Effect of Budget Deficit on Exchange Rate in Nigeria from 1980 to 2017: An Error Correction Model Approach

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Abstract

This study examines the effect of budget deficit on exchange rate in Nigeria using a time series data from 1980 to 2017. The study employs an Error Correction Model Approach (ECM) for evaluation. The stationarity test result shows that all the variables are stationary and integrated of order one at 5% level of significance. The Johansen hypothesized cointegration test result show that the trace likelihood ratio and the maximum Eigen value results point out that the null hypothesis of no cointegration among the variables is rejected in favor of the alternative hypothesis up to five cointegrating equations at 5% significant level respectively. The long run analysis of the effect of the budget deficit on the exchange rate performance reveal that the coefficient of the variables, DEFICIT_1, LOG (M2) and OPEN show positive signs. The coefficient of the variables INF, DEEP and LOG (CONSUM) indicate negative signs. The equilibrium

Error-Correction Model result has the expected negative sign and is statistically significant. The Pairwise Granger Causality test result shows that there is a unidirection of causality from EXCHR to DEFICIT_1. The study therefore recommends that the Federal Government should adopt policy that encourages foreign capital inflow in order to boost the country's productive base.

**Keywords:** Budget deficit; exchange rate; unit root; cointegration; ECM; Nigeria.

Introduction

In many countries large budget deficits are among the most serious problems of their economies (Apergis, 1998). Economic theory argues that large budget deficits tend to have harmful effects on many macroeconomic variables, such as domestic interest rates, investments, and trade deficits. In particular, massive budget deficits result in high interest rates as the government's demand for funds conflict with private financing requirements; eventually, high interest rates discourage private investment. The implication of high interest rates would be that residential construction, business investment in plant and equipment, and consumer spending on durable goods could be hard hit by the implementation of such a fiscal policy, especially, if monetary policy is non-accommodative (Apergis, 1998). Under the Ricardian equivalence view, deficit policy is a matter of indifference, since an increase in government debt leads to a future increase in taxes and thus it is not an addition to private sector wealth. This fact has no effect on consumption, interest rates and aggregate demand (Apergis, 1998). Studies on twin deficits have been conducted by many scholars. The twin deficit hypothesis according to Feldstein (1985) is a situation where large budget deficit leads to a current account deficit. As domestic interest rate rises comparing to the foreign interest, it pushes up the value of domestic currency as it leads to foreign portfolio capital inflow. This would automatically result to trade decline.

The Nigerian economy over the years has continued to witness a huge budget deficit from the 1980s. From 1980 to 1981, budget deficit

rose from ₦2 billion to ₦3.9 billion; and from 1986, it rose to ₦8.2 billion, while there was an observed fall in 1987, to ₦5.8 billion and stood at N101 billion in 2006. In 2007, the budget deficit was N609.2 billion. The global financial crises of 2008 resulted to sluggish economic growth as demand for crude oil declined, this resulted to a deficit of 0.56 trillion naira (about 2.2% of the GDP). Between 2009 and 2010, the budget deficit increased to 249 billion naira and ₦1.1 trillion respectively. The 2007 fiscal year recorded a deficit of N609.2 billon as against N580.30 billion in the previous budget. The international financial crisis of 2008 led to slowing growth across the world economy, resulting in lower demand for the nations crude oil, as a result the economy witnessed 0.56 trillion deficit (2.5% of GDP). The 2009 and 2010 fiscal years equally recorded deficits of 249 billion and ₦ 1.1 trillion respectively. In 2012 and 2013, the budget deficit was -2.85% and -2.33% of the GDP respectively. Figure no. 1 shows the interaction of budget deficit and exchange rate in Nigeria from 1980 to 2017.

Fig. no. 1. The trend of budget deficit and exchange rate (1980-2017)
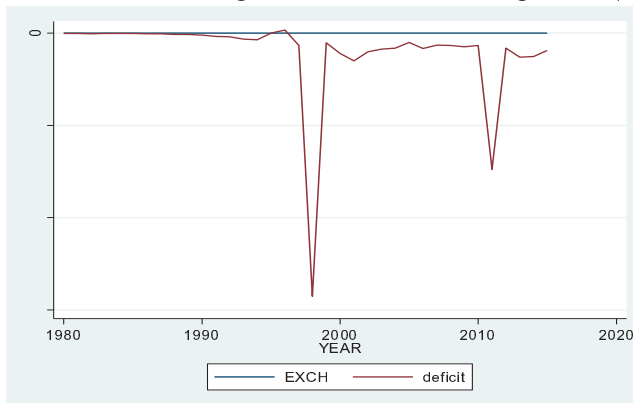
Source: Authors' own computation from Stata 11 result

The figure shows that the economy continued to witness a rise in the budget deficit, hence in 2014 and 2015 the deficit was -2.13% and -3.47 of the GDP respectively. Equally, in 2016, the country recorded a deficit of -3.93% of the GDP, while the year 2017 the country recorded a deficit of -5.75% of the GDP. From the foregoing, the consequence of growing budget deficit on the exchange rate regime in Nigeria is enormous and calls for immediate serious attention by the Economists.

