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Re-examining the Relationship between Inflation, Exchange rate and Economic Growth in Nigeria

Adekunle O. Ahmed¹

Abstract: This paper re-examining the relationship between inflation, exchange rate and economic growth in Nigeria. The study used annual time series data from 1981 to 2016 sourced from Central Bank of Nigeria Statistical Bulletin (CBN). The study employed ARDL Model to test for short and long run relationship among the variables. The empirical results show that there is long run relationship among the variables. The short run result reveals that only inflation has a negative relationship with economic growth in Nigeria. The indirect relationship between inflation and economic growth requires urgent attention by government because variation in exchange rate translate to export and import of goods and services will be associated with inflation as the fluctuation in exchange rate leads to upward and downward trend in price.

Keywords: ARDL; Exchange rate; Inflation; Economic growth

1. Introduction

Issues on exchange rate movement and inflation on economy has remained an interesting puzzle in the literature. Given the implications of such movement on the economic growth, it required an adequate attention to be tackled by any government in most developing countries, especially in Nigeria, where exchange rate has remained devastated while the problem of high inflation persists.

Nigeria as a country has experimented many policies within the scope of fixed and exchange rate systems over the years. The objective of change in policies within time is to stabilize price and attain other crucial macroeconomic goals (Ezeh & Obi, 2016).

Inflation has unstable movement in Nigeria as a result of changing in government. Maintaining a moderate inflation rate has been a global objective of regulatory bank of Nigeria (CBN) since the Structural Adjustment Period (SAP) (Afolabi & Efunwoye, 1995).

It is important to state that changes in exchange rate and inflation influenced investment decision as well as economic growth of a country. Local firms as well as those involved in international trade will increase their level of investment, especially, if the exchange rate and inflation rate are at moderate level (Razin & Collins, 1997). The aim of this paper is to re-examine the empirical relationship between inflation, exchange rate and economic growth in Nigeria.

2. Literature Review

Numerous studies have been done to show the possible effect of exchange rate and inflation on economic growth.

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Razin and Collins (1997) examined the relationship between economic growth and real exchange rate, considering investments and tradable products sector as channels through which the RER deviation may affect economic growth. They came to the conclusion that only a very high overvaluation seems to be associated with slower economic growth, while moderate to high (but not too high) undervaluation of real exchange rate appears to stimulate economic growth.

Eichengreen and Lablang, (2003) carried out a research on twelve countries over a period of 120 years and found strong inverse relationship between exchange rate stability and economic growth. They concluded that the results of each estimates strongly depend on time period and the sample. Schnabel (2007) identified robust evidence through panel estimation that the exchange rate stability is associated with more growth in the European monetary unit (EMU) periphery. The evidence according to him is strong for emerging Europe which has moved to more stable environment. Odili (2015) examined the Macroeconomic Variables and Exchange rate Dynamics in Nigeria. They employed a multiple econometric tools which revealed a negative relationship between exchange rate volatility and the manufacturing performance. Jin (2008) carried out a comparative study of exchange rate stability and volatility and found out that the appreciation of the exchange rate increases the gross domestic product (GDP) in Russia while it reduces the gross domestic product (GDP) in Japan and China. Razazad, Haghiri and Behrooznia (2011) identified in Iran that during stagnation and low price period that the depreciation of currency have positive and significant effect on real GDP while depreciation of currency have significant effects on real GDP in high price period. Aliyu (2011) found out that appreciation of exchange rate exerts positive influence on real economic growth in Nigeria.

Carrera and Vuletin (2003) analysed the relationship between exchange rate regimes and short term volatility of the effective real exchange rate. They tried to set out the relative importance of these links specifically by analysing the exchange rate regimen influence on real exchange rate (RER) volatility using a dynamic panel date analysis. A sample of 92 countries for the period 1980-1999 was considered. The study revealed that other variables influences real exchange rate (RER) volatility and it also analysed the persistence of shocks in real exchange rate (RER). The study further found evidence of more openness, acceleration in per capita Gross Domestic Product (GPD) growth, reduction and volatility. Evidence from the study also supports the view that the analysis of the dynamics of the exchange rate regime needs to differentiate between developing and developed countries. Benita and Lauterbach (2007) studied the daily volatility of exchange rate between the United States of America dollar and 43 other currencies in 1990-2001. This study used several macroeconomic variables to proxy for the domestic economy uncertainty, wealth and openness to international markets as controls in the analysis. The main findings of the study were that exchange rate volatility was positively correlated with real domestic interest rate and with the degree of the central bank intervention. In the panel, the study finds positive correlation between exchange rate volatility, real interest rates and the intensity of the central bank intervention.

