EXCHANGE RATE FLUCTUATION AND NIGERIA'S ECONOMIC GROWTH

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Abstract
The study investigates the effect of exchange rate fluctuation on economic growth of Nigeria: 1996 – 2016. The research adopted Rudi Dornbusch Exchange rate overshooting model as the main theoretical framework. The study employed multiple regression analysis with Ordinary Least Square (OLS) econometric technique to examine the effect of exchange rate fluctuation on the economic growth in Nigeria. The result showed that exchange rate has significant positive effect on economic growth in Nigeria. It therefore suggests strict foreign control policies in order to determine appropriate exchange rate value in Nigeria.
Key words: Economic growth, exchange rate, exchange rate appreciation, exchange rate depreciation

Introduction

Exchange rate is the price of one country's currency in relation to another country currency. It is the required amount of unit of a currency that can buy another currency. Kandil, (2004) says that exchange rate fluctuations influence domestic prices through their effect on aggregate supply and demand. In general, when a country currency depreciates it will result in high import prices, if that country is an international price taker, while lower import prices result from appreciation. Aliyu, (2011) asserted that appreciation of exchange rate result to increase imports and reduces exports while depreciation exchange rate tend to cause a shift from foreign goods to domestic goods. Hence, it leads to diversion of income from importing countries to exporting countries through a shift in terms of trade.

Developed nations of the world do put extra efforts in the management of their exchange rate policies. In Nigeria, exchange rate policy has undergone substantial transformation from the immediate post-independence period when the country maintains a fixed parity with the British Pound through the oil boom of the 1970s, to the floating of the currency since 1986, following the near collapse of the economy between 1982 and 1985 (Akpan & Akpan, 2012).

In 1986 when the federal government adopted Structural Adjustment Programme (SAP), the country moved from fixed exchange regime to a flexible exchange rate regime where exchange rate is left completely to be determined by market forces (i.e. forces of demand and supply of foreign exchange). The prevailing system manage to

float until monetary authorities intervene periodically in the foreign exchange market in order to attain some strategic objectives (Mordi, 2006). Inconsistency in policies and lack of continuity in exchange rate policies aggregated unstable nature of the naira rate (Gbosi, 2005).

Bensonate (2012) and Aliyu (2011) noted that despite various efforts by the government to maintain stable exchange rate, naira has depreciated through 1980s to date. Flexible exchange rate and management of the floating exchange rate have not proved better as the naira keeps deteriorating and many macro-economic variables keep being unstable. It is therefore known that, the effects of these various macro-economic shocks depend on the exchange rate policy adopted by the country and so, it is important to investigate the effect of exchange rate fluctuations on the Nigeria economic growth of the nation.

Literature Review

Theoretical Framework

The Dornbusch overshooting hypothesis (DOH) model is a theoretical explanation for high level of exchange rate volatility. They assume that, goods' price are sticky, or slow to change in the short run but the price of currencies are flexible; that the arbitrage in asset markets hold via the uncovered interest parity equation and the expectation of exchange rate are "consistent" and rational. The most important insight of the economy can induce compensating volatility in others, specifically, when an exogenous variables changes, the short run effect on the exchange rate can be greater than the long run effect, so in the short run, the exchange rate over shoots it new equilibrium long term value.

The model also assumes that a domestic output is an imperfect substitute of imports, and on aggregate demand for domestic goods. Therefore, it will determine the absolute and relative price (Dornbusch, 1976). Both the goods market and money market are in equilibrium purchasing power parity (PPP) in long run. Moreover, while commodity prices are sticky, assets prices (i.e. exchange rate) adjust instantaneously in response to new information. Thus, when a change in monetary policy occurs (e.g. an unanticipated permanent increase in the money supply), the market will adjust to a new equilibrium between prices and quantities initially, because of the "stickness" of prices of goods, the new short run equilibrium level will first be achieved through shift in financial market prices. Then gradually, continuously re-prices approaching its new long equilibrium are to be attained in the domestic money market, the currency exchange market, and the goods market. As a result, the foreign exchange market will initially over-react to a monetary change, achieving a new short run equilibrium. Overtime goods' prices will eventually respond, following the foreign exchange market to dissipate its over-reaction and the economy to reach the new long run equilibrium in all market.

