



Effects of Exchange Rate Fluctuations on Economic Growth of Nigeria

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ABSTRACT

This study investigates the effects of exchange rate fluctuation on economic growth of Nigeria. Using annual data for the period 1986-2012, the study employed the ordinary least square (OLS) technique, the Johansson co-integration test and the error correction mechanism (ECM) to examine the relationship between exchange rate and economic growth. The result suggests that there is no strong relationship between exchange rate and economic growth in Nigeria. It is therefore suggested that Nigeria improve its competitive capacity in the international market through export diversification.

Keywords; Exchange rate, economic growth, exchange rate depreciation, exchange rate appreciation, co-integration.

1.0 INTRODUCTION

Developing countries are faced with many kinds of structural transformations, because of this exchange rate policies seem to be sensitive and controversial to their economies; nations therefore put extra efforts in the management of their exchange rate policies.

In Nigeria, the exchange rate policy has undergone substantial transformation from the immediate post-independence period when the country maintained a fixed parity with the British pound, through the oil boom of the 1970s, to the floating of the currency in (since) 1986, following the near collapse of the economy between 1982 and 1985 period (Akpan and Atan 2012). During the 1970s through the mid 1980s the Naira was pegged to order currencies mainly the Dollar, this exchange rate policy tended to encourage over valuation of the Naira as it swung between 0.71 and 0.89 to a dollar in 1970 through 1985 which encouraged imports of all kinds while discouraging non-oil exports. Nigerians' exchange rate has been more volatile in the post structural adjustment programme (SAP) period due to its excessive exposure to external shocks. The effect of the recent global economic meltdown on Nigerian exchange was phenomenon as the Naira exchange rate to the dollar rose astronomically from about N120/\$ to about N180/\$ (about 50% increase) between 2008 and 2009. This is attributed to the sharp drop in foreign earnings of Nigeria as a result of the persistent fall of crude oil price, which plunged from an all time high of US\$ 147 per barrel in July 2007 to a low of US\$45 per barrel in December 2008. (CBN,2008). Thinking in terms of supply and demand is a necessary first step toward understanding exchange rates, we need to know the perceptions and actions of international financial investors especially when dealing with the floating exchange rate. It is believed that the billions of Naira of foreign exchange trading that occurs each day is related to both international trade in goods and services and positioning/ repositioning of the currency composition of the portfolio of international financial investors. With this an exchange rate policy adopted by a country becomes very sensitive to macroeconomic shocks. Countries therefore tend to adopt exchange rate policy that absolve both internal and international trade shocks, this is because the performance of the country's economy is better if shocks are less disruptive as the economy is more stable with such policy.

Nigeria has adopted several exchange regimes. During the time of fixed exchange rate, the movement of exchange rate seemed to be stable but the economy were getting worse everyday, the alarming deterioration of the economy called for a change, hence the switch over to flexible exchange rate, the management of the floating exchange rate has not proved better as the naira deteriorates everyday and many macroeconomic variables are not stable. Hence, the effects of various macroeconomic shocks depend on the exchange rate policy adopted by the country, it is therefore important to investigate the effects of exchange rate fluctuations on the Nigeria economic growth and also the factors that influence exchange rate in Nigeria.

2.0 BRIEF REVIEW OF RELATED LITERATURE

2.1 Conceptual Issues

Exchange rate is the price of the currency of one country expressed in terms of the currency of another. For example, the Nigeria Naira has exchange rate against the U.S. dollar and many other currencies. It may be expressed as nominal exchange rate or real exchange rate.

