DUTSE JOURNAL OF ECONOMICS AND DEVELOPMENT STUDIES (DUJEDS)
DEPARTMENT OF ECONOMICS AND DEVELOPMENT STUDIES
FEDERAL UNIVERSITY DUTSE
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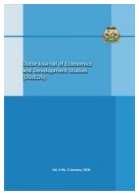

IMPACT OF REAL EXCHANGE RATE ON ECONOMIC GROWTH IN NIGERIA

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Abstract
The objective of this study examined the direction of causality between real exchange rates on economic growth in Nigeria, using annual time series data for the period of 1970-2016. The paper uses Johansen cointegration and vector error correction model (VECM) through the analysis of impulse response function (IRFs) and Variance decomposition (VDCs). The results revealed that real exchange rates and money supply have positive impact on economic growth, while interest rate, inflation rate, and trade openness have negative long run impact on economic growth in Nigeria. The implication of the results is that undervaluation of the naira currency will significantly hampers growth in the long run, although will significantly enhances economic growth in the short run. As such, the policy of depreciation of exchange rates to achieve higher growth rates is only effective in the short run. It recommends that misalignment (overvaluation and undervaluation) should be avoided by every means and that the current monetary policy in Nigeria should be maintained.

Keywords: Real Exchange Rates, Economic growth, Nigeria

Introduction

The real exchange rate which is commonly seen as the relative price of tradable to non-tradable is highly priced implicit rather than an explicit, hence, creating a forum for debates or controversy on the measurement procedure of real exchange rate. However, real exchange rate index is seen as a means of representing international competitiveness of a country and at the same time used as a guide to monetary and exchange rate policies.

The obvious effect of real exchange rate fluctuation on economic decisions has received considerable attention in the literature, not only because of its significant impact on other macroeconomic variables but because there has been a number of significant developments in recent times, with substantial contributions been made to both the theory and empirical understanding of exchange rate. An important development in econometrics together with the increasing availability of high-quality data has also stimulated a large output of empirical work on the exchange rate (Botha and Pretorius, 2009).

Exchange rate policies and impact on economic growth in developing countries are often sensitive and controversial mainly because of the kind of structural transformation required in reducing imports or expanding non-oil exports; this invariably implies a depreciation of the nominal exchange rate. Such domestic adjustments due to their short-run impact on prices and demand are perceived as having severe implication on the economy. Ironically, the distortions inherent in the overvalued exchange rate regime are hardly a subject of debate in developing economies that are dependent on imports for production and consumption (Obadan, 2006).

It has become pertinent to mention that exchange management and macroeconomic performance in developing countries remain a major concern to all. The fluctuations of the exchange rate in response to internal and external shocks call for a serious investigation. Though, there exist agreements that devaluation or depreciation may boost domestic production by stimulating net export components. Proof to this can be seen in the rise of international competitiveness to domestic industries leading to the increase in domestic spending as against foreign spending. This further reaffirms the idea that the success of currency depreciation in promoting trade balance largely depends on switching demand in proper direction and amount as well as on the capacity of the home economy to meet additional demand by supplying more goods (Guitan, 1976 and Dornbusch, 1988).

This lack of consensus in the literature (theoretical and empirical) justifies the contradictory calls by different stakeholders in Nigeria's economy on how to proffer solutions to the fluctuating naira exchange. Some stakeholders in industries, monetary authorities, labor unions as well as educationist are now calling for and against devaluation. The call for devaluation comes with some puzzles as the government will always try to interfere with market forces.

The main objective of this paper is to assess the influence of real exchange on economic growth; to identify the direction of causality between real exchange rates and economic growth in Nigeria. The study is organized into five sections. Section two reviews literature and theoretical framework. Section three provides methodology employed in the study. Section four presents and discusses estimation results and section five presents the conclusions.

Literature Review

This research work dwells mainly on two approaches of traditional approach and structural approach in order ascertain the implication of the theory as regard to the naira exchange rate even though most developing countries are tune with the structural approach. This paper will attempt to investigate impact of these approaches with specific attention short and long-run periods. The former approach holds that exchange rate depreciation has expansionary effects on economic growth as local goods become cheaper aboard hence increasing their demand and consequently leading to increasing in exports (Salvatore, 2005). This later approach goes contrary. It holds that currency depreciation has contractionary effects on both output and employment. This view holds sway in most developing countries of the world.

