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HOW FAR DOES CURRENCY DEPRECIATION AFFECT DOMESTIC OUTPUT IN NIGERIA?

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ABSTRACT

Since 1986 when Nigeria implemented series of economic reforms, the country's currency has experienced considerable changes in value mainly in the form of depreciation. Towards obtaining a realistic value, various exchange rate policies were adopted with the focus of making the exchange rate market driven. The main result from the various experiments has been the continuous depreciation of the Naira against major international currencies. While there is consensus among economists about the importance of exchange rate in macroeconomic management, opinions differ considerably on the specific impact of exchange rate depreciation on aggregate output. It is on this premise that this study examines how far currency depreciation affects domestic output in Nigeria. To achieve this objective, this study uses Granger causality test and ECM estimation technique. The variables were found to be non-stationary at levels but stationary after first differencing and were also co-integrated. The result from the estimation of the domestic output function shows that depreciation of the Naira exerts positive impact on the level of domestic output in the long run but a negative impact in the short run. The main implication drawn is that though a depreciation of the domestic currency could cause domestic output and prices to change, the final effect may be indeterminate, depending on the impact of other output growth determinants. It was recommended that the reinforcement of import substitution strategy should be vigorously pursued to reduce pressure on available foreign currencies and also ensure stability in the exchange rate of the domestic currency.

Key words*: Domestic output, depreciation, purchasing power parity, ECM, Nigeria*.

INTRODUCTION

The Nigerian Naira has experienced considerable changes in value for some years now; most of the changes are however in the form of depreciation. Depreciation is a reduction in the exchange rate of a country's currency in relation to the rate of other currencies, a more common phenomenon of floating exchange rate regimes in developing countries. The boom in oil revenue enjoyed by Nigeria in the 1970s started dwindling in 1981 when the world oil market began to collapse. This in itself led to a sharp decline in the nation's external reserves. The effects became obvious as supply of raw materials and spare parts were reduced, resulting in extensive plant closures. Indeed, by 1986, the government had to introduce an economic recovery programme that was expected to solve all economic problems in the country. Implementation of the programme started with the adoption of the Second-tier Foreign Exchange Market (SFEM) in September 1986 as a major means of achieving a realistic exchange rate for the Naira through the market forces. To enlarge the scope of the Foreign Exchange Market, Bureau de Change were introduced in 1989 for dealing in privately sourced foreign exchange that would allow small users have access to the needed foreign exchange.

By 1994, further reforms were introduced in the Foreign Exchange Market to deal with wild variations in exchange rates. These included the formal pegging of the Naira exchange rate, the centralisation of foreign exchange in the Central Bank of Nigeria (CBN), the restriction of Bureau de Change to buy foreign exchange as agents of the CBN, the reaffirmation of the illegality of the parallel market and the discontinuation of open accounts and bills for collection as means of payments.

In recognition of the role of an appropriate exchange rate in the recovery of an ailing economy, the Federal Government outlined new broad policies in 1994 aimed at stabilizing and probably improving the value of the Naira. Among other policy measures, the exchange rate was pegged at ₦21.9960 to the US Dollar, designed partly at instilling orderliness into the foreign exchange market, which also encouraged increased activities in the productive sectors of the economy.

Indeed by 1995, the Foreign Exchange Market became liberalised with the introduction of an Autonomous Foreign Exchange Market (AFEM) for the sale of foreign exchange to end-users by the CBN through selected authorised dealers at market determined rates. In addition, Bureau de Change was accorded the status of authorized buyers and sellers of foreign exchange. The Foreign Exchange Market was further liberalized in October 1999 with the introduction of an Inter-bank Foreign Exchange Market (IFEM).

In July 2002, the government adopted the Dutch Auction System (DAS) where every bank was allowed to buy foreign exchange from the Central Bank at individual rates. The huge dwindling in the price of oil below $30 per barrel in late 2012, coupled with an exchange rate of ₦156 to the US Dollar by January 2013 led to a continuing debate on the desirability of further depreciation of the currency.

This research is therefore focused on examining the nature and extent of the effects of depreciation on the domestic output in Nigeria. Following the introduction is the literature review that contains both theoretical and empirical review. Section three presents the theoretical framework for the study and model specification. Section four contains results analysis and interpretation. In section five, we discuss the findings and proffer policy implications of the results. The last section concludes the paper.

LITERATURE REVIEW

Theoretical Review

Currency devaluation can arise from two sources: market forces or deliberate government intervention. In the first case, the global financial market changes its opinion about the stability in value of a currency and decides to part with less units of the foreign currency. In the second category, a nation's government fixes the relative price of its currency at a particular level, and thus prohibits exchange at any other rate.