The nominal exchange rate is a monetary concept which measures the relative price of two moneys e.g. Naira in relation to dollar ($\text{₦}/\text{\$}$), while the real exchange rate is a real concept that measures the relative price or value of different countries products. An exchange rate system can also be fixed or allowed to fluctuate. A fixed exchange rate is a system in which a country's exchange rate remains constant or stays within some small margin of fluctuation around a constant par value. On the other hand, the floating exchange rate (which is our concern in this study) is an exchange rate system with no government or central bank action to keep it stable (Black 2003). With floating rates external shocks especially foreign trade shocks are less disruptive and monetary policy is more effective in influencing aggregate demand (Pugel, 2007), hence economic growth is achieved. Economic growth is an increase in an economic variable normally persisting over successive periods. The variable concerned may be real or nominal. Growth in real economic variable such as Gross Domestic Product (GDP) for short periods or at low rate may occur by simply having similar activities conducted on a large scale. Rapid or persistent growth is likely to involve positive changes in the nature of economic activity while exchange rate fluctuation could encourage.

2.2 THEORETICAL LITERATURE

The earliest theory developed by Mundell (1961) and Mickinnon (1963) focused on trade and stabilization of the business cycle. According to the theory a fixed exchange rate regime can increase trade and out put growth by reducing exchange rate uncertainty and encourages investment by lowering currency premium from interest rates. On the other hand a flexible exchange rate could increase output growth and trade by price adjustment process. For this theory there is a positive relationship between exchange rate and economic growth.

Another standing point of exchange rate theory is the purchasing power parity (PPP) which is also called the inflation theory of exchange rates. This theory argues that the exchange rate will change so that the price of a particular good or service will be the same regardless of where you buy it. For this reason, the theory of PPP is often known as the law of one price. It is expressed with the equation:

$$E = P_{dd} / P_{ff}$$

Where;

E = Nominal exchange rate

P_{dd} = Domestic prices in domestic currency (P)

P_{ff} = Foreign prices in foreign currency (P^*)

This is simply expressed as $E = P/P^*$.

From the equation, it is deduced that E depends mainly on the factor that influence domestic price level. Therefore taking E as endogenously determined. A commonly used variant expresses the equation in terms of differences relating the changes in the nominal exchange rate of changes in relative prices. This is known as relative PPP: Showing that; $\% \Delta E = \% \Delta P - \% \Delta P^*$

Where $\% \Delta$ = Percentage change (Chamberline and Yaeh, 2006).

There is also the monetary theory of the exchange rate, according to this theory, the exchange rate is determined by the actions of the domestic monetary authority and is an extension of the simple quantity theory of money: $Mv = Py$.

Where M = Monetary stock; v = velocity of money in correlation, P = price level, Y = full employment of output. With V and Y being constant, the equation gives $P = 1/v (M/y)$, therefore $\% \Delta M = \% \Delta P$

If relative prices are determined by different monetary regimes, then it is easy to make the additional step; using the relative PPP equation, the change in domestic prices can then feed directly and proportionally into exchange rate; i.e. $\% \Delta M = \% \Delta P = \% \Delta E$. This takes exchange rate to be exogenously determined and its changes has effect on economic growth through changes in monetary stock. (Chamberline and Yaeh, 2006).

Another theory that explained exchange rate 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 favorable balance of payment raises the exchange rate, while an unfavorable balance of payment reduces the exchange rate. Thus the theory implies that the exchange is determined by the demand for and supply of exchange which depends on imports and exports of goods/services, international loans, reparation payments, etc. (Jhingan, 2003). It takes exchange rate to be endogenously determined.

2.3 EMPIRICAL LITERATURE

Changes in exchange rates are given various names depending on the kind of exchange rate regime prevailing. Under the floating-rate system, a fall in the market price of a currency is called a “depreciation” of that currency; a rise is an “appreciation. We refer to discrete official reduction in the otherwise fixed par value of a currency as a “devaluation”, “revaluation” is the antonym describing a discrete raising of the official par. In this sub-section, we tend to review the impact of this changes (changes in exchange rate) on GDP and by extension the factors that affect these changes.