Another theory that explains this is the balance of payment theory. It holds that under free exchange rates, the exchange rate of the currency of a country depends upon its balance of payment. A favourable balance of payment raises the exchange rate, while an unfavourable balance of payment reduces the exchange rate. Thus, the theory implies that the exchange rate is determined by the demand for and supply of exchange of goods which depends on imports and exports of goods and services, international loans, reparation payments, etc (Jhingan, 2003). It takes exchange rate to be endogenously determined.

Empirical Review

Gytson and Schmidt (1983) studies ten (10) countries using different estimate of key parameter of the model and the result shows that devaluation was expansionary in eight of the ten countries. On the contrary Edarol, (1989) and Daiz-Alejandro (1985) examined the impact of devaluation on GDP and other macro-economic variables and observed that devaluation was contra directionary. Devaluation includes income distribution towards savings which in turn depressed consumption and real absorption.

Akpan and Akpan (2012) investigated the effect of exchange rate movement on real output growth in Nigeria based on quarterly series for the period of 1986 – 2010. The paper examined the possible direct and indirect relationship between exchange rates and GDP growth, the estimation result suggests that there is no evidence of a strong relationship between changes in exchange rate and output growths, rather Nigeria's economic growth has been directly affected by monetary variables.

Asher (2012) examined the impact of exchange rate fluctuation on the Nigeria economic growth for the period of thirty (30) years, (1980 – 2010). The result showed that real exchange rate has positive effect on the economic growth. In similar study, Akpan (2008) investigated foreign exchange market and economic growth in an emerging petroleum based economy from 1970 – 2003 in Nigeria. He found out that positive relationship exists between exchange rate and economic growth.

Eme and Johnson (2012) investigated the effect of exchange rate movement on real output growth in Nigeria for the period of 1986 – 2010. The result reveals that, there is no evidence of a strong direct relationship between exchange rate and output growth.

Methodology

This study relied on time series secondary data spanning from 1996 to 2016 sourced from World Development Indicator, 2016 and Central Bank of Nigeria Statistical Bulletin 2015 edition. Data collected include Gross Domestic Product (GDP) to measure economic growth, exchange rate (EXCHR), interest rate (INTR) and inflation (INFL).

Multiple regression analysis with OLS econometric technique for data analysis was adopted to verify whether a significant relationship exists between economic growth which is the dependent variable and exchange rate, interest rate and inflation as the

independent variables in the Nigerian economy. The empirical model which specifies that economic growth (GDP) is significantly influenced by exchange rate, in conformity with the Dornbusch Overshooting Model which have been applied to examine the effects of exchange rate fluctuation on economic growth are formulated as follows:

GDP = f (EXCHR, INTR. INFL) ..... (1)
Equation 1 can be transformed as:
$GDP = \lambda o + \lambda_1 EXCHR + \lambda_2 INTR + \lambda_3 INFL + i$ ..... (2)

Where:
GDP = Gross Domestic Product
EXCHR = Exchange Rate
INTR = Interest Rate
INFL = Inflation Rate
λo = Intercept Term
λ_1, and λ_3 = Parameters to be estimated
i = Error Term

The behavioural assumptions and the presumptive signs are stated as follows:

$\lambda_1 > 0$ and $\lambda_2 < 0$, $\lambda_3 < 0$. This implies that exchange rate in favour of Nigeria's currency is expected to be positively related to economic growth, while interest rate and inflation is expected to be positive related to economic growth; while interest rate and inflation is expected to be positively related to economic growth.

Result and Discussion
This section provide in details the result of the data used in the study and the interpretation and discussion of results. It is a step by step analysis beginning from the unit root to the regression analysis.