Various theoretical arguments exist on the possible effects of exchange rate shocks on the economy. A negative exchange-rate shock can be contractionary in nature by generating a decline in aggregate real activity and also reducing the price level; however, it can also generate a negative real balance effect which in turn lowers aggregate demand, thereby leading to lower domestic output too. It has equally been argued that positive exchange-rate shock can generate a redistribution of income from a group with a low marginal propensity to save to that with a high marginal propensity to save; this results in a decline in aggregate demand and output (Krugman and Taylor, 1978). In addition, where the price elasticity of imports and exports are sufficiently low, positive exchange-rate shock may worsen trade balance expressed in domestic currency, thereby generating a recessionary effect (Akinlo and Odusola, 2013).

There have been calls for a return to the fixed exchange rate regime of the past; however, the Optimum Currency Area as a theoretical underpinning specifies that even though a fixed exchange rate system reduces rate uncertainty and can increase output level, it can also act to reduce output through a sluggish price adjustment process. More importantly, the policy thrust of the Nigerian government is not in a hurry to swerve from the current floating exchange rate system.

The Purchasing Power Parity (PPP) Theory

The Purchasing Power Parity (PPP) simply states that a unit of any given currency should be able to buy the same quantum of goods in all countries. Many economists believe that the PPP describes the forces that determine exchange rates in the long run. Accordingly, the nominal exchange rate between the currencies of two countries must reflect the different price levels in those countries. The theory is based on the law of one price: that in the absence of trade barriers and transportation costs, spatial commodity arbitrage ensures that the price of any good is equalized across countries. This shows that there exists a proportional relationship between the exchange rate of the currencies of two countries and their relative inflation rates.

The Uncovered Interest Parity (UIP)

The Parity assumes that capital is perfectly mobile across countries, as there are no exchange controls, no transaction costs, while investors are risk neutral. This is such that assets denominated in different currencies are regarded by investors as perfect substitutes. Hence, the law of one price will hold for asset returns rather than prices of tradable goods. Under this scenario, if the expected changes in the nominal spot exchange rate reflect that expected inflation rates in two countries remains constant, then UIP implies that the real interest rates will be the same in the two countries.

The Balance of Payment (BOP) Model

The BOP model explains that exchange rate is determined by the level of capital flow arising from international trade in goods, services and financial assets, such that the balance of payment equality is maintained at all times. It thus uses the concept of "balance" in the balance of payment as a condition of equilibrium in the foreign exchange market.

Empirical Review

There had been argument in Business Times (2002) that the instability and continuous depreciation of the naira has done a lot of damages to the macro economy of the country; among these damages are the declining standard of living of the populace, increased cost of production, and cost push inflation. These have also tended to undermine international competitiveness of the nation's non-oil exports. Soludo (2007) added other impacts of depreciation to include increase in domestic prices of imported intermediate goods, inflation, and low level of real per capita income arising from the fall in household income and real wages. There is also deterioration in the growth of domestic private investment owing to exchange rate uncertainties, low business confidence, credit crunch, and a proportionate increase in the value of external debts exposure that are denominated in foreign currencies.

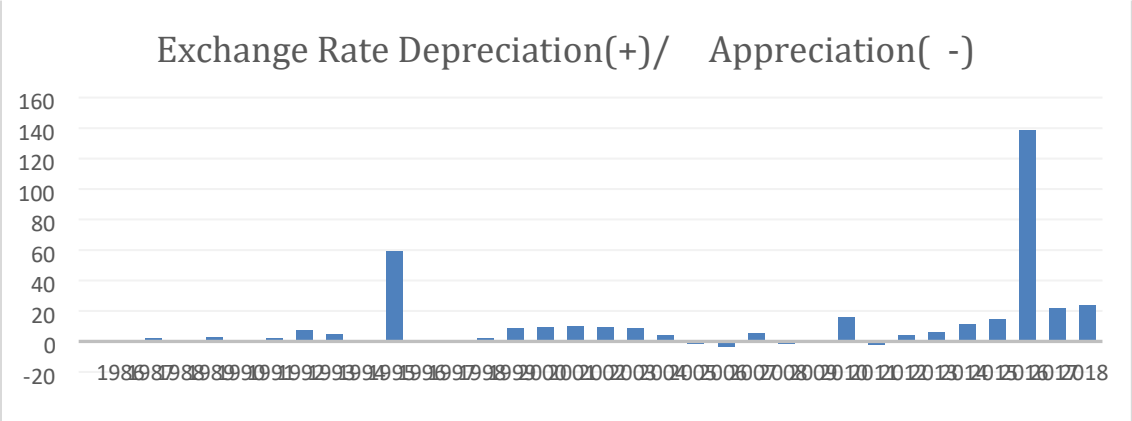

Figure 1: Exchange Rate Depreciation (+)/Appreciation (-)