Lots of research work has been written on the relationship between real exchange rates and economic growth using different estimation approaches. Though their findings remain valid, yet there is the need to update them to meet present day challenges of exchange rates fluctuations and it impact on the economic growth. Looking at the arguments that exchange depreciation has expansionary effects on economic growth of otherwise. Notably, questions were raised with regard to the relationship between exchange rate and economic growth, which are fundamental macroeconomic issues. However, relatively large literature shows the exchange rate depreciation has expansionary effect on economic growth in most nations.

Razin and Collin (1997) studied the real exchange misalignments and growth of a large sample of developed and developing countries. The paper used regression analysis to explore whether real exchange rate misalignments are related to country growth rates. The findings were that overvalued exchange rate lowers economic growth, while moderate to high under evaluation are associated with more rapid economic growth. It is imperative to state that these findings are supported by the traditional theory of exchange rates. However, the results are not consistent with that of developed countries. For instance, Kalyoncu et al., (2008) who assess the long and short run effects of real exchange rate depreciation on output levels in OECD countries, the results unlike in the case of Razin and Collin (1997) was mixed in the long-run as currency depreciation exert negative impact on output expansion in Australia, Hungary, Poland, Portugal, Switzerland, and Turkey while in three countries namely; Finland, Germany, and Sweden this relationship was found to be positive. In the short run, depreciation exerts anegative impact on output in Finland, Germany, and Turkey while depreciation exerts apositive impact on output in Hungary and Switzerland.

Abdulkadir I. Ali, I *et al* (2015) investigates the impact of Naira real exchange rate misalignment on Nigeria's economic growth using quarterly data spanning the period 2000- 2014.Their modeling approach accounts for the possible effects of endogeneity and structural breaks in the estimated relationships by using Gregory and Hansen cointegration test.. Their findings show that naira was on the average overvalued by 0.17 per cent during the study period, showing a negative impact of real exchange rate misalignment on economic growth.

Bakare (2011) carried out an empirical analysis of the consequence of foreign exchange rate reform on the performance of private domestic investment in Nigeria using ordinary least square multiple regression analytical method. The result shows significant but negative relationship between floating exchange rate and private investment in Nigeria.

Methodology

The data set used in this paper consists of quarterly time series from 1970Q1-2016Q4. The variables under consideration are real exchange rate (RER), interest rate (RIR), inflation (RIF), money supply (Ms) and openness (OPN). The data are sourced from Central Bank Statistical Bulletin 1970-2017.

The broad objective of this paper is to assess the impact of real exchange rate on economic growth. An output growth model is specified by adding real exchange rate to the set of explanatory variables. In this study, the dependent variable is the economic growth denoted by the symbol (y) as explain by the movements in other explanatory variables which are Real exchange rate (RER), interest rate (RIR), inflation rate (RIF), money supply (Ms) and openness (OPN). This model is further specified below.

$$y=\alpha_0+\beta_1 RER+\beta_2 RIR+\beta_3 RIF+\beta_4 M^s+\beta_5 OPN+\mu_t \quad \ldots\ldots(1)$$

Where:

y = Real GDP.

α_0= Intersect.

$\beta_1,\beta_2,\beta_3,\beta_4,\beta_5$: Coefficient of the explanatory variables.

RER= Real exchange rate.

RIR = Interest rate.

RIF = Inflation rate.

M^s = Is the broad money supply.

OPN = Denote trade openness.

μ_t= Stochastic variable.

Therefore, the log- linear form of the function becomes:

$$Logy_t=\beta_0+\beta_1 logRER_{t-i}+\beta_2 logRIR_{t-i}+\beta_3 logRIF_{t-i}+\beta_4 logM^s_{t-i}+\beta_5 logOPN_{t-i}+\mu_t \ldots \quad (2)$$

A Priori Expectation

Three basic criteria is used to evaluate the results obtained from the model; economic (a priori expectations), statistical and econometric criteria.

Apriori expectations denote the use of the sign and magnitude of the parameters as contained in the model. It is, however, stated as:

$$\beta_1, \beta_4, \beta_5 > 0 \quad \text{and} \quad \beta_2, \beta_3 < 0$$

Therefore, an increase in real exchange rate (appreciation), money supply and trade openness will result in an increase in real output as such parameter β_1, β_4, and β_5 is expected to greater than zero, while an increase in interest rate and inflation results in the decrease in real output, hence parameter β_2, and β_3 is expected to less than zero. Therefore, β_1, β_4,and β_5 exert positive effects on real output whereas, β_2, and β_3 exert negative effects on real output.

