Determinants of Budget Deficit in Nigeria

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Abstract – **This paper investigates the factors governing the determination of budget deficit in Nigeria from 1981q1 through 2016q4. Our methodology is based on Johansen cointegration and Vector Error Correction model (VECM) approach. The result from the Johansen cointegration test suggests one cointegrating vector, which indicates the existence of a long run cointegrating relationship. Evidence from the long run and short run parameters suggest that exchange rate, interest rate and one year lag of budget deficit are the major determinants of budget deficit. Therefore, to achieve a realistic fiscal surplus, the government should determine a high level of accountability in its fiscal operations. In addition, any fiscal surplus should be channeled into productive investments to diversify the economy and reduce the likelihood of potential budget deficits.**

Keywords - *Budget deficit, exchange rate external debt, VECM*

I.   Introduction

One of the major problems facing the economies of many developing countries in recent decades has been the persistent shortfall in revenues, which has resulted in substantial budget deficits. The steady rise in budget deficits has drawn a lot of attention, resulting in an increasing debate among academics and policymakers about the long-term consequences of budget deficits in those economies. Budget deficits and their funding are often mentioned hypothetically in the economic literature as a major problem in both developed and developing economies. In most cases, this conclusion is based on the evidence that suggests budget deficits were at the forefront of macroeconomic and adjustment in both developed and developing countries since the 1980s (Easterly et al., 1994; Abang Abdul Rahman et al., 2019; Muhamad et al., 2020). The rapidly growing of developing countries in recent times has brought the issues of budget deficits into sharp focus, therefore, when a deficit is involved, it is important to find remedy for financing such deficits so as to avoid its negative effects (Eisner, 1989; Easterly, 1999; Kok and Selvaratnam, 2018). For instance, the deterioration of fiscal deficits have been responsible for much of the economic crisis that beset Nigeria resulting in over indebtedness and growing debt servicing that crowd out investment and growth (Adamu and Rajah, 2016; Adamu et al., 2021). Though, Nigeria has greater influence on the nation's economic activities through the use of fiscal instruments

amongst which are budget deficit operation. This has an effect on macroeconomic variables, which serve as media through which budget deficit affects economic development.

The objective of this paper is to empirically investigate the macroeconomic and financial factors that govern explosive nature of budget deficits in Nigeria. The paper can significantly help the policy makers to know how changes in these factors can affect budget deficits in the economy through the determination of the effectiveness of the decisions undertaken by the government on budget financing. And it will also be useful for the investors who might be able to identify various economic and financial variables that they should focus on investment and this will build more confidence in them to make sound investment decisions.

This paper is distinct from previous research in three ways. To begin with, only a few attempts have been made to research the determinants of Nigeria's fiscal deficits, and their results are conflicting (see, Osahon and Oriakhi, 2013; Bakare, 2014). Second, although most previous research has focused on macroeconomic variables (see, Alam et al., 2020; Bangura et al., 2016), this analysis combines macroeconomic and financial control variables associated with high budget deficits into a single equation. This is a subject that has not received much attention in the literature. As a consequence, by accounting for control variables like interest rate, exchange rate, stock prices, and external debt, this study fills in the gaps. Third, this analysis uses quarterly data instead of annual data, as is common in the literature.

The rest of the paper is structured as follows: section 2 presents a brief overview of trends of budget deficits. Section 3 discusses theoretical and empirical literature. Section 4 dwells into the model and methodology of the paper while section 5 presents results and discussion. Finally, section 6 concludes the paper.