Statement of the Problem

Studies on the interaction between budget deficit and exchange rate by scholars have produced a clear cut direction hence there exist an ambiguity theoretically on the direction of relations between the variables. Gulcan and Bilman (2005) were of the view that deficit reduction leads to either stronger exchange rate or weak exchange rate. The effect on interest rate and exchange rate can occur directly or indirectly. A decrease in exchange rate is as a result of direct effect; this also leads to a reduction of the demand for loans. While when it increases, it shows an indirect effect of budget deficit (Gulcan and Bilman, 2005). The authors assert that deficit reduction leads to an interest rate decrease, noting that its real exchange rate effect is not explicit. Hence, understanding the determinant of this inconsistent behaviour in the long and short run of real and nominal exchange rate has become one of the major tasks of economists (Gulcan and Bilman, 2005). Deficit spending and its exchange rate effect have continued to generate theoretical arguments among scholars. Based on this assertion, this study therefore tends to answer the following questions: What therefore is the effect of budget deficit on exchange rate in Nigeria? Is there a long run relationship between budget deficit and exchange rate in Nigeria? What are the effects of other fiscal and monetary policy variables on exchange rate in Nigeria?

Objectives of the Study

The main objective of this study is to examine the budget deficit effect on exchange rate in Nigeria. The specific objectives are:
(1) To ascertain if there exist a long run relationship between budget deficit and exchange rate in Nigeria
(2) To ascertain the effects of other fiscal and monetary policy variables on exchange rate in Nigeria

Research Hypotheses

Based on the objectives outlined above, the following hypotheses therefore would guide this study:
H_0: There is no effect of budget deficit on exchange rate in Nigeria
H_0: There is no long run relationship between budget deficit and exchange rate in Nigeria
H_0: There is no effect of other fiscal and monetary policy variables on exchange rate in Nigeria

Scope of the Study

This study is limited to the Nigerian economy. It covers the period from 1980 to 2017. The variables that will be used to determine the relationship between Budget Deficit and Exchange rate in Nigeria are: Budget deficit, Trade openness, Current account Balance, Total gross Investment and Inflation.

Significance of the Study

The major thrust of this work is to find out if there is any impact of budget deficit on exchange rate in Nigeria. If, at the end of this research it is found out that it is true, it will be of immense value to the policy makers in Nigeria who will find it useful in their policy formulation. Financial market operators will also find it expedient in meeting up with some of the financial market challenges, local and foreign investors will also use the result of the work to solve some of the investment challenges. Students, producers and other stakeholders in the Nigerian economy will find it immensely useful to their fields. The variables of interest to be considered in this study will include exchange rate, budget deficit, broad money supply, financial deepening, trade openness, inflation and Government consumption expenditure.

Literature Review
Theoretical Literature

The literature review on the relationship between budget deficit and exchange rate centers on portfolio crowding out hypothesis. It states that when government incurs a huge budget deficit that is accompanied with debt, it directly affects asset prices thereby leading to a reduction in the level of aggregate demand in the economy (Friedman, 1978). In a closed economy according to Hoelscher(1986), this hypothesis implies a significant positive association between debt stock disturbances (budget deficits) and real interest rates. In their studies, Fleming (1962) and Mundell (1963) assert that an open economy operating under static exchange rate expectation accompanied with fixed asset prices, a fiscal policy measures financed through a huge debt obligation is crowded out completely in a flexible exchange rate regime system. However, Barro (1974) argued that, if it is assumed that taxpayers realize that current deficits must be paid by future taxes, they will increase their savings by an amount equal to the present value of future tax liabilities due to current deficits.

Budget Deficits and Inflation

The budget deficit has effect on inflation; this effect according to Meltzer (1989) could be traced to the 1980s inflation that occurred in countries like Bolivia, Argentina and Brazil as a result of money issued to pay public spending. However, the experience in most developed countries does not support the view that deficits must sooner or later increase money growth and produce inflation. According to Saleh (2003) "An example is Italy, which experienced a budget deficit of about 10% of Gross National Product (GNP) throughout the 1980s". Inflationary effect on the economy was reduced from about 20% to about 5% during the period under review. Other countries with similar experiences of low level inflation include United States of America and Japan. In Japan, the rate of inflation was almost zero, while the budget deficit climbed during the 1980s. During the same period the inflation rate in the United States reduced from 10% to about 4% even with an increase in the Government's huge fiscal deficit of the 1980s. The decline in the inflationary levels could be attributed to a decline in the money growth despite huge borrowing by the governments (Saleh, 2003).