Techniques of Data Analysis

The paper employs the Johansen (1995) and Johansen and Juselius (1990) cointegration technique. The technique is well known for establishing the long run relationship between variables. This approach applies maximum likelihood estimation to a vector error correction (VEC) model to simultaneously determine the long run and short run determinants of the dependent variable in a model. First the data has to be integrated of the same order. To achieve this, unit root tests will be perform to examine the stationarity of the data set, variables shall be subjected to the Augmented Dickey- Fuller (ADF)

and Philips-Perron unit root test. According to Greene (2000), the following steps are used when implementing the Johansen procedure:
Step 1: Testing for the order of integration of the variables under examination. All the variables should be integrated of the same order before proceeding with the cointegration test.

Step 2: This step involves setting the appropriate lag length of the model. Also in the step is the estimation of the model and the determination of the rank of Π.

Step 3: With regards to the deterministic components in the multivariate system the choice of the appropriate model is made. An analysis of the normalized co-integrating vector(s) and speed of adjustment coefficients is made.
Step 4 includes the determination of the number of cointegrating vectors. Causality tests on the error correction model to identify a structural model and determine whether the estimated model is reasonable are done in this last step.

After ascertaining the existence of cointegrating relationships, the vector error correction model (VECM) is estimated to test for the short-run dynamics. We consider the following VAR of order P:

$$y_t = A_1 y_{t-1} + \ldots A_p y_{p-t} + Bx_t + \varepsilon_t \quad (3)$$

where; it is a -vector of non-stationary I(1) variables, is a d-vector of deterministic variables, and is a vector of innovations. In order to use the Johansen test, the VAR (4.6) above needs to be turned into a VECM specification (Brooks, 2008). We may rewrite this VAR as:

$$\Delta y_t = \prod yt\text{-}1 + \sum_{i-1}^{p-1} \Gamma_i \Delta y_{t-1} + Bx_t + \varepsilon_t \quad (4)$$

$$\prod = \sum_{i-1}^{p} A_i - \Gamma_i = -\sum_{j=i-1}^{p} A_j \quad (5)$$

Granger's representation theorem asserts that if the coefficient matrix has reduced rank, then there exist matrices and each with rank such that and is I(0). is the number of cointegration relations (the cointegration rank) and each column of is the cointegration vector. The elements of being known as the adjustment parameters in the VEC model. Johansen's method is to estimate the matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of (Green, 2007).

Data Presentation and Analysis
Unit Root/Stationarity Test Results
The Augmented Dickey-Fuller and the Phillips-Peron test results are shown in Tables 1(a) and 1(b).

Table 1(a): Stationarity of Augmented Dickey-Fuller Test

Order of Integration	Variable	Intercept	Trend & Intercept	None
Level	D(GDP)	0.078317	-0.978086	2.203166
1ST Difference	D(GDP,2)	-6.275085***	-6.186073***	-5.640911***
Level	D(RER)	0.946861	-1.535312	2.192443
1ST Difference	D(RER,2)	-5.814026***	-6.184793***	-5.226851***
Level	D(RIF)	-3.29666	-3.304651	-2.099688
1ST Difference	D(RIF,2)	-6.578198***	-6.548202***	-6.661208***
Level	D(RIR)	-2.363562	-2.430731	-0.677077
1ST Difference	D(RIR,2)	-6.996231***	-7.046802***	-8.758202***
Level	D(MS)	6.655711	6.443579	6.738324
1ST Difference	D(MS,2)	-4.266470***	-4.920509***	-4.065722***
Level	D(OPN)	-1.254334	-1.161258	-1.783214
1st Difference	D(OPN,2)	-6.114171***	-6.111398***	-5.945212***

Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationary at 5% and * represent stationary variables at 10%.
Source: Computed by the researcher using E-views 9. (March 2018)