According to Kandil, (2004), exchange rate fluctuations influence domestic prices through their effects on aggregate supply and demand. In general, when a currency depreciates it will result in high import prices if the country is an international price taker, while lower import prices result from appreciation. Gylfson and Schmidt (1983) studied ten countries using different estimates of key parameters of the model, and found that devaluation was expansionary in eight of the ten countries and contractionary in the other two countries. On the contrary Edward (1989) and Daiz-Alejandro (1965) examined the impacts of devaluation on GDP and other macroeconomic variables and observed that devaluation was contractionary. According to Daiz, devaluation induces a shift in income distribution towards savers, which in turn depresses consumption and real absorption. A panel estimation for about 18 countries carried out by Edwards and Levy-Yeyati (2003) observed that countries with more flexible exchange rates grow faster. This study was supported by Eichengream and Leblang (2003) whose study reveal a strong negative relationship between exchange stability and growth for 12 countries over a period of 120 years. The work of Mireille (2007) suggests that over valuation of exchange rates have constituted a major setback in the recovery process of Nigeria and Benin republic. The implication is that overvaluation of exchange rate reduces output growth. Another study by Adubi (1999) used empirical study to determine the dynamic effects of exchange rate fluctuations on exchange rate risk in agro trade flows. He observed that exchange rate changes have a negative effect on agricultural export. He concluded thus, the more volatile the exchange rate changes the low the income earnings of farmers which in turn leads to a decline in output production and a reduction in export trade. An interesting work was carried out by Batini (2004) and Mordi (2006) who examined the relationship between exchange rate, inflection and output in Nigeria; their models showed a contractionary impact on the parallel exchange rate on output in the short run. In an attempt to explain the inflation movement in Kenya, Ndung'u (1993) used Vector Auto Regression (VAR) analysis to analyse six variables- money supply, domestic price level, exchange rate index, foreign price index, real output and the rate of interest, he noted that the rate of inflation and exchange rate explained each other. Kamin and Klan (1998) used error correction technique to estimate a regression equation linking the output to the real exchange rate for a group of twenty seven countries. They did not find that devaluation were contractionary in the long run. But Morley (1992) estimated the effect of real exchange rates on output for twenty eight developing countries that devalued their currencies using a regression analysis, he observed that depreciation of the level of the real exchange rate reduced the output. Akpan and Atan (2012) investigated the effect of exchange rate movements 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 results suggest that there is no evidence of a strong direct relationship between changes in exchange rate and output growth, rather Nigerian's economic growth has been directly affected by monetary variables.

In literature, there seems to be a consensus view on the fact that devaluation or depreciation could boost domestic production through stimulating the net export components. This assertion has a mixed support as evidenced in our empirical study. Many authors argue that devaluation most at times leads to contractionary growth of the economy. Based on this fact, we found the need to carry out a research on the subject matter.

3.0 METHODOLOGY

The study aims at providing empirical evidence on the effect of exchange rate and some other selected macroeconomic variables on economic growth of Nigeria. Theoretically, exchange rate fluctuations – depreciation or appreciation of the exchange rate effect economic growth, so also do such variables like money supply and inflation direct the movement of the growth in the economy. To determine the effect of these variables on economic growth, we employed annual time-series data from 1986-2012, sourced from Central Bank of Nigeria (CBN), statistical bulletin, the data was analysed using the Augmented Dickey-Fuller unit root test, Johansen co-integration test and error correction mechanism, (ECM) in case there is co-integration among the variables.

3.1 SPECIFICATION OF THE MODELS

Output equation;

$$RGDP = f(Ms, ER, IMF) \text{ --- (1)}$$

This is specified in econometric form as:

$$YR_t = \alpha_0 + \alpha_1 Ms_t + \alpha_2 ER_t + \alpha_3 INF_t + \alpha_4 YR_{t-1} + \mu \text{ ---- (2)}$$

Where

YR_t = Growth rate of real GDP (RGDP)

Ms_t = Growth rate of money supply ($Ms = M_2$)

ER_t = Nominal exchanges rate (ER)

INF_t = Rate of inflation (INF) yearly average consumer price Index.