Deficit Financing

According to Easterly and Schmids-Hebbel (1993), the consequences of deficits depend on how they are financed. They explained that financing approach adopted if used excessively might lead to a macroeconomic imbalance. The implications however, depend on country's economic conditions (Easterly and Schmids-Hebbel, 1993). The first approach to deficit financing which includes depletion of cash reserves leads to exchange rate appreciation in contrast to the level it would otherwise have had. The authors noted that depletion of foreign reserve to finance huge budget deficit has a limit; and hence leads to capital flight due to negative anticipation by the private sector thus leading to a balance of payment crises. Another approach to deficit financing will lead to households' reduction of excess cash holdings thus driving up the level of prices pending when the economy returns to an equilibrium level.

The Trends in Budget Deficit, Exchange Rate and Inflation in Nigeria

The Nigerian economy has witnessed a rise in the budget deficit. Olusoji and Oderinde (2011) noted that the ratio of fiscal deficit to gross domestic product (GDP) during the period 1971–1977 averaged 2.5%. This was not surprising as increased oil revenue during the period considerably narrowed the fiscal gap. The windfall from the country's oil earnings was used in promoting infrastructural development, ambitious and unproductive projects. At face value, it could be argued that in the 1970s government expenditures fuelled inflation. From 1978 to 1993, the ratio of fiscal deficit to GDP averaged 7.8%. This rate was less than the 9.2% recorded during the nine years of Nigeria's Structural Adjustment Programme (SAP) (1986–1994). During this period, the fiscal deficit/GDP ratio increased from 4.2% in 1984, to 15.6% in 1993, but in 1987 it stood at only 5.5%. The economy witnessed a double digit rate of inflation during the period of stabilization except for the years: 1982 when it reduced to 7.5%, 1985 (5.5%) and 1986 (5.4%). Therefore, it could be inferred that inflation did not abate during the period of stabilization and structural adjustment programme in the economy (Olusoji and Oderinde, 2011).

Empirical Literature

Epaphra (2017) examines the relationship between government budget deficit and macroeconomic variables in Tanzania from 1966 to 2015. Using a Vector Error Correction Model technique, the study finds a negative relationship between exchange rate and budget deficit

Olanipekun and Oladiran (2015) examine the relationship between public spending and manufacturing sector output from 1970 to 2013 in Nigeria. The study employs an ECM and cointegration techniques for evaluation. The study show that a one percent in public spending increases manufacturing sector output to eleven percent and a decrease of recurrent expenditure to 26.9%.

Shetta and Kamaly (2014) estimate crowding in and out of budget deficit on banks credit to the private sector in Egypt employing a Vector Auto Regression (VAR) model approach. The result of the impulse response function indicate that the effect of a government borrowing shock is with regard to the overall banking sector credit.

Eze and Ogiji (2013) evaluate the fiscal policy variables effect on the manufacturing sector growth in Nigeria using the error correction

model. The results indicate that government expenditure significantly affect manufacturing sector growth based on the magnitude and the level of significance of the coefficient p-value. The study finds a long-run relationship between fiscal policy and manufacturing sector growth in Nigeria.

Asgari (2012) investigates the impact of budget deficit reduction on exchange rate in Iran from 1978 to 2008 using an Auto Regressive Distributed Lag (ARDL) model. The result indicates a long run relationship between budget deficit and exchange rate.

Limitations of the Previous Studies

Studies conducted in this area in Nigeria had either focused on effects of twins' deficits, exchange rate depreciation on inflation, impact of price response to exchange rate changes, causal link between twin deficits and other macroeconomic variables, relationships between budget deficits, inflation and monetary growth, effects of exchange rate depreciation on inflation, government revenues and expenditures, and money supply (Oladipo, et al., 2012; Enoma, 2011; Omotor, 2008; Hakro, 2009; Tekin-Koru and Ozmen, 2003; Egwaikhide et al., 1994). This study is to investigate the effect of budget deficit on exchange rate in Nigeria using an error correction model approach. Therefore this study by contributing to the existing literature will extend the period using data from 1980 to 2017.

Research Methodology
Theoretical Framework and Methodology

There are three distinct schools of thought on the effect of budget deficit on private investment which include neoclassical school, Keynesian school and Ricardian equivalent. According to Bernhin (1989), the Neoclassical school were of the view that individuals plans their consumption over their entire life cycle; hence pushing taxes to the future generation, budget deficit would increase current consumption. The Keynesian school's view differs from the neoclassical school in two ways. Firstly, it allow the possibility that there are unemployed resources; and secondly, it presumes that there exists a large liquidity constrained individuals kin the economy thus it guarantees that aggregate consumption is very sensitive to changes in disposable income (Saleh, 2003). The Ricardian equivalence hypothesis developed by Barro (1989) were of the view that an increase in budget deficit as a

result of an increase in government expenditure must be paid for either now or later with the total present value of receipts fixed by the total present value of spending. Hence, a tax cut today should be matched with an increase in the future taxes thereby leaving interest rates and private investment unchanged.