Table 1(b): Stationarity of the Philips-Perron Test

Order of Integration	Variable	Intercept	Trend & Intercept	None
Level	D(GDP)	0.078371	-1.035259	2.203166
1ST Difference	D(GDP,2)	-6.303658***	-6.1933074***	-5.764004***
Level	D(RER)	0.946861	-1.535312	2.192443
1ST Difference	D(RER,2)	-5.811479***	-6.184531***	-5.339353***
Level	D(RIF)	-3.20661	-3.188025	-1.818704
1ST Difference	D(RIF,2)	-11.04970***	-12.51615***	-11.18258***
Level	D(RIR)	-2.163092	-2.246049	-0.522365
1ST Difference	D(RIR,2)	-8.684926***	-8.782832***	-8.758202***
Level	D(LMS)	0.609354	-1.986454	3.69535
1ST Difference	D(LMS,2)	-4.592069***	-4.598024***	-1.812875
Level	D(OPN)	-1.324892	-1.680342	-1.690125
1st Difference	D(OPN,2)	-4.627035***	-4.548284***	-4.700615***

Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationary at 5% and * represent stationary variables at 10%.

Source: Computed by the researchers using E-views 9. (March 2018)

Table 1(a) shows the Augmented Dickey-Fuller results. The test has a null hypothesis of a unit root. The calculated value of ADF was compared with the critical value.. For variables in levels, the test in intercepts revealed that all variables were not stationary. For the intercept, all the data in levels was not stationary as reflected by the non-rejection of the null hypothesis at both 1% and 5 % significance levels. All the differenced variables were stationary at 1% significant level; hence the null hypothesis of unit root is rejected. For the test under trend and intercept and trend and no intercept, data series were all non-stationary in levels but became stationary at 1% significant level when first differenced.

Table 1(b) shows the Phillips-Peron results. For variables in levels, the test in intercepts revealed that none of the variables were stationary. All differenced variables on intercept were stationary at 1% significance level. On trend and intercept, all variables were non-stationary in levels but all variables on trend and intercept were stationary at 1% significance level when first differenced. For the test under no trend and no intercept, all variables in levels were non-stationary. When first differenced, all the variables were stationary at 1% significance.

Both methods used to test for stationarity significantly revealed that the data series were non-stationary in levels and stationary when first differenced. Therefore, the series are integrated of the same order I (1).

Tests for Co-integration

Cointegration describes the existence of an equilibrium or stationarity relationship between two or more times series each of which is individually nonstationary. For the purposes of this study, cointegration examines the long run relationship between the gross domestic product and exchange rates. The trace test results based on the Johansen cointegration are shown in Table 1(a).

Table 2(a): Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistics	0.05 Critical Value	Prob.**
None*	0.549268	102.8609	95.75366	0.0148
At most 1	0.438278	68.59500	69.81889	0.0623
At most 2	0.396156	43.79484	47.85613	0.1143
At most 3	0.266524	22.10397	29.79707	0.2928
At most 4	0.184340	8.775699	15.49471	0.3865
At most 5	0.000328	0.014110	3.841466	0.9053

Table 2(b): Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob**
None	0.549268	34.26595	40.07757	0.1952
At most 1	0.438278	24.80016	33.87687	0.3987
At most 2	0.396156	21.69087	27.58434	0.2367
At most 3	0.266524	13.32827	21.13162	0.4225
At most 4	0.184340	8.761589	14.26460	0.3865
At most 5	0.000328	0.014110	3.841466	0.9053

Source: Computed by the researchers using E-views 9. (March 2018)

Table 2(a) shows the results of the trace test which reflect that at least one co-integrating equation exists at 5% significance level. The null hypothesis of no co-integrating vectors is rejected since the trace (test) statistic of 102.8609 is greater than the 5% critical value of approximately 95.75366.

Using a similar explanation, the null hypothesis that there is at most 1 co-integrating vector cannot be rejected since the test statistic of approximately 68.59500 is less than the 5% critical value of about 69.81889. For that reason, the trace statistics specified 1 co-integrating relationship at 5% significance level. The maximum Eigen value test in Table 4.2(b) put forward that there is only no co-integrating relationship in the gross domestic product model. The maximum Eigen value test also reflects that no co-integrating equation exists at 5% significance levelsince the test statistic of about 34.26595 is less than the 5% critical value of about 40.07757.Therefore, it can be concluded that there is one significant long run relationship between the given variables (using the trace test). Since variables can either have short or long run effects, a vector error correction model (VECM) is used to disaggregate these effects.