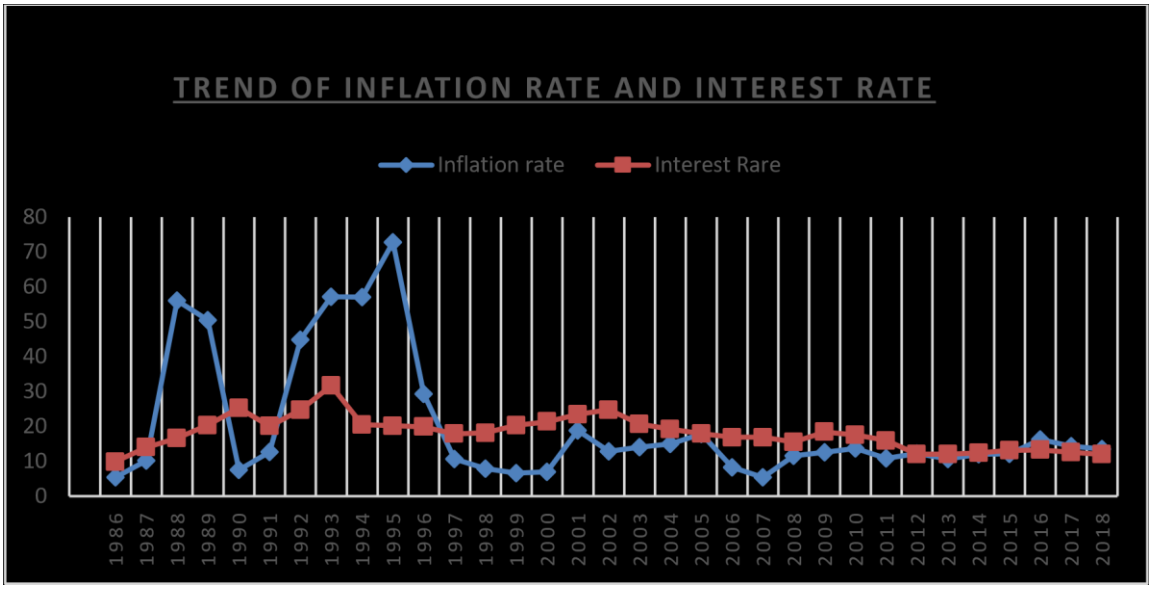

Figure 2: Trend of Inflation and Interest Rate

Using panel estimations for a group of 180 countries, Edwards and Levy Yeyati (2003) found evidence that countries operating flexible exchange rate grow faster; Eichengreen and Lablang (2003) however found strong negative relationship between exchange rate stability and growth for 12 countries over a period of 120 years. They conclude that the results of such estimations strongly depend on the time period and the sample.

The often-held notion that devaluation stimulates export and curtails import has also been controverted. For instance, Abeysinghe and Yeok (1998) empirically investigated the impact of currency appreciation on the exports of Singapore, and found that import and exports are not adversely affected by currency appreciation. Thus, Singapore becomes a particularly interesting case study as it has been experiencing sustained export growth despite currency appreciation. Ehinomen and Oladipo (2012) asserted that since Nigeria is heavily factor-input import dependent, the inability to source the required inputs in the manufacturing sector locally is a chronic problem. Consequently, the exchange rate plays an important role in the ability of the economy to attain a realistic growth in the manufacturing sector.

While Rogoffs and Reinhartl (2004) opined that developing countries are relatively better off with flexible exchange rate regimes, Oyejide and Udun (2010) felt that countries at a relatively early stage of financial development and integration are better-off choosing fixed or relatively rigid regimes. Still, Anyanwu (1997) observed that gradual and timely devaluation with adequate fiscal management could have been the key ingredient of macroeconomic stability in developing countries.

Using error correction model, Adebiyi and Dauda (2009) argued on the contrary that trade liberalization promoted growth in the Nigerian industrial sector and stabilized the exchange rate market between 1970 and 2006. To them, there was a positive and significant relationship between index of industrial production and real export. By implication, the policy of deregulation impacted positively on export through exchange rate depreciation. However, the study of Rodric (2006) on the relation between exchange rate and economic growth in Kenya revealed the inconclusive: that there was no statistically significant direct relationship between the two variables.

Zafar and Zahid (2013) examine the effects of some of the key macroeconomic variables on economic growth by employing multiple regression framework and time series data over the period 1959/60 to 1996/97. The quantitative evidence shows that primary education is an important precondition for accelerating growth. Kolawole (2013) asserted that macroeconomic stability is fundamental basis of sustainable economic growth, because it increases national saving and private investment, just as it improves exports and balance of payments with improved competitiveness. Equally, Ismaila and Imoughele (2015) examined the macroeconomic determinants of economic growth in Nigeria. Their results showed that gross fixed capital formation, foreign direct investment and total government expenditure are the main determinants of Nigeria's economic output under a stable inflationary rate. Probably as a mid-way, Olisadebe (1991) suggested that stability should not imply fixing the exchange rate; rather, the rate should be allowed to vary in a manner that should further the achievement of other macroeconomic objectives.