Model Specification

Therefore, developing a model for the impact of budget deficit on exchange rate in Nigeria from 1980–2017 could be stated mathematically as follows:

$$EXCHR = F (DEFICIT\_1, M2, INF, OPEN, DEEP, CONSUM) \quad .(1)$$

Where
EXCHR   = Exchange rate
Deficit_1 = Budget deficit
M2   = Broad money supply
INF   = Inflation
OPEN   = Trade openness
DEEP   = Financial deepening
CONSUM = Government Consumption expenditure

In order to estimate the equation empirically, equation (1) would be transformed into econometrics equation stated as follows:

$$EXCHR = \beta_0 + \beta_1 DEFICIT\_1 + \beta_2 M2 + \beta_3 INF + \beta_4 OPEN + \beta_5 DEEP + \beta_6 CONSUM + \mu_t \qquad ......(2)$$

where
β_0 = the constant term
β's = the parameters to be estimated
μ = stochastic error

For statistical reason, we adopt a log-log regression model. The assumption states that the logarithm of the expected value of the response variable is a linear combination of the explanatory variables. We use logarithms because this transformation is the most commonly used variance stabilizing tool for variables that have wide range (Weisberg, 1980). The log-log model is therefore stated as follows:

$$LOG(EXCHR) = \beta_0 + \beta_1 DEFICIT\_1 + \beta_2 LOG(M2) + \beta_3 INF$$
$$+ \beta_4 OPEN + \beta_5 DEEP + \beta_6 LOG(CONSUM) + \upsilon_t \quad \text{.......(3)}$$

where

β_0 = constant term of the model.

β_1 = coefficient of DEFICIT_1

β_2 = coefficient of LOG(M2)

β_3 = coefficient of INF

β_4 = coefficient of OPEN

β_5 = coefficient of DEEP

β_6 = coefficient of LOG(CONSUM)

υ_t = stochastic error term

Evaluation Procedure

The evaluation procedures are to ensure whether or not the parameters estimated are statistically and theoretically acceptable and reliable. The unit root test, co-integration test and error correction mechanism will be conducted to ascertain the short and long run stationary or stability as well as correcting the maladjustment in the long run among the macroeconomic variables. The Ordinary Least Square (OLS) single equation is the estimation procedure adopted for this study. This model is chosen based on its Best Linear Unbiased Estimates (BLUE) properties.

Co-integration

Co-integration is an economic technique used in testing correlation between non-stationary time variables. Two series are co-integrate if they both move together along a trend at the same rate, co-integration then talks about the convergence of an econometric system to the existence of long run equilibrium relationship overtime. After long run equilibrium has been established between the variables, the error correction mechanism must be formed (Engle and Granger, 1987). The Error Correction Model (ECM) equation is therefore stated as follows:

$$\Delta LOG(EXCHR)_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta DEFICIT\_1_{t\text{-}1} + \sum_{i=0}^{n} \alpha_{2i} \Delta LOG(M2)_{1t\text{-}1} + \sum_{i=0}^{n} \alpha_{3i} \Delta INF_{2t\text{-}1}$$
$$+ \sum_{i=0}^{n} \alpha_{4i} \Delta OPEN_{3t\text{-}1} + \sum_{i=0}^{n} \alpha_{5i} \Delta DEEP_{4t\text{-}1} + \sum_{i=0}^{n} \alpha_{6i} \Delta LOG(CONSUM)_{5t\text{-}1} \quad .(4)$$
$$+ \lambda ECM(\text{-}1) + \mu_t$$

Granger Causality Test Procedure

In order to ascertain the significance of the second objective which is to determine the direction of causality, a granger causality test is carried out. The causality procedure employed in this study for testing statistical causality between variables is developed by Granger (1969). The procedure is therefore stated as follows:

$$E_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_i E_{t-1} + \sum_{i=1}^{k_2} \beta_i D_{t=1} + \sum_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

$$D_t = \Upsilon_0 + \sum_{i=1}^{k_3} \Upsilon_i E_{t=1} + \sum_{i=1}^{k_4} \lambda_i D_{t=1} + \omega_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(6)$$

where
E = an indicator of exchange rate
D = budget deficit
t = current value of exchange rate
t-1= lagged value of exchange rate

Source of Data

Data for this study are from secondary sources. The estimation period is from 1980-2017. The data used in this study are from the statistical bulletin of the Central Bank of Nigeria (CBN) (2015, 2016), CBN Annual Report and Statement of Account for various years.

Econometrics Software

The Eviews9 and STATA11 econometrics packages were utilized in analyzing the data, while Excel will be used in imputing the data.