Vector Error Correction Model (VECM)

Using the results from the cointegration test the VECM was specified. The VECM results are presented in Tables 3 and 4.

Table 3: Results of Long run cointegration Equation

Variable	Coefficient	Standard error	t-statistics
Constant	-2.627	-	-
LGDP	1.000	-	-
LRER	-0.073	0.015	-4.907
LRIR	-0.100	0.023	4.340
LRIF	-0.050	0.014	-3.582
LMS	0.001	0.008	0.104
LOPN	-0.049	0.015	-3.162

Source: Computed by the researchers using E-views 9. (March 2018)

The long run impact of real exchange rate on economic growth as presented in Table 5 is illustrated using Equation 6.

GDP = 2.627+0.073RER+0.100RIR+0.050RIF-0.001MS+0.049OPN……..……(6)

Equation 6 shows that RER and MS have a positive long run relationship with GDP. On the other hand, RIF, RIR, and OPN show a negative long run relationship with GDP. It is important to mention that variables RER, RIR, RIF, and OPN are statistically significant in explaining economic growth since they have absolute t-values greater than 2, while variable MS is not statistically significant in explaining economic growth. The result suggests that a unit increase in RER which denotes depreciation of Nigerian naira against its trading partners will reduce economic growth in the long run by approximately 0.073. This indicates that despite the negative relationship that exists in the short run as shown in table 5 below; in the long run this is not sustainable. In the long run, the results follow the Structuralist view to exchange rates reviewed which holds that depreciation might have a contractionary effect on output and employment, especially for less economically developed countries. Depreciation increases the cost of imports in particular, and the cost of domestic production in general, through imported inputs.

Table 4: Error correction Model results

Variable	Coefficient	Standard error	t-statistics
D(LGDP)	-0.148265	0.04779	-3.10269
D(LRER)	3.319542	1.32953	2.49678
D(LRIF)	0.742523	3.36037	0.22096
D(RIR)	-0.777484	1.16462	-0.66758
D(LMS)	-0.500745	0.75550	-0.66280
D(LOPN)	-0.176638	1.77769	-0.09936

Source: Computed by the researchers using E-views 9. (March 2018)

In Table 4 the coefficient of D (LGDP) of -0.1483 shows that the speed of adjustment is approximately 14.8 percent. This means that if there is a deviation from equilibrium, only 14.8 per cent is corrected in one-quarter as the variable moves towards restoring equilibrium. This means that there is no strong pressure on economic growth to restore long run equilibrium whenever there is a

disturbance. This speed of adjustment is statistically significant with an absolute t-value of approximately 3.10269. The low speed of adjustment by economic growth may reflect the existence of some other factors affecting economic growth in Nigeria which is not specified in the model.

In the short run, it can be seen in Table 4.6 that the real exchange rate has a negative effect on growth. A unit increase in real exchange rates which is a depreciation of the Nigerian naira and increases economic growth by 3.320 approximately. Depreciation may in some cases be a quick fix in the short run, but not sustainable in the long run. As is the case in this study, in the long run, the relationship becomes positive. The real exchange rate is the only variable that is statistically significant in explaining economic growth in Nigeria in the short run as seen by absolute t-values of above 2. The other variables RIR, RIF, OPN, and MS are statistically insignificant because t-values are below 2.

Causality Test

This test becomes necessary as it helps in defining the nature of causality existing among real exchange rate in assessing its impacts on economic growth in Nigeria. The Pair wise causality test result is presented in Tables 5.

Table 5: Pairwise Causality Tests

Null Hypothesis	Obs	F-Statistics	Prob
RER does not Granger cause GDP	43	5.01892	0.0052
GDP does not Granger cause RER		029493	0.8288
RIF does not Granger cause GDP	43	0.10683	0.9556
GDP does not Granger cause RIF		1.60813	0.2045
RIR does not Granger cause GDP	43	1.20436	0.3221
GDP does not Granger cause RIR		0.12773	0.9430
MS does not Granger cause GDP	43	4.90616	0.0058
GDP does not Granger cause MS		1.15400	0.3407
OPN does not Granger cause GDP	43	1.81459	0.1619
GDP does not Granger cause OPN		1.44860	0.2448

Source: Computed by the researchers using E-views 9. (March 2018)

In Table 5 it shows that we reject the null hypothesis that RER does not Granger cause GDP, this is because the probability value of 0.0052 is less than 5 percent. This indicates that the previous value of RER can be used to predict the future value of GDP. However, we are to accept the null hypothesis that GDP does not Granger cause RER since probability value of 0.8288 is greater than 5 per cent. Hence, denoting that uni-directional causality exists between RER and GDP.