Considering the role of global trade, and using annual time series data from 1981 to 2008, Edoumiekumo and Opukri (2013) evaluated economic growth factors in Nigeria. The result showed two co-integrating equations which established the existence of long run relationship. Inyiama (2013) examined the nexus between inflation rate and economic growth in Nigeria for the period 1979-2010 by using the Johansen-Juselius cointegration technique of the Ordinary Least Squares (OLS) approach. The empirical results indicated that inflation rate has negative relationship with real gross domestic product, while exchange rates and interest rates have positive but insignificant relationship with inflation rate. The results of the Granger causality revealed that even though causality does not run between inflation rate and real gross domestic product in the country, unidirectional causality runs from exchange rate to real gross domestic product.

Owolabi (1992) states that although the market driven exchange rate has succeeded in removing the problem of currency devaluation, problem of devaluation is as a result of over-liquidity in the system resulting from expansionary fiscal and monetary developments, and the activities of some speculative market operators. He further advised that to reduce or eliminate the depreciation of the Naira, inflation should be reduced through fiscal and monetary restraints and the application of appropriate supply increasing measures.

With these differing findings, devaluation may sometimes bring an ambiguous effect on domestic output and trade balance.

METHODOLOGY

Theoretically, changes that occur to domestic output are much related to what happens to the levels of exchange rate, level of interest rate, and the rate of increase in the average price level. It is also expected from theory that an exchange rate shock will lead to changes in domestic output, while increase in inflation rate will decrease domestic output just as a reduction in interest rate will boost production. Under a floating exchange rate system, traded currencies often have fluctuations in their values; such changes depend on the intensity of the demand and supply conditions in the

foreign exchange market. In Nigeria, different foreign currencies are traded, although the United States Dollar represents a major currency of reference.

The price elasticity approach may be particularly relevant to Nigeria considering the high dependency nature of the economy on imported inputs. The basis of this lies in the Marshall-Lerner condition that devaluation brings a positive effect on trade if the sum of the demand elasticity for exports and imports exceed unity. Thus, with this framework, if the demand for US dollar is given as:

$D_{\$} = f(R)$ ……. (1)

Where, $D_{\$}$ shows the amount of Dollar demanded while R is the Naira price of Dollars, such that:

$\frac{dD\$}{dR} = f'(R) < 0$. The supply-of-Naira function can be derived from (1) above as:

$S_{₦} = g(^1/R) = Rf(R)$ …… (2)

If we now allow a given R to be R*, such that:

$R^* = {}^1/R$ …… (3)

Then, $R = {}^1/R^*$ …….. (4)

Substituting (4) into (2) yields:

$S_{₦} = g(R^*) = ({}^1/R^*)\, f\,({}^1/R^*)$ …… (5)

Equation (5) gives the amount of Naira supplied ($S_{₦}$) as a function of the price of Naira in terms of Dollars (R*), which gives the supply function of Naira in terms of Dollars.

The elasticity of the demand for Dollar can be expressed as:

$\ell^{\$}_{d} = f'(R)\, \frac{f}{(^{R}R)}$ ……. (6)

While, the elasticity of the supply of Naira is given by:

$\ell^{₦}_{s} = g'(R^*)\, \frac{R_*}{g(R^*)}$ ……. (7)

The elasticity shown in (6) and (7) above can be related as follows:

Differentiating (5) with respect to R* yields:

$g'(R^*) = \frac{1}{R_{*2}} f\left(\frac{1}{R_*}\right) - \left(\frac{1}{R_{*3}}\right) f'\left(\frac{1}{R_*}\right) -$

[redacted])] …….. (8)

Substituting (8) into (7) and making use of the thoughts of (2), (3), and (6) we obtain:

$$\ell_{₦s} = - R\, f(R)\, 1 \Big/ \left[1 + R[fg'((RR*))/\, f(R)]\right]$$

$$= -1 - \ell^{\$}_{d}$$

$$= \ell^{₦}_{s} + \ell^{\$}_{d} = -1 \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

Equation (9) now shows that the demand elasticity for Dollar and the supply elasticity of Naira are perfectly compensating in nature. These imply that for every depreciation of the Naira that arise from the elasticity of demand for Dollar, there is a corresponding change in opposite direction in the elasticity of supply of Naira that led to the depreciation. And usually, depreciation arise whenever the demand curve for Dollar is inelastic, that is $-1 < \ell^{\$}_{d} \leq 0$ and thus making the supply curve for Naira to be backward bending; this compares to the upward sloping supply curve for Naira when the demand curve for Dollar is elastic ($\ell^{\$}_{d} < -1$).