Data Presentation and Analysis
The trend of the exchange rate from 1980 to 2017

From the figure no. 2 below, the trend analysis of the exchange rate from (1980-2017) indicates that there was a stable exchange stability in the Nigerian economy between 1980, 1990 to 2000. From the year 2001, there has been an upward trend and continuous fluctuation of the exchange rate in the Nigerian economy.

Fig. no. 2. The trend of the exchange rate from 1980 to 2017
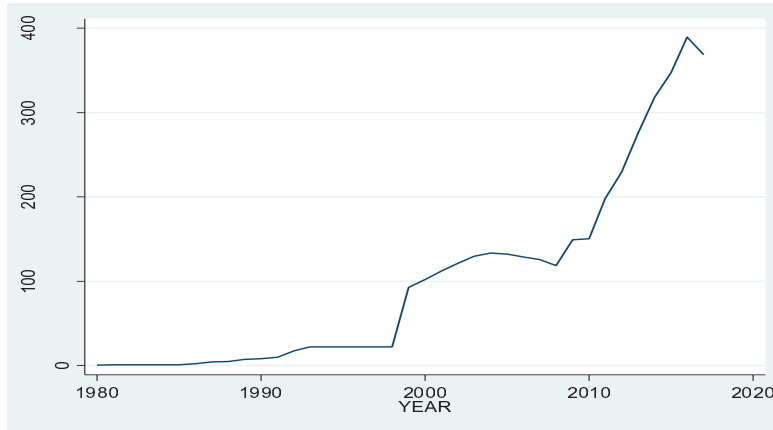
Source: Authors' own computation from the STATA 11 result

Descriptive Statistics

The Jarque-Bera (JB) test statistic was used to determine whether the variables (control variables) follow the normal probability distribution. The JB test of normality is a large-sample or asymptotic test that computes kurtosis and the skewness measures. We therefor examine the Sample mean, standard deviation, skewness and kurtosis, and the Jacque-Bera statistics as well as the p-values. The descriptive statistics of the variables used in this study are shown in the figure no. 3 below:

Fig. no. 3. Descriptive statistics

	EXCHR	DEFICIT_1	M2	INF	OPEN	DEEP	CONSUM
Mean	100.2872	534210.8	3958.914	19.87045	76.74921	10.76939	24091.60
Median	57.37225	198799.3	450.7130	14.50000	77.37500	8.171854	26079.29
Maximum	389.5263	1349130.	21607.68	72.80000	263.4800	20.77330	32743.80
Minimum	0.544500	-23504.6	14.46112	5.400000	27.80000	5.800000	11976.64
Std. Dev.	114.8553	539823.7	6256.973	16.27148	39.75196	5.376178	5847.843
Skewness	1.146611	0.161534	1.531699	1.672856	2.982974	1.002999	-0.716893
Kurtosis	3.325481	1.145822	3.996388	5.095231	14.69252	2.219202	2.526863
Jarque-Bera	8.494280	5.608719	16.43055	24.67432	272.8204	7.336648	3.609366
Probability	0.014305	0.060546	0.000270	0.000004	0.000000	0.025519	0.164527
Sum	3810.915	20300012	150438.7	755.0769	2916.470	409.2369	915480.8
Sum Sq. Dev.	488094.5	1.08E+13	1.45E+09	9796.159	58468.07	1069.422	1.27E+09
Observations	38	38	38	38	38	38	38

Source: Authors' own computation from the Eviews result

From the table above results, the descriptive statistics indicates that from 1980 to 2017, the seven variables under consideration show an averaged positive mean values. The standard deviation showed that the highest standard deviation of (539823.7) is recorded by the DEFICIT_1 while the least standard deviation of (5.376178) is recorded by DEEP. The skewness statistics from the table revealed that six of the variables are positively skewed while one variable is skewed negatively; the kurtosis coefficients show that four of the variables are leptokurtic, suggesting that the distributions are high relative to normal distribution, while two variables are mesokurtic, indicating not too flat topped and one other variable is platykurtic, indicating a flat topped. The probabilities of Jarque-Bera test of normality for the variables indicate that seven of the variables have values greater than 5% level of significance.

Correlation

In the correlation test, we test the variables to ascertain the degree of relationship that exist between the independent variables and the dependent variable. The relationships among the studied variables depicted in the model were tested using correlation matrix and the result presented below:

Fig. no. 4. The Correlation matrix

	EXCHR	DEFICIT_1	M2	INF	OPEN	DEEP	CONSUM
EXCHR	1.000000	0.750311	0.824776	-0.18641	0.684120	0.860700	0.344820
DEFICIT_1	0.750311	1.000000	0.604791	-0.28622	0.407044	0.641446	0.318738
M2	0.824776	0.604791	1.000000	-0.15213	0.478745	0.863602	0.285244
INF	-0.18641	-0.286224	-0.15213	1.000000	0.065850	-0.137979	-0.568469
OPEN	0.684120	0.407044	0.478745	0.065850	1.000000	0.529276	0.017265
DEEP	0.860700	0.641446	0.863602	-0.13798	0.529276	1.000000	0.266978
CONSUM	0.344820	0.318738	0.285244	-0.56847	0.017265	0.266978	1.000000

Source: Authors' own computation from the Eviews result

The correlation result shows that five of the variables have positive relationships with the EXCHR. The relationships are actually at 75%, 82%, 68%, 86% and 34% respectively. One of the variables under consideration, (INF) indicates a negative sign.