In Nigeria, studies have been conducted to estimate exchange volatility as was predicated in the studies of Akpokodje, 2009. Aliyu, 2011, Obaseki, 2001, Ogunleye, 2009, Olowe, 2009, Yinusa and Akinlo, 2008. Most of the studies in exchange rate volatility in Nigeria measure the impact of exchange rate volatility on trade balance with little attention to other macroeconomic variable shocks. Akpokodje (2009) explored the export and import effect of exchange rate volatility with specific reference to the non-communuate Finnaciene Africaine (Non-CFA) countries of Africa during the period 1986-2006. The study revealed a negative effect of exchange rate volatility on exports and imports in the selected African countries. The adverse effect of the exchange rate volatility in the

sample countries found in the study suggests the need for policy interventions that will help minimize and where possible eradicate exchange rate volatility. Also Yinusa (2008) investigated the relationship between nominal exchange rate volatility and dollarization in Nigeria by applying Granger Causality Test for the period 1986-2003 using quarterly data. The study reported a bi-causality between them but the causality from dollarization to exchange rate volatility appears stronger and dominant. He however, concluded that policies that aim to reduce exchange rate volatility in Nigeria measures that specifically address the issue of dollarization. But the exact measure of exchange rate volatility in the study was not reported.

From the reviewed of empirical literature, it is cleared that there is scanty literature on relationship between exchange rate, inflation and economic growth in Nigeria. The previous studies either show the effect of inflation on economic growth or the effect of exchange rate on economic growth. Hence, this study bridges the gap in literature.

3. Research Method

The analysis of the relationship between exchange rate and inflation in the economic growth process is often achieved using regression analysis which can be explicitly or implicitly stated based on a theoretical framework of endogenous models (King & Levine, 2004). Thus, the level of impact of exchange rate and inflation on the economic growth of Nigeria is assumed to be influenced by several variables as “y” which represents the official gross domestic product (GDP) and “x” which include among others, inflation (INFLA) and Exchange rate (EXCH) .If these assumptions are right, then a multiple linear regression analysis could be adopted and specified thus;

$$GDP = f(INFLA, EXCH)$$

Where:

GDP = Gross Domestic Product

INFLA = Inflation

EXCH = Exchange rate

$$GDP = \alpha + \beta_1 INFLA + \beta_2 EXCH + u_t \quad (ii)$$

The ARDL model specification is;

$$GDP = \alpha + \sum_{i=1}^{\eta} \beta_i GDP_{t-i} + \sum_{i=0}^{b_1} \theta_i INFLA_{t-1} + \sum_{i=0}^{b_2} \mu_i EXCH_{t-1} + u_t \quad (iii)$$

$$GDP = \alpha + \sum_{i=1}^{\eta} \beta_i GDP_{t-i} + \sum_{i=0}^{b_1} \theta_i INFLA_{t-1} + \sum_{i=0}^{b_2} \mu_i EXCH_{t-1} + u_t \quad (iv)$$

$$GDP = \sum_{i=1}^{\eta} \beta_i \Delta GDP_{t-1} + \sum_{i=0}^{b_1} \theta_i \Delta INFLA_{t-1} + \sum_{i=0}^{b_2} \mu_i \Delta EXCH_{t-1} + u_t \quad (v)$$

Obtain the error term as

$$W_t = GDP_t - (\beta_1 INFLA_{t-1} + \beta_2 EXCH_{t-1}) \quad (vi)$$

3.1. A Priori Expectation

Independent Variable	Full Name	Expected Sign
INFLA	Inflation	-/+
EXCH	Exchange rate	-/+

4. Data Analysis and Interpretation

4.1. Empirical Result

Table 1

Series	ADF-Stat	5%	p-value
EXCH	-0.1356	-2.948	0.558
EXCH(1)	-6.0332	-2.951	0.000
INFLA	-2.9085	2.9481	0.054
INFLA(1)	-5.7623	-2.951	0.000
GDP	-4.514	-2.948	0.000