This study makes use of a model that is represented by a 3-component vector that expresses GDP as a function of exchange rate, inflation rate, and interest rate, defined as:

GDP = f (EXR, IFR, ITR)…… (10)

The model thereafter used OLS to estimate the unrestricted equation:

$GDP = \beta_0 + \beta_1 EXR + \beta_2 IFR + \beta_3 ITR + \mu$……. (11)

Where,

GDP = Domestic Output
EXR = Exchange Rate
IFR= Inflation Rate ITR
= Interest rate
μ_t = error term

With, $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 < 0$

Equation (11) is such that:

$\Delta GDP = \beta_0 + \beta_1 \Delta E_t + \beta_2 \Delta F_t + \beta_3 \Delta R_t + \varepsilon_t$ ……. (12)

All the variables are as defined, and ε_t = idiosyncratic error, a vector of structural disturbances. It is serially uncorrelated such that $E(\varepsilon_t \varepsilon_{t-1})$ results in a diagonal matrix.

The models employed above are estimated using annual Nigeria data on the indicated macro-economic indicators for the period 1986 – 2018. Data were sourced mainly from the National Bureau of Statistics (NBS). The correlation and multiple regression analysis were carried out using the E-views estimation package.

RESULTS

Table 1: Descriptive Statistics of Variables

Descriptive Statistics	IFR	ITR	LGDP	EXR
Mean	20.22697	18.04030	8.704397	113.7488
Median	12.70000	17.95000	8.961335	120.9700
Maximum	72.81000	31.65000	10.94629	366.2300
Minimum	5.380000	9.930000	4.902307	2.020000
Std. Dev.	18.24657	4.753579	1.873964	92.59197
Skewness	1.616327	0.563834	-0.569943	1.097163
Kurtosis	4.215291	3.415632	2.086070	4.250226
Jarque-Bera	16.39960	1.986029	2.935088	8.769932
Probability	0.000275	0.370458	0.230491	0.012463
Sum	667.4900	595.3300	287.2451	3753.710
Sum Sq. Dev.	10654.00	723.0885	112.3757	274344.7
Observations	33	33	33	33

Source: Authors' Computation from E-Views 10, 2020
Note: IFR = Inflation Rate ITR = Interest Rate LGDP = Log of Gross Domestic Product
EXR = Exchange Rate

It can be observed that inflation rate ranges from 5.38% to 72.81% with an average of 20.23%, interest rate ranges from 9.93% to 31.65%, and an average value of 18.04%, The log of Gross Domestic Product ranges from 4.90 to 10.95 with an average value of 8.70, while exchange rate ranges from ₦2.020 to ₦366.23 with an average value of ₦113.75. As shown in Table 1, only the log of GDP is negatively skewed with its mean lying to the left of the peak while all other variables are positively skewed. The Jarque-Bera statistics of the variables and their corresponding probability values indicate that interest rate and log of GDP are normally distributed while inflation rate and exchange rate are not.

Covariance/Correlation Analysis

From the above, we thereafter examined the direction and strength of the relationships among the variables in Table 2 below.

Table 2: Covariance/Correlation Analysis

Sample: 1986 2018
Included observations: 33

Covariance Correlation	IFR	ITR	LGDP	EXR
IFR	322.8483 1.000000			
ITR	35.44543	21.91177		

	0.421427	1.000000		
LGDP	-13.40727	-3.395020	3.405323	
	-0.404354	-0.393029	1.000000	
EXR	-589.3737	-212.6935	142.1927	8313.477
	-0.359749	-0.498338	0.845097	1.000000

Source: Author s' Computation from E -Views 10, 2020
Note: Variables are as defined in Table 1.

Table 2 shows that the relationship between the log gross domestic product (GDP) and exchange rate (EXR) is strong and positive. It also shows that a weak negative relationship exists between the log of gross domestic product (GDP) and interest rate (ITR), and weak although negative relationship between the log of gross domestic product (GDP) and inflation rate (IFR). Equally the relationship between interest rate and inflation rate is weak but positive. The covariance between the variables indicate that they are not widely dispersed from each other except with respect to exchange rate that shows large covariance with other variables.