Unit Root/Stationarity test

The assumption is stated as follows: If the absolute value of the Augmented Dickey Fuller (ADF) test is greater than the critical value either at 1% ,5% or 10% level of significance at order zero, one or two, it shows that the variable under consideration is stationary otherwise it is not. The results of the Augmented Dickey Fuller (ADF) test obtained are as follow:

Table no. 1. The Unit root test

Variable	I(O)	Prob.	I(1)	Prob.
EXCHR	-0.014393	0.9512	-5.925264	0.0000
DEFICIT_1	1.573889	0.9992	-2.243766	0.1953
M2	1.573889	0.9992	-2.837410	0.0664
INF	2.168742	0.9999	-2.737215	0.0780
OPEN	-1.460446	0.5418	-6.629703	0.0000
DEEP	-0.873338	0.7852	-9.979574	0.0000
CONSUM	-2.620280	0.0983	-8.049354	0.0000

Source: Authors' own computation from the Eviews result

The stationarity tests result indicate that one of the variables under consideration, CONSUM is stationary at difference level while the other variables are non-stationary at level. However, after first differencing the variables became stationary; hence all the variables under consideration, are stationary and integrated of order one at 5% level of significance. A cointegration test is therefore conducted.

Cointegration test

To establish whether long-run relationship exists among the variables or not, cointegration tests are conducted by using the multivariate procedure developed by Johansen (1988) and Johansen and Juselius (1990). It allows for hypothesis testing regarding the elements of co-integrating vectors and loading matrix. The Johansen hypothesized cointegration was carried out to determine the number of cointegrating vectors.

Figure no. 5. The Cointegration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.937300	300.7209	125.6154	0.0000
At most 1 *	0.883483	203.7920	95.75366	0.0000
At most 2 *	0.776706	128.5518	69.81889	0.0000
At most 3 *	0.637955	76.07751	47.85613	0.0000
At most 4 *	0.521217	40.51795	29.79707	0.0020
At most 5	0.299279	14.74016	15.49471	0.0647
At most 6	0.063403	2.292577	3.841466	0.1300
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.937300	96.92890	46.23142	0.0000
At most 1 *	0.883483	75.24022	40.07757	0.0000
At most 2 *	0.776706	52.47430	33.87687	0.0001
At most 3 *	0.637955	35.55956	27.58434	0.0038
At most 4 *	0.521217	25.77779	21.13162	0.0103
At most 5	0.299279	12.44759	14.26460	0.0950
At most 6	0.063403	2.292577	3.841466	0.1300
Max-eigenvalue test indicates 5 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: Authors' own computation from the Eviews result

The Johansen hypothesized cointegration offers two tests, the trace test and the Eigen value test, with a view to identify the number of cointegrating relationships. From the table above, the trace likelihood ratio and the maximum Eigen value results point out that the null hypothesis of no cointegration among the variables is rejected in favour of the alternative hypothesis up to five cointegrating equations at 5% significant level respectively. This implies that a unique long-run relationship exists among the variables and the coefficients of estimated regression can be taken as equilibrium values.

The Effect of Budget Deficit on Exchange Rate Growth
In order to ascertain the long run effect of the budget deficit on the exchange rate performance during the period under review, we conducted an Ordinary Least Square (OLS) multiple regression. It is

expected that the coefficients of the variables under consideration will exhibit various characteristics in sign and sizes that conforms to the a priori expectations of the economic theory.

Table no. 2. The Regression result

Dependent Variable: LOG (EXCHR)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.242734	5.188393	1.781425	0.0846
DEFICIT_1	9.010007	4.160007	2.165429	0.0382
LOG (M2)	0.604755	0.101236	5.973694	0.0000
INF	-0.000806	0.008680	-0.092842	0.9266
OPEN	0.011088	0.003436	3.226767	0.0030
DEEP	-0.027169	0.032930	-0.825056	0.4156
LOG (CONSUM)	-1.063686	0.508697	-2.091001	0.0448
R-squared	0.913745	Mean dependent var		3.342605
Adjusted R-squared	0.897051	S.D. dependent var		2.114910
S.E. of regression	0.678584	Akaike info criterion		2.227204
Sum squared resid	14.27475	Schwarz criterion		2.528865
Log likelihood	-35.31688	Hannan-Quinn criter.		2.334533
F-statistic	54.73341	Durbin-Watson stat		1.729002
Prob (F-statistic)	0.000000			

Source: Authors' own computation from the Eviews result

From the result above, the coefficient of the variables, DEFICIT, LOG (M2) and OPEN show positive signs, which imply that the variables contributed positively to the exchange rate growth during the period under review and the variables are statistically significant. It indicates that any unit change in the amount of budget deficit will lead to an increase in the current rate of exchange to the tune of 9.0%. The coefficient of LOG (M2) are positively signed and statistically significant at 5% critical level. Also, the coefficient of the variable OPEN indicates positive and significantly statistical. It implies that any unit change in the money supply and the degree of openness of the economy will lead to 60%, and 1% increases respectively in the current rate of exchange.

