from CBN statistical bulletin. The ADF unit root test showed that all the variables were stationary but some at level and others first difference prior to estimations of the ARDL to prevent false regressions results. Meanwhile, the ARDL results showed that exchange rate variation has a negative and significant impact on economic growth. Similarly, exchange rate has a negative and significant impact on economic growth. The paper concludes that fluctuation in exchange rate influences economic growth in Nigeria. Thus, if the menace of high rate of exchange is not checked, it will weakened Nigeria naira in relation to other international currencies such as Euros, USA dollar and Pound starlings. Based on the findings, the paper recommended that Nigeria government should diversify her product and export opportunities so as to become price giver and not a price taker in the international market. This will strengthened the value of the naira in relation to international currencies.

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