Result of Stationarity Tests

The data set employed in the research used annual figures in the form of time series. A major problem of this type of data relates to being non-stationary in nature; data stationarity therefore needs to be confirmed. The Augmented Dickey-Fuller and Phillips-Peron tests were used to determine whether the variables have unit roots. The results are shown in Table 3 below:

Table 3: Stationarity Tests

Variables	Augmented Dickey Fuller (Intercept Only)	ADF (Intercept and Trend)	Phillips-Peron (Intercept Only)	Phillips-Peron (Intercept and Trend)	Decision
EXR	1.367	-0.517	1.398	-0.644	I(1)
□EXR	-4.830**	-5.196**	-4.825**	-5.196**	I(0)
IFR	-4.759**	-3.096	-2.820	-3.300	I(1)
□IFR	-2.584	-6.230**	-7.352**	-6.923**	I(0)
ITR	-2.309	-3.818*	-2.499	-3.836*	I(1)
□ITR	-6.154**	-6.312**	-6.289**	-6.342**	I(0)
LGDP	-3.274*	-1.082	-7.194**	-0.685	I(1)
□LGDP	-4.626**	-4.696**	-4.588**	-8.585**	I(0)

Source: Authors' Computation from E-Views 10, 2020
Note: □ = First difference operator;
Critical Values (Intercept Only): 1% = -3.670 5% = -2.964
Critical Values (Intercept with Trend): 1% = -4.297 5% = -3.568

(i) ** and * indicate significant at 1% and 5% respectively
(ii) Variables are as defined in Table 1

As shown in Table 3 above, all the variables for the study i.e. the log of gross domestic product (GDP), interest rate (ITR), exchange rate (EXR) and inflation rate (IFR) were not stationary at their levels but become stationary after first differencing. This means all the variables were integrated of order 1, thus allowing the possibility of a long-run relationship among them and the use of an error correction model estimation technique.

Co-integration Analysis Result

The meaningfulness of a regression is important just as its ability at predicting long run phenomenon. Hence, with the above result, there is a need to verify if the variables co-integrate by examining the actual number of co-integrating equations that exist among the variables; this was conducted using the Johansen co-integration test. The result from the co-integration test is presented in Table 4 below.

Table 4: Co-integration Test

Series: IFR ITR LGDP EXR
Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.762211	69.74868	47.85613	0.0001
At most 1	0.445142	25.22114	29.79707	0.1537
At most 2	0.200542	6.960810	15.49471	0.5822
At most 3	0.000721	0.022359	3.841466	0.8811

Trace test indicates 1 co - integrating eqn .(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.762211	44.52754	27.58434	0.0001
At most 1	0.445142	18.26033	21.13162	0.1204
At most 2	0.200542	6.938450	14.26460	0.4964
At most 3	0.000721	0.022359	3.841466	0.8811

Max-eigenvalue test indicates 1 co - integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 5: Summary of Johannes Co-integration test

Hypothesized	Trace	Max-Eigen	Critical values at 0.05

No. of CE(s)	Statistic	Statistic	Trace	Max-eigen
None	69.749	44.528	47.85613	27.58434
At most 1	25.221	18.260	29.79707	21.13162
At most 2	6.961	6.938	15.49471	14.26460
At most 3	0.022	0.022	3.841466	3.841466

Source: Authors' Computation from E-Views 10, 2020

In order to confirm if there is a long-run relationship among the variables in the model, the paper employed the Johansen Co-integration test, use of the trace statistics and Max-Eigen respectively; this was done by comparing their values with the critical values at 5% level. Table 5 above shows that the Trace Statistics/Max-Eigen indicates at least one co-integrating equation at 5% level of significance. Thus, the variables are co-integrated and we can therefore conclude that a long-run relationship exists among the variables.

Pairwise Granger Causality Test

The pairwise Granger causality test was used in ascertaining the preliminary causal relationship that exists between the variables of the study. The results from this test are shown in Table 6 below.

Table 6: Pairwise Granger Causality Tests

Sample: 1986 2018
Lags: 2

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**	**Decision**
ITR does not Granger Cause IFR	3 1	1.43725	0.2558	Accepted
IFR does not Granger Cause ITR		2.51129	0.1007	Accepted
LGDP does not Granger Cause IFR	31	5.16931	0.0129	Rejected
IFR does not Granger Cause LGDP		0.27238	0.7637	Accepted
EXR does not Granger Cause IFR	31	3.48492	0.0456	Rejected
IFR does not Granger Cause EXR		0.19291	0.8257	Accepted
LGDP does not Granger Cause ITR	31	6.59624	0.0048	Rejected
ITR does not Granger Cause LGDP		3.92886	0.0323	Rejected
EXR does not Granger Cause ITR	31	4.15584	0.0272	Rejected

ITR does not Granger Cause EXR		0.52000	0.6006	Accepted
EXR does not Granger Cause LGDP	31	0.23488	0.7923	Accepted
LGDP does not Granger Cause EXR		0.18140	0.8351	Accepted

Source: Authors' Computation from E -Views 10, 2020

Note: (i) A probability value less than 0.05 implies the rejection of the null hypothesis;
(ii) Variables are as defined in Table 1.