YR_{t-1} = Lag of real GDP

EXCHANGE RATE EQUATION

$$ER_t = \alpha_0 + \alpha_1 YR_t + \alpha_2 Ms_t + \alpha_3 INF_t + \alpha_4 ER_{t-1} + U \text{ ---- (2)}$$

Where

α_0 = Intercept,

α_{1-4} = Parameters to be estimated and

μ = iid stochastic error term,

t = Time subscript

Note: Similar symbols in the two equation means the same.

4.0 DATA ANALYSIS AND INTERPRETATION OF RESULTS

This section provides in detail the analysis of data used in the study and the interpretation of the empirical results. It is a step by step analysis, beginning from the unit root test to the regression analysis.

4.1 UNIT ROOT TEST

Non-stationary data produces spurious regression; hence the result may be misleading. Therefore, it is cognizant to establish the stationarity of data to be used. This is carried out using the Augmented Dickey-Fuller (ADF) unit root test. The decision rule is that the ADF test statistic value must be greater than Mackinnon critical value of 5% in absolute value.

Table 1: Unit Root Test Result

Variable	At level		At 1 st level		Order of integration
	ADF Stat	Prob	ADF Stat	Prob	
-					-
YR _t	-0.509113	0.9830	-6.415652	0.0000	1(1)
MS _t	-1.323470	0.6015	-9.777589	0.0000	1(1)
ER _t	-0.414807	0.8926	-4.849915	0.0007	1(1)
INF _t	-2.417951	0.1736	-3.088421	0.0430	1(1)

Note: The maximum critical values at 5 percent level and at 1st difference are 2.981038 and 2.986295 respectively.

The result of table 1 above showed that the variables are non-stationary in level form since their ADF values are less than their critical values at 5%, the null hypothesis of a unit root was accepted for all the variables but was rejected at 1st difference (ADF value > critical value). We therefore conclude that the variables under investigation are integrated of order one 1(1). Since the variables are integrated of the same order, 1(1), we proceed to examine their co-integration relationship using the Johansson co-integration test.

4.2 CO-INTEGRATION TEST

Given the unit root properties of the variables, we proceed to carry out the co-integration test.

Table 2: Johansson Co-integration Test

Series: YR_t, MS_t, ER_t, INF_t

Table 2:Lags intervals (in first difference); 1 to 1

Hypothesized No of CE(s)	Eigen value	Trace statistic	0.05 critical value	Prob**
None *	0.580798	61.08467	47.85613	0.0018
At Most 1*	0.568140	39.34958	29.79707	0.0030
At Most 2*	0.519709	18.35823	15.49471	0.0180
At Most 3	0.000966	0.024150	3.8414766	0.8764

Note: * denotes rejection of the hypothesis at the 0.05 level.

** Mackinnon-Hang-Michelis (1999) P-values.

from the table above, it could be deduced that the Trace statistic of 61.08 is greater than 5% critical value of 47.86; indicating that at least there is one co-integrating equation hence the none* hypothesis was rejected. This shows the existence of a long-run equilibrium relationship among the variables. Consequently, we adopt the error correction mechanism which was specified in case, co-integration was established among the variables.

Equation 2 is therefore rewritten to determine both short and long run impact of the independent variables on economic growth of Nigeria.

$$\Delta YR_t = \alpha_0 + \lambda(YR_t - \delta x_{t-1}) + \alpha_1 \Delta MS_t + \alpha_2 \Delta ER_t + \alpha_3 \Delta INF_t + \alpha_4 \Delta YR_{t-1} \text{ -----(4)}$$

Where;

- Δ = Difference operator
- λ = The long run multiplier
- $(YR_t - \delta x_{t-1})$ = The error correction term (ECM)
- X_{t-1} = Exogenous variable that are integrated of order zero