The coefficient of the variables INF, DEEP and LOG (CONSUM) indicate negative signs, thus indicating a negative relationship between the variables and exchange rate growth in Nigeria during the period under review. Thus unit change in the inflationary level will lead to a decrease in the current exchange rate growth; while a unit change in the government consumption expenditure will lead to -1% increases in the current exchange rate growth rate of the economy. Statistically, the F-statistic is 54.73341 and the probability of the null hypothesis for no significance in that regression is [0.000000]. The R^2 - (R-squared) which measures the overall goodness of fit of the entire regression shows the value is 0.913745 = 91%, while the adjusted R^2 of 0.897051 = 89% shows that the independent variables explain the dependent variable to the tune of 98%. Also, the Durbin Watson (DW) statistics DW = 1.729002 which is greater than the R^2 shows that the overall regression is statistically significance. Furthermore, the t-ratios for those regressors are also meaningful, and their probabilities are below $\alpha(0.05)$. Thus, the null hypothesis $\beta i = 0$ is rejected, and those regressors are significant even at a confidence level of 95%.

Error Correction Model (ECM)
The coefficients of the explanatory variables in the error correction model measure the short-run relationship. ECM corrects the deviations from the long run equilibrium by short-run adjustments. This shows us that changes in independent variables are a function of changes in explanatory variables and the lagged error term in cointegrated regression. The ECM result is therefore presented below:

Table no. 3. Error-correction estimates

Dependent Variable: LOG (EXCHR)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.882278	4.503446	1.972329	0.0585
DEFICIT_1	2.710007	4.030007	0.673545	0.5061
LOG(M2)	0.717023	0.100355	7.144854	0.0000
INF	-0.007473	0.007521	-0.993604	0.3289
OPEN	0.008645	0.003004	2.877672	0.0076
DEEP	-0.042307	0.028148	-1.503022	0.1440
LOG(CONSUM)	-1.012931	0.445773	-2.272305	0.0309
D(ECM(-1))	-0.784058	0.240727	-3.257045	0.0029
R-squared	0.931803	Mean dependent var		3.557723
Adjusted R-squared	0.914753	S.D. dependent var		1.955435
S.E. of regression	0.570929	Akaike info criterion		1.910028
Sum squared resid	9.126892	Schwarz criterion		2.261921
Log likelihood	-26.38050	Hannan-Quinn criter.		2.032848
F-statistic	54.65322	Durbin-Watson stat		1.730389
Prob (F-statistic)	0.000000			

Source: Authors' own computation from the Eviews result

In the short run result, the coefficient of the lagged variable of the regressand which forms part of the independent variables on the dependent variable shows the following values DEFICIT (2.710007), LOG (M2) (0.717023) and OPEN (0.008645) which are positive. This implies that an increase in the budget deficit pushes the growth of the rate of exchange to the tune of 2.7% in the short term. The equilibrium error-correction coefficient ECM (-1) is -0.784058 which has the expected negative sign and statistically significant. The implication is that there is a long run causality running from independent variables to dependent variable. We can therefore state that 78 percent gap between long run equilibrium value and the actual value of the dependent variable (EXCHR) has been corrected. It can be also said that the speed of adjustment towards long run equilibrium is 78 percent annually.

Its t-ratio is -3.257045 and the probability of the null hypothesis being true for zero is [0.0029], which is significant even when α = 0.05. Thus, it can also be concluded that the adjustment is quite meaningful in

the short-run error correction mechanism. Equally, the coefficient of multiple determinations (R^2) shows that the model has a good fit as the independent variables were found to jointly explain 91% of the movement in the dependent variable. However, the fitness of the model could be interpreted in the F-statistic which is significant at 54.65322 and explains the adequacy of overall variables incorporated in the model.

Granger Causality Test

The procedure used in this study for testing statistical causality between the variables is the Granger causality test. The tests determine the predictive content of one variable beyond that inherent in the explanatory variable itself.

From the pairwise Granger Causality test result, it shows that there is a uni-direction of causality from EXCHR to DEFICIT_1. This implies that the exchange rate granger causes the budget deficit in the economy during the period under review. There exist no direction of causality between M2 and EXCHR, INF and EXCHR and also CONSUM and EXCHR. From table no. 4 results a bi-directional causality between OPEN and EXCHR. The result equally indicates a uni-direction of causality from DEEP to EXCHR.