As shown in Table 6 above, no causality was found between interest rate and inflation rate while a unidirectional causality was recorded between the log of GDP and inflation rate with the causality running from log of GDP to inflation rate. A uni-directional causality was also found between exchange rate and inflation rate with the causality running from exchange rate to inflation rate. While a bi-directional causality was found between the log of GDP and interest rate, a uni-directional causality exists between exchange rate and interest rate with the causality running from exchange rate to interest rate. Also, no causality was found between exchange rate and the log of GDP.

Model Estimation Results

Given the confirmation that the variables of this study are not stationary in levels but stationary after first differencing, it means that regressions based on the levels of the variables are most likely to give spurious results. To avoid this, we use the error correction model (ECM) estimation technique given the fact that the variables are also cointegrated. We first present the result from the long run regression in Table 7 below using the residual from the model as the error correction term in the short run ECM model.

Table 7: Long Run OLS Regression

Dependent Variable: LGDP
Method: Least Squares
Sample: 1986 2018
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFR	-0.014175	0.011124	-1.274211	0.2127
ITR	0.032274	0.045954	0.702302	0.4881
EXR	0.016925	0.002293	7.380911	0.0000
C	6.483718	0.962033	6.739600	0.0000
R-squared	0.730338	Mean dependent var		8.704397
Adjusted R-squared	0.702442	S.D. dependent var		1.873964
S.E. of regression	1.022226	Akaike info criterion		2.995054
Sum squared resid	30.30341	Schwarz criterion		3.176449
Log likelihood	-45.41839	Hannan-Quinn criter.		3.056088
F-statistic	26.18072	Durbin-Watson stat		1.293307
Prob(F-statistic)	0.000000			

Source: Authors' Computation from E -Views 10, 2020

Note: Variables are as defined in Table 1.

As shown in Table 7, the impact of inflation rate on domestic output in Nigeria is negative and statistically insignificant in the long run. The coefficient of interest rate is positively signed and statistically insignificant as well. However, exchange rate has a positive and statistically significant impact on output as represented by the log of GDP. Further results indicate that a significant proportion of the variations in domestic output is explained by the linear influence of the three explanatory variables. The not too impressive Durbin-Watson statistic of 1.293 may be attributed to the time series properties of the variables identified previously and may be accommodated since we are more concerned with the short run ECM model.

The result of the long run regression can be summarized as follows:

$LGDP = \beta_0 + \beta_1 IFR + \beta_2 ITR + \beta_3 EXR + \mu$

$= 6.484 - 0.014IFR + 0.032ITR + 0.017EXR$ Std Error: (0.962) (0.011) (0.046) (0.002) t-statistic: (6.740) (–1.274) (0.702) (7.381)

$R^2 = 0.7303$ Adj. $R^2 = 0.7024$ S.E = 1.0222 DW= 1.2933 F-Statistics = 26.181

The results from the short run parsimonious ECM model is presented in Table 8 below.

Table 8: Parsimonious Short Run ECM Results

Dependent Variable: D(LGDP)
Method: Least Squares
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.279762	0.039610	7.062967	0.0000
□EXR(-2))	-0.003869	0.001276	-3.031729	0.0063
□IFR	0.006058	0.002723	2.224296	0.0372
□IFR(-2)	0.004345	0.002412	1.801179	0.0861
□ITR	-0.017323	0.009137	-1.895870	0.0718
□ITR(-1)	-0.030842	0.010845	-2.844019	0.0097
ECM(-1)	-0.181766	0.053241	-3.414043	0.0026

R-squared	0.612171	Mean dependent var	0.179101
Adjusted R-squared	0.526331	S.D. dependent var	0.183467
S.E. of regression	0.150585	Akaike info criterion	-0.705254
Sum squared resid	0.476192	Schwarz criterion	-0.284895
Log likelihood	19.57881	Hannan-Quinn criter.	-0.570777
F-statistic	2.755981	Durbin-Watson stat	1.913177
Prob(F-statistic)	0.029861		

Source: Authors' Computation from E -Views 10, 2020
Note: □ = First difference operator;

As shown in Table 8, the lagged value of exchange rate negatively affects the domestic output in the short run in Nigeria. This contrasts sharply with the positive effect found for exchange rate in the long run model. The impact of inflation on output in the short run is positive and statistically significant also contrasting with the negative effect recorded in the long run regression. Interest rate impact on output in the short run is negative and statistically significant. The ECM term is negatively signed as expected and statistically significant, corroborating the long run co-integration relationship found among the variables. However, the coefficient of the ECM term which is –-0.182 indicates that 18.2% of disequilibrium in the previous year are corrected in the current year, suggesting a weak adjustment process.

DISCUSSION, CONCLUSION AND IMPLICATIONS

Every level of depreciation in the value of Naira relative to the Dollar makes all imported commodities to become more expensive in Nigeria. Also, the production of goods for domestic consumption and for export expands as long as there exist excess capacity in industries, coupled with effective demand; this enhances the level of domestic output and probably an increase in price level.