4.3 MULTIPLE REGRESSION RESULTS

The result of the equations are presented below

Table 3: Result of the growth of GDP equation

Dependent variable $\Delta(YR_t)$					
Variable	Coefficient	Std error	t. stat	Prob.	
C	3927709	381059.3	1.030734	0.3150	R square =0.617287 Adj R ² = 0.521609 F.Stat =6.451702 Prob(F.stat)=0.001008 Durbin-Watson (DW) Stat = 1.593642
$\Delta(MS_t)$	1.695984	0.412024	4.116230	0.0005	
$\Delta(ER_t)$	-41617.90	19876.00	-0.735455	0.4706	
$\Delta(INF_t)$	-9320.73	18183.09	-0.512604	0.6138	
$\Delta(YR_t(-1))$	0.098077	0.036111	2.715949	0.0133	
ECM(-1)	0.524917	0.242128	-2.167933	0.0426	

Table 4: Result of exchange rate equation

Dependent variable $\Delta(ER_t)$					
Variable	Coefficient	Std error	t. stat	Prob.	
C	6.750305	4.915889	1.373161	0.1842	R. square =0.292361 Adj R ² = 20.6237 F.Stat =2.349168 D. W. Stat = 1.932576
$\Delta(YR_t)$	-6.17E-07	2.29 E-06	0.247767	0.8067	
$\Delta(MS_t)$	-5.11 E-06	5.56 E-06	-0.919409	0.8067	
$\Delta(INF_t)$	0.034660	2.203054	0.170695	0.8661	
$\Delta ER_t(-1)$	0.039948	0.084966	0.470166	0.6431	

The interpretation of the equation results begins with the growth rate of GDP equation. This result shows that economic growth is determined by money supply and lag of growth rate of GDP in the Nigeria context, it therefore means that Nigeria's economic growth has been effected more by money supply and past levels of GDP rather than exchange rate. The theory that exchange rate effects output and trade is not demonstrated by this result. The reason being that Nigeria is near to mono economy, such that the greater percentage of her export is from one product (the oil), therefore the advantage of exchange rate depreciation is not reaped because the country has not diversified her export opportunities. An explanatory power of 61.7% is a proof that the exogenous variables fit reasonably well, while the D.W. statistic of 1.59 indicates absence of first order serial correlation. The result shows that the error correction term (ECM) for the estimated RGDP equation is statistically significant and negative. Thus it will rightly act to correct any deviations from long-run equilibrium. The coefficient of 0.5249 denotes that about 52.3% of any past deviation will be corrected in current period.

In the second equation (Exchange Rate Equation) it was found that the relationship between exchange rate and Nigerian macroeconomic variable (as employed in our analysis) are very weak. The explanatory power of 29.2361 is very low and none of the independent variables is significant at 5% level of significant. This result contradicts Akpan and Atan (2012) whose work found money supply and lag of exchange rate to be significant in explaining the movement in exchange rate. One interesting outcome is that the D.W. Statistic shows absence of any first order serial correlation indicating that the poor result is not a problem of model specification.

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

This paper investigated the effects of exchange rate movements on economic growth of Nigeria. The result demonstrated that no strong relationship exists between the exchange rate movement and economic growth in Nigeria which contradicts many existing literature. However, we uphold our result because even the variables that are expected to effect the exchange rate were found to be insignificant in determining the changes in exchange rate. This however does not change the fact that exchange rate is an important economic metric as it reflects underlying strength and competitiveness with world economics (Akonji, 2003) rather it calls for sober reflection and stronger policy

implementation that could strength macroeconomic variable in Nigeria to perform well. There is urgent need for Nigeria to diversify her product and export opportunities so as to become price giver and not a price taker in the international market. This study also suggests that further studies investigate the relationship between export of goods/services, foreign direct investment, international investment in the Nigeria capital market and movements in exchange rate in Nigeria.

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