We used the Augmented Dickey-Fuller Unit root to test the data and the decision rule to test the statistic value must be greater than Mackinnon critical. The parameter statistics are shown in Table 1.

Table 1: Augmented Dickey-Fuller Unit Root Test

Variables	Level	First difference	Second difference	Lag(s)	Model	Order of integration
DLOG(GDP)	-2.505	-10.35***		1	Trend and drift	1(1)
D(EXCR)	1.529	-4.456**	-5.621***	1	Trend & drift	1(2)
INTR	3.285	-3.489		1	Trend & drift	1(1)
INFL	-2.197	-5.860***		0	None	1(0)
ECM	-4.691***					

Source: *Extracted from output data; Authors' computation*
Note: *(**) *** denotes statistically significant at 1%, 5% and 10% level respectively.

From the results obtained in ADF unit root test as evident in table 1 shows that all the variables had unit root problem at various level, while GDP, EXCHR, INFL become stationary at their first difference. And, INTR was neither stationary at level nor at first difference but became stationary at second difference. Using the variables integrated at order one, i.e., 1(1), and the generated residual which is stationary at level, we therefore employ the Johansen Co-integration Rank test to help us to determine the number of co-integrating equations in the Error Correction Model (ECM).

Having given the unit root properties of the variables we proceed to carry out the co-integration rank test to help us determine the number of co-integration equations in the Error Correction Model (ECM). The relevant data are shown in Table 2.

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

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.886702	68.18129	42.91525	0.0000
At most 1*	0.759041	31.15985	25.87211	0.0100
At most 2*	0.336220	6.966688	12.51798	0.3480

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
*Denotes rejection of the hypothesis at the 0.05 level
** Mackinnon-Haug-Michelis (1999) p-values

Source: *Extracted from output data; Authors' computation*

In table 2, the result of the trace statistic indicates two (2) co-integrating equations at 5% level. This can also easily be seen as two of the trace statistic values are greater than their critical value at 5% level. This reveals that there is a long-run relationship among the variables employed in the model. Having confirmed the fact that all the

1(1) variables are co-integrated in model, we proceed to estimate the Error Correction Model (ECM). The results of the regression are presented in Table 3.

Table 3: Estimated Regression Result: Dependent Variable: LOG(GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.09881	0.666069	16.66315	0.0000
EXCHR	0.013446	0.003035	4.431059	0.0010
INTR	-0.105247	0.018087	-5.818793	0.0001
INFL	-0.065812	0.015035	-4.377213	0.0011
ECM(-1)	0-006072	0.002006	-3.026250	0.0115
R-squared				
Adjusted R-squared	0.969938	Mean dependent var		10.35407
S.E. of regression	0.959006	S.D. dependent var		0.863694
Sum squared resid	0.174871	Akaike info criterion		-0.399227
Log likelihood	0.336380	Schwarz criterion		-0.157793
F-statistic	8.193813	Hannan-Quinn criter.		-0.386863
Prob(F-statistic)	88.72740	Durbin-Watson stat		2.031175
	0.000000			

Source: *Extracted from output data; Authors' computation*

Table 3 shows the estimated Error Correction Model (ECM) results on the impact of exchange rate fluctuations on economic growth in Nigeria, about 0.006 percent of the disequilibrium errors between the actual and the long-run or equilibrium value of Gross Domestic Product (GDP) accumulated in the previous period has been corrected in the current period. The ECM (-1) coefficient conforms to a priori expectation as its sign is negative and it is statistically significant, hence justifying by the use of the error correction model in this study.

The model with an adjusted R^2 of 0.9590 reveals that the independent variables (EXCHR, INFL and INTR) included in our model accounts for 95.90 percent changes in Nigeria economic growth (GDP), while the remaining 4.10 percent unexplained changes is due to other extraneous factors that accounts for the changes in economic growth which are captured by the error term. This implies that there is no misspecification error in the model. The F-ratio with 88.727 with probability values of 0.000 as well as a significant R-squared are all highly significant at the 5 percent levels; thus, the model has goodness of fit. Moreso, the Durbin Watson (DW) statistic of 2.031 imply that autocorrelation is not present in the model.