Even though a depreciation of the domestic currency ordinarily could cause domestic output and the price level to increase, the final effect may be indeterminate, depending on the extent of rise in both output and price level. These above findings also have their own policy implications.

Production oriented expansionary fiscal policy designed to increase level of domestic production and reduce excise taxes can be financed through public reserves or foreign aids as long as they would not impose unnecessary pressure on the balance of payments. A downward pressure on available foreign currencies involves the use and reinforcement of import substitution strategy. This will allow Nigerians to start living within their means. Greater and sustained investment policy on R & D initiated through private/public partnership can ensure reduction in the importation of capital and intermediate goods, and enhance domestic production at competitive prices.

This study shows that currency depreciation has a positive relationship with domestic output in Nigeria in the long run. It is therefore the opinion of this paper that working under floating exchange rate can only yield the desired results if adequate policies of the above type are taken into consideration.

REFERENCES

Abeysinghe, Tilak and Yeok, Tan Lin. (1998). Exchange rate appreciation and export competitiveness: The case of Singapore. *Applied Economics*, *30*(1), 51-55.

Adebiyi, M.A & Dauda, R.O.S (2009). Trade liberalization policy and industrialization: growth performance in Nigeria: An error correction mechanism technique, Paper presented at *the 45th annual conference of the Nigerian Economic Society, 24th to 26th August, Central Bank of Nigeria, Abuja.*

Akinlo, A. and A. Odusola (2013). Assessing the impact of Nigeria's naira depreciation on output and inflation. *Applied Economics*. 35, 691–703.

Alemu A.M and L. Jin-sang, (2014). Examining the effects of currency depreciation on trade balance in selected Asian economies. *International Journal of Global Business*, *7*(1), 59-76, June 2014.

Business Times (2002). Naira devaluation: Investors proffer alternatives. Retrieved from www.businesstimes.com.ng/naira-devaluation-investors-proffer-alternatives/

Central Bank of Nigeria (1991). Nigeria's exchange rate policy. *CBN Research Department.*

Central Bank of Nigeria (1996). The foreign exchange market and its management in Nigeria Brief series. *Research and Statistics Department.*

Central Bank of Nigeria (1998). The foreign exchange market and its management in Nigeria Brief Series. *Research and Statistics Department*.

Edoumiekumo, S.G and Opukri, C. O (2013). Economic growth factor in Nigeria: The role of global trade. *American Journal of Humanities and Social Sciences, 1*(2): 51-55.

Edwards, S. and E. Levy-Yeyati (2003). *Flexible Exchange Rates as Shock Absorbers*. NBER working paper 9867.

Ehinomen C, & Oladipo T.I, (2012). Exchange rate management and the manufacturing sector performance in the Nigerian Economy. *IOSR Journal of Humanities and Social Science, 5*(5): 1 – 12.

Eichengreen, B and Leblang, D. (2003). Exchange rates and cohesion: Historical perspectives and political-economy considerations. *Journal of Common Market Studies, 1*(41), 797–822.

Inyiama, O.I. (2013). Does inflation weaken economic growth? Evidence from Nigeria. *European Journal of Accounting Auditing and Finance Research*, *1*(4), 139-150.

Ismaila, M. And L. E. Imoughele (2015). Macroeconomic determinants of economic growth in Nigeria: A Cointegration approach. *International Journal of Academic Research in Economics and Management Sciences*, *4*(1), 34-46.

Kolawole, B.O. (2013). Growth-effects of macroeconomic stability factors: Empirical evidence from Nigeria. *Developing Country Studies, 3*(14), 47-54.

Krugman, P. R. and Taylor, L. (1978). Contractionary effects of devaluation. *Journal of International Economics,* 8*, 445–56.*

National Bureau of Statistics (NBS): Federal Republic of Nigeria, Abuja. *www.nigerianstat.gov.ng*.

Olisadebe, E. U. (1991). Appraisal of recent exchange rate policy measures in Nigeria. *CBN Economic and Financial Review*, 29(2).

Oyejide and Udun (2010). Exchange rate regime and economic growth: Evidence from developing Asian and advanced European economies. *www.cgu.edu.include/huang*

Rodric, D. (2006). *The Real Exchange Rate and Economic Growth,* Harvard University, Cambridge, September.

Rogoffs, K. & Reinhart, C.M (2004). The modern history of Exchange rate arrangements: A reinterpretation. *Quarterly Journal of Economics*, *119*(1), 1-47.

Soludo, C. C. (2007). Achieving interest rate and exchange rate stability in Nigeria: Options and relevance. *Research Department, CBN, Abuja.*

Zafar, I. and Zahid, G. (2013). Macroeconomic determinants of economic growth in Pakistan. www.researchgate,net/publication/24046058macroeconomic_determinants_of_economic_growth_in_pakistan