Similarly, we reject the null hypothesis that MS does not Granger cause GDP since the probability value of 0.0058 is less than 5 per cent, the previous values of MS can be used to predict the future value of GDP. On the contrary, we will accept the null hypothesis that GDP does not Granger cause MS as the probability value of 0.3407 is greater than 5 per cent. Therefore, indicating that there is uni-directional causality between MS and GDP.

In another trend, there is no causality between RIF and GDP, RIR and GDP as well as OPN and GDP as their respective probabilities exceed 5 per cent.

Impulse Response Analysis

Impulse response analysis traces out the responsiveness of the dependent variables in a VAR to shocks from each of the variables (Brooks 2008). The estimation results of the contemporaneous coefficient matrix formed the underlining basis in computing impulse response functions. Analytical (asymptotic) response standard errors are used to display responses of other variables on the economic growth.

Restrictions were imposed on the appropriate coefficients of the system so as to have a SVAR. Once the SVAR is identified, we present the impulse response analysis which reports the dynamic response of each variable to shocks in different equations of the VAR system within two standard error bands (shown as dotted lines). Finally, we compute forecast error variance decomposition which provides the proportion of the total forecast-error variance of each variable that is caused by each of the shocks or disturbances in the system. Results of the impulse response analysis are presented in Figure 1.

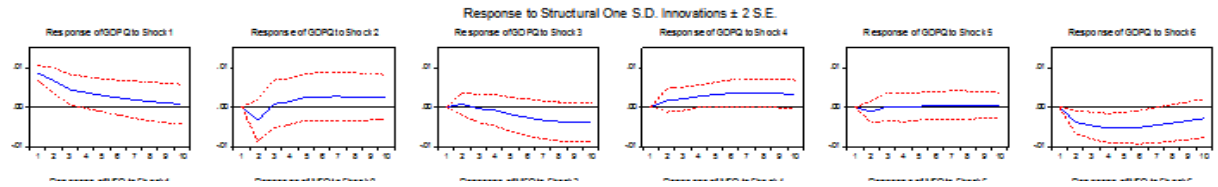

Fig. 1: Impulse Responses on GDP

Source: Computed by the researchers using E-views 9. (March 2018)
Note: Shock 1, Shock 2, Shock 3, Shock 4, Shock 5 and Shock 6 refer to GDP, MS, OPN, RER, RIF, and RIR

Since this study focuses on the impact of real exchange rate on economic growth, only the responses of economic growth to real exchange rate and the responses of economic growth to economic growth will be analyzed as shown in row one in figure 4.1. These impulse response functions help in showing the dynamic response of economic growth to a one-period standard deviation shock to the innovations of the system and also indicate the directions and persistence of the response to each of the shocks over 10 quarters. For the most part, the impulse response functions have the expected pattern and confirm the results from the short run relationship analysis. Shocks to all the variables are significant although they are not persistent.

Shock of MS to GDP has negative significant effects in the 2nd quarter and positive significant effects from the 3rd quarters, indicating that in the long run increase in money supply will stimulate economic growth. Shock of OPN has negative and significant effects on GDP. Shock of RER has positive effects on economic growth, this is in tune with the traditional approach to exchange that states that exchange depreciation has expansionary effects on economic growth. Shock of RIF has negligible effects on economic growth. On the contrary shock of RIR has negative effects on economic growth both in the short and long run.

Variance Decomposition Analysis

Variance decomposition provides a way of determining the relative importance of shocks to real exchange rate in explaining variations in economic growth. The results of the variance decomposition analysis are presented in Table 4.8 and these show the proportion of the forecast error variance in economic growth as explained by its own innovations and innovations in the real exchange rate**.**