The results relating to the existence of Granger causal relationships between the variables are presented in the table below:

Table no. 4. The Pairwise Granger Causality Tests

Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
DEFICIT_1 does not Granger Cause EXCHR	36	0.22961	0.7962
EXCHR does not Granger Cause DEFICIT_1		6.16695	0.0056
M2 does not Granger Cause EXCHR	36	1.90696	0.1656
EXCHR does not Granger Cause M2		0.03981	0.9610
INF does not Granger Cause EXCHR	36	0.48279	0.6216
EXCHR does not Granger Cause INF		0.40806	0.6685
OPEN does not Granger Cause EXCHR	36	4.62296	0.0175
EXCHR does not Granger Cause OPEN		4.91594	0.0140
DEEP does not Granger Cause EXCHR	36	3.89782	0.0309
EXCHR does not Granger Cause DEEP		1.67593	0.2036
CONSUM does not Granger Cause EXCHR	36	0.12058	0.8868
EXCHR does not Granger Cause CONSUM		2.21929	0.1257

Source: Authors' own computation from the Eviews result

Summary of Findings

The incidence of chronic budget deficits and continuous increase in the public debt coupled with the general economic decline resulted in the adoption of the SAP. As a result of the escalating government deficit, the economy had continues to witness general increases in the level of prices. It was noted that introduction of SAP led to a reduction of the fiscal deficits to the maximum of 3% of the GDP. However, the economy continues to witness persistent budget deficit which has affected productive activities. This study adopted an error correction model procedure to estimate the effect of budget deficit on exchange rate in Nigeria.

In conclusion, the trend analysis of the exchange rate from (1980-2017) indicates that there was an exchange stability in the

Nigerian economy between 1980, 1990 to 2000. Also, there has been an upward trend and continuous fluctuation of the exchange rate in the Nigerian economy during the period under consideration. The descriptive statistics of the variables under consideration show an averaged positive mean values. The standard deviation showed that the highest standard deviation of (539823.7) is recorded by the DEFICIT_1 while the least standard deviation of (5.376178) is recorded by DEEP. The skewness statistics from the table show that six of the variables are positively skewed while one variable is skewed negatively; the kurtosis coefficients show that four of the variables are leptokurtic, while two variables are mesokurtic, and one other variable is platykurtic. The probability of Jarque-Bera test of normality for the variables indicates that seven of the variables have values greater than 5% level of significance. The correlation result shows that five of the variables have positive relationships with the EXCHR, while one of the variables under consideration indicates a negative sign.

The stationarity tests result of the variables under consideration shows that one variable CONSUM is stationary at level difference while the other variables are non-stationary at level. At first difference, all the variables became stationary and integrated of order one at 5% level of significance. The Johansen hypothesized cointegration test result show that the trace likelihood ratio and the maximum Eigen value results point out that the null hypothesis of no cointegration among the variables is rejected in favor of the alternative hypothesis up to five cointegrating equations at 5% significant level respectively. The long run analysis of the effect of the budget deficit on the exchange rate performance reveal that the coefficient of the variables, DEFICIT_1, LOG (M2) and OPEN show positive signs, implying that the variables contributed positively to the exchange rate growth during the period under review and the variables are statistically significant. The coefficient of the variables INF, DEEP and LOG (CONSUM) indicate negative signs, thus indicating a negative relationship between the variables during the period under review. Statistically, the F-statistic result indicate that the entire regression are adequate while the R^2 - (R-squared) the adjusted R^2 results shows that the independent variables explain the dependent variable to the tune of 98%. Also the Durbin Watson (DW) statistics shows that the overall regression is statistically significance. Furthermore, the t-ratios for those regressors are also meaningful, and their probabilities are below α (0.05).

The coefficients of the explanatory variables in the error correction model result show that the coefficient of the regressand variables which includes DEFICIT_1, LOG (M2) and OPEN are positive. The equilibrium error-correction coefficient ECM (−1) is -0.784058 and has the expected negative sign and statistically significant. Its t-ratio and the probability of the null hypothesis is significant at $\alpha = 0.05$. The pairwise Granger Causality test result shows that there is a uni-direction of causality from EXCHR to DEFICIT_1. There exist no direction of causality between M2 and EXCHR, INF and EXCHR and also CONSUM and EXCHR. A bi-directional causality exists between OPEN and EXCHR. Equally is a uni-direction of causality from DEEP to EXCHR. Based on the findings of the study, the policy recommendations are as follows: the Federal Government should adopt policy that encourages foreign inflow in order to boost the country's productive base. This would shift the country from import to an export oriented economy. The Federal government should adopt measures aimed at increasing the already depleted foreign reserve as well as increase public saving to complement private saving in the economy.

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