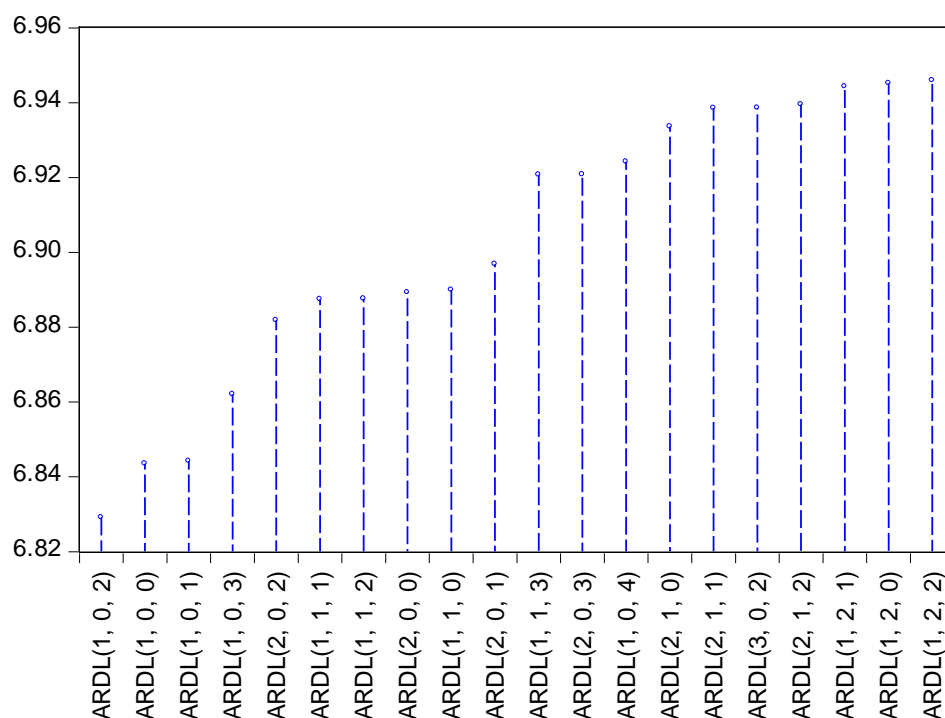
Source: Author's Compilation, (2017)

The ADF test in Table 1 shows that EXCH and INFLA are I(1) series, while GDP is I(0). Since the level of integration differs among the variables, the use of Johansen co-integration technique to determine their long run equilibrium becomes inappropriate. Thus, the study adopts the Autoregressive Distributive Lag (ARDL) approach to determine the relationship between the variables.

Table 2. ARDL Bounds Test (1981-2016)

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	8.467239	2
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Akaike Information Criteria (top 20 models)



From the Bounds testing (ARDL) in table 2 above, it is cleared that the F-Statistic is higher than the lower and upper bound limits. It is concluded that there is long-run co-integration relationship among the variables and the Akaike information depicts the automatic selection is 4 and shows the combination of the lag period and the effects on each variables. This means that jointly the exogenous variables are significant. Therefore, the study proceeds to short run relationship of the variables.

Table 3. Short run Error Correction Model Result using ARDL Approach (1981-2016)

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH)	0.039772	0.022605	1.759458	0.0494
D(INFLA)	-0.112701	0.087828	-1.283203	0.2099
D(INFLA(-1))	0.132584	0.088426	1.499367	0.1450
CointEq(-1)	-0.858973	0.173032	-4.964228	0.0000

$$\text{Cointeq} = \text{GDP} - (0.0463 \cdot \text{EXCH} - 0.0273 \cdot \text{INFLA} + 1.0675)$$

Source: Author's Computation, (2017)