Discussion of Findings

From the result in table 3, the relationship between exchange rate fluctuation and economic growth in Nigeria shows that a unit change in EXCHR when all variables are held constant will lead to an increase in GDP by 0.0013 percent. The impact is positive and statistically significant with a significant t-statistic value 4.4310 and probability values of 0.001. Thus, exchange rate (EXCHR) impacts positively on

economic growth in Nigeria and this result is in line with the findings of Asher, (2012) who examined the impacts of exchange rate fluctuation on the Nigeria economic growth. The results showed that real exchange rate has a positive effect on the economic growth. In a similar study, Akpan (2008) investigated foreign exchange market and economic growth in an emerging petroleum based economy in Nigeria. He found that positive relationship exists between exchange rate and economic growth. Also Obansa, *et al.* (2013), Azeez, *et al*. (2012) examined the relationship between exchange rate and economic growth in Nigeria over different period as cited in the empirical review. The results indicated that exchange rate has a strong impact on economic growth and that the effect of exchange rate is positive related to Gross Domestic Product (GDP). But contrary to the finding of Aghion *et al.* (2009) who found a similar result, but they also showed that the negative effect of real exchange rate volatility on economic growth shrinks in countries with higher levels of financial development. Also Johnson (2012), investigated the effect of exchange rate movement on real output growth in Nigeria. The result revealed that there is no evidence of a strong direct relationship between changes in exchange rate and output growth.

The result in table 3 also shows that, a unit changes in interest rate (INTR) when all variables are held constant will cause a decrease in GDP by 0.1052 percent. The impact of interest rate on economic growth is negative and statistically significant with an absolute significant t-statistic value 5.8187 and probability values of 0.0001. This implies that interest rate (INTR) has significant positive impact on economic growth in Nigeria.

Similarly the result in that table 3 still shows that a unit change in INFL when all variables are held constant will lead to a decrease in GDP by 0.065 percent. This reveals that inflation in the result has a negative statistically significant impact on economic growth with an absolute significant of t-statistic value of 4.3772 and probability values of 0.0011. Thus, the relationship between inflation and economic growth is negative.

Conclusion

Exchange rate movement in developing countries are often sensitive and controversial, mainly because of the kind of structural transformation required, such as reducing imports or expanding non-oil exports, which invariably imply a depreciation of the nominal exchange rate. Such domestic adjustments, due to their short-run impact on prices and demand, are perceived as damaging to the economy. Ironically, the distortions inherent in an overvalued exchange rate regime are hardly a subject of debate in developing economies that are dependent on imports for production and consumption. This study which investigates the effect of exchange rate fluctuations on economic growth in Nigeria concludes that a movement in exchange rate is a crucial macroeconomic indicator in explaining change in economic performance in Nigeria. Also, stable exchange rate will curtail inflation, increase export, maintain a favourable

balance of trade, and help to solve the problem of deficits and increase the external reserve of the economy.

Recommendations

Sequel to the findings of this study, the following policy recommendations are suggested. To control exchange rate, these policies have to be adopted.

1. Strict foreign exchange control policies should be adopted in order to help in the determination of appropriate exchange rate value. This will go a long way to strengthen the naira.
2. The government should create incentive such as loan subsidy etc, to small scale industries, thereby encouraging them to process on domestic goods into processed goods that will help boast Nigeria's export.
3. The government should encourage the export promotion strategies in order to maintain a surplus balance of trade.
4. An effective policy should be made based on the fiscal and monetary policies which should be aimed at achieving a realistic exchange rate for naira.
5. An appropriate environment and infrastructural facilities should be provided so that foreign investors will be attracted to invest in Nigeria. This will provide employment opportunities; increase the level of income and the standard of living of the people.

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