Table 6: Variance Decomposition of GDP

Period	S.E	Shork1	Shork2	Shork3	Shork4	Shork5	Shork6
1	0.008624	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.012290	79.07648	7.658676	0.375410	1.893653	1.018314	9.977465
3	0.014081	70.33370	6.166017	0.375357	3.562873	0.784437	18.77762
4	0.015819	61.07203	5.666256	0.551648	5.769985	0.624315	26.31577
5	0.017556	52.51816	6.736058	1.637739	7.852046	0.519799	30.73619
6	0.019123	45.78460	7.538389	3.256751	9.877308	0.472363	33.07059
7	0.020522	40.56610	8.259190	5.390406	11.60277	0.469165	33.71237
8	0.021738	36.56862	8.742297	7.702549	13.00558	0.466762	33.51419
9	0.022792	33.46203	9.207281	9.990662	14.06647	0.465526	32.80803
10	0.023685	31.07875	9.674189	12.04706	14.86563	0.463821	31.87055

Source: Computed by the researchers using E-views 9. (March 2018)

Note: Shock 1, Shock 2, Shock 3, Shock 4, Shock 5 and Shock 6 refer to GDP, MS, OPN, RER, RIF, and RIR

Since this study focuses on the movements of economic growth following shocks to itself or real exchange rate determinants, the study reports only the variance decomposition in economic growth and it analyses the relative importance of real exchange rate in influencing its movements.

The paper allows the variance decompositions for 10 quarters in order to ascertain the effects when the variables are allowed to affect economic growth for a relatively long time. In the first quarter, all of the variances in economic growth is explained by its own innovations (shocks), as suggested in Brooks (2008). For the 5th quarter ahead forecast error variance reported in column 2 of Table 4.8 under S.E., economic growth itself explains about 52.5 per cent of its variation, while the other variables explain only the remaining 47.5 per cent. Of this MS explains 6.74 per cent, OPN explains about 1.64 per cent, RIF explains 0.52 per cent, RER explains 7.8 and RIR explain about 30.73 per cent.

However, after a period of 10 quarters, economic growth explains about 31 per cent of its own variation, while other variables explain the remaining 69 per cent. The influence of MS is 9.67 per cent, while OPN increased to about 12.5 per cent, RIF decreased to 0.46 per cent, RER increased to 14.87 and RIR decreased to about 31.87 per cent. These results are similar to those from the impulse response analysis in that all the variables have a significant impact on economic growth in the short run.

Economic growth explains most of its variations, closely followed by RIR, then RER and MS. OPN and RIF though significant, do not explain much of the variations in economic growth. Using the variance decomposition analysis it can be seen that interest rate, real exchange rates and money supply are variables that are very significant in explaining economic growth in Nigeria over the study period.

Conclusion and Recommendations

The objective of the paper work is to assess the impact of real exchange rate on economic growth in Nigeria, using quarterly data from 1970-2016. The paper employed the Johansen (1995) and Johansen and Juselius (1990) cointegration technique. The research work also exhumes the nature of the long run relationship between real exchange rate and economic growth. Another puzzle that this work tried to explain is whether there is a causal relationship between real exchange rate and economic growth in Nigeria. The results shows that real exchange and money supply have a positive long run relationship with GDP, of which only real exchange rate is statistically significant in explaining economic growth, as money supply remain insignificant in explaining economic growth. Similarly, the rate of interest, the rate of inflation and openness have been seen to have a negative long run relationship with GDP, although, they were all significant in explaining economic growth. This finding is, however, in tune with the apriori expectation designed for this study. The paper also shows that there exists a unidirectional relationship between real exchange rates and economic growth, money supply and economic growth; proxy by GDP. This is stated thus; real exchange rates Granger causes GDP, while GDP does not Granger cause real exchange. Similarly, money supply Granger cause GDP, while GDP does not Granger cause GDP. This implies that previous values of both real exchange rates and money supply can be used to predict the future value GDP and not the other way round, that is previous values of GDP cannot be used to predict the future values of real exchange rates and money supply. In this regard, for Nigeria to increase economic growth the policy of devaluating the currency can only work in the short run as depreciation increases growth but this can be seen only as a quick fix that has negative consequences in the long run. In the long run, a depreciation/devaluation can only reduce economic growth; hence depreciation/devaluation works well in the short run but has negative consequences in the long run.

Based on these finding the policy of depreciation to boost exports and increase employment in the economy might not be the best policy for Nigeria government. In order to avoid misalignments (overvaluation or undervaluation of the naira), the best policy, therefore, is to allow exchange rates to be determined by the forces of demand and supply amidst certain regulation in order to restore naira exchange equilibrium.

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