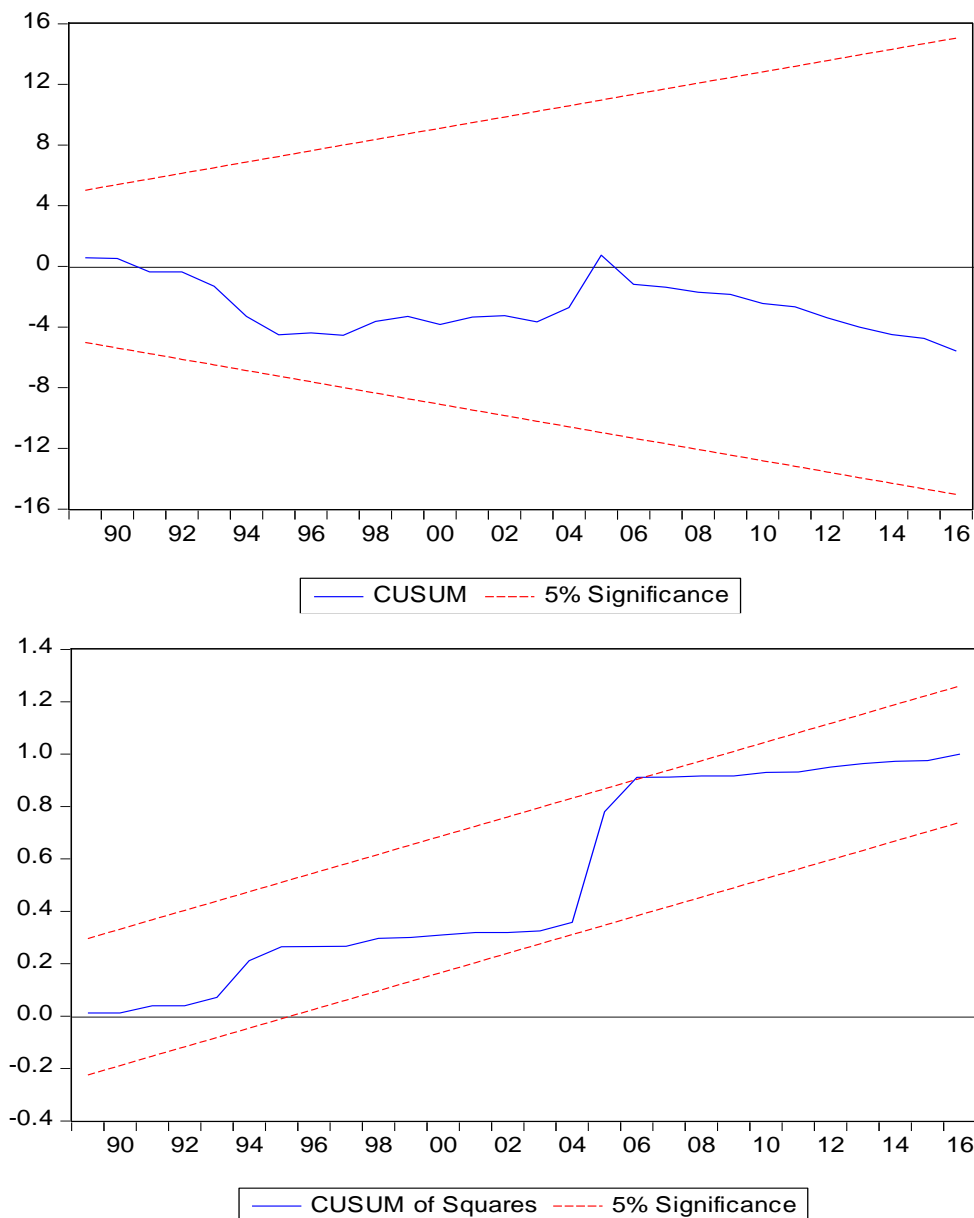
The result of the table 3 indicates that there is direct effect of the lags of the EXCH, while INFLA shows a negative relationship on Nigeria economy. The exchange rate (EXCH) shows a positive effect on GDP which implies that a rise in EXCH will lead to a corresponding increase in GDP in Nigeria. The inflation (INFLA) shows a negative relationship on Nigerian Economy which implies that a change in M will lead to decrease in GDP but non-significant at 5%.

From this result it is cleared that exchange rate and inflation have a long and short run effect on Nigerian economy. Inflation has a negative effect but non-significant, which has serious economic implication on Nigerian economy. The Error Correction Mechanism (ECM) is used to determine the

short run dynamics of the variables. The ECM coefficient must be negative, less than one and significant at 5%. Our results validate these properties because the coefficient of the ECM is -0.85, less than one and using probability value of the ECM, the study affirms that it is highly significant with $p = 0.0000$.

4.5. Stability Test

This study adopts stability test in order to confirm the stability of the econometric model employed in the study. In this regard, the study used CUSUM and CUSUM sum of Square which confirm that our model is reliable and good for policy implications as result that the blue line fall within the red line.



5. Concluding Remarks

This study re-examining the relationship between exchange rate, inflation and economic growth in Nigeria. The ARDL results obtained show that there is positive relationship between exchange rate and GDP in the short run and this result is in line with apriori expectation. It technically means that an increase in exchange rate will lead to increase in GDP. The inflation has expected sign but it is non-significant. This is because in view of exchange rate variations, export and import of goods and services will be associated with inflation as the fluctuation leads to upward and downward trend in prices. The study established that exchange rate and inflation need more adequate attention and supervision by government since Nigeria has propensity to grow its GDP.

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