II. Overview of Budget Deficit in Nigeria

Nigeria is one of the major African countries been plagued by several economic challenges of maintaining a stable fiscal balance with challenges of fiscal deficit partly captured by the budget deficit, which started since 1957 and this situation has persisted up till date (Oyejide, 1972; Adamu, 2016). For example, available records have shown that government expenditure in Nigeria has consistently exceeded its revenue from 1980 to 2012 while the reverse occurred between 1995 and 1996 when the government recorded surplus budget (Bakare et al., 2014). Studies have shown that persistent budget deficits can be a major policy concern, irrespective of whether the country affected is developed or developing (Saleh, 2003). This is because an accumulated budget deficit may crowd-out both private and public investment if they cause an increase in government expenditure, interest rates and decline in expected tax revenue. However, evidence has shown that most developing countries run huge budget deficits due to excessive government spending on social services (Abakah and Adusah-Poku, 2016, Adamu, 2019). Figure 1 shows the trend in Nigeria's government budget deficits as a percentage of GDP that has been volatile throughout the period. Between 1980 and 1983, the budget deficits were fairly low. Thereafter, it kept rising between 1984 and 1989 with a one time high of -11.3% in 1986 and later became volatile until it reached an all-time peak in 2006 at a point 8.8%. More recently, specifically in 2016, the budget hit an all-time at -4.3 due to increasing external debt and debt service payment, which engulf about half of the total revenues of the country.
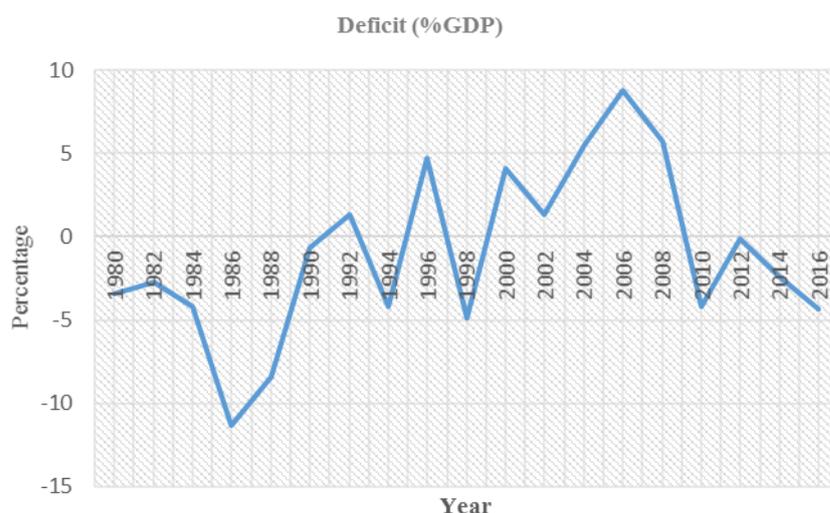

Figure 1: Deficit as percentage of GDP, 1980-2016.

III. Literature Review

The development of a budget deficit is often traced to the Keynesian inspired expenditure led growth theory of the 1970s. Most countries of the world adopted this theory that the government has to motivate the aggregate demand side of the economy in order to stimulate economic growth. However, the consequences of budget deficit on macroeconomic variables cannot be underestimated in most countries of the world, including Nigeria (Olomola and Olagunju, 2004). According to Keynes, a significant fraction of the population is thought of as either myopic or liquidity constrained. These individuals have very high propensities to consume out of current disposable income. A temporary tax reduction therefore has an immediate and quantitatively significant impact on aggregate demand. If the economy's resources are initially underemployed, national income rises, thereby generating second round effects and the well-known Keynesian multiplier. Since deficits stimulate both consumption and national income, saving and capital accumulation need not be adversely affected (Bernheim, 1989). According to the Ricardian equivalence hypothesis, actual government spending is the most convenient method for examining the effect of government economic activities on households, and how government funds public expenses is irrelevant (Ricciuti, 2003). Elsewhere, Barro (1989) argues that if the government does not finance expenditures by tax, a budget deficit would occur. If budget deficits are financed by loan, households would know that the government has to increase taxes in the near future to compensate for principal and interest payments. So, the type of finance (tax or loan) does not make any difference on the consumption decisions of household and capital allocation of the economy. This situation is called Ricardian equivalence hypothesis. Barro (1989) concluded that households would reflect the same response whether the government finances the budget deficit by loan or taxes. Therefore, change in the present value of current and future government spending would affect national savings and hence interest rate.

From the empirical standpoint, there are a number of studies trying to study the factors determining budget deficits in a number of countries. For instance, Gnimassoun and Do Santos (2021) Gnimassoun and Do Santos (2021) apply Sala-i-Martin's Extreme Bound Analysis to previous research on developing countries to comprehend if their estimated effect on public deficits is robust under thousands of different scenarios. External shocks, debt ratios, financial development, democracy, and government spending control are all strongly linked to fiscal deficits, according to the researchers' findings. Sadekin et al. (2020) investigates the patterns and origins of Bangladesh's government budget deficit. The data was analysed using descriptive techniques. Result indicates that government finances are the major cause of the budget deficit from domestic sources rather than foreign sources. Similarly, using VECM in Bangladesh, Alam et al., (2020) reveal that exchange rate, inflation, trade and money supply have positive effects on budget deficit in the long run while negative effects have been identified in the short run. Akalpler and Panshak (2019) examines the link between Nigeria's current account deficit and its budget deficit using annual time series data spanning 1980 to 2016. Autoregressive Distributed Lag (ARDL) and Granger causality tests are used. The emergence of a twin deficit hypothesis for Nigeria is revealed by the findings, which rule out not only the Ricardian equivalence hypothesis, but also the reverse and bi-directional causality hypotheses.

For the period 1993 to 2017, Al-Qudah and Jaradat (2018) examines the effect of output growth and external debt on Jordan's budget deficit. Output growth has a negative effect on the budget deficit, while external debt has a positive effect, according to the findings. In the short run, empirical findings indicate that budget deficit lags one and two have a positive effect on current budget deficits in Jordan, while external debt lags two and three have a negative impact. Using VECM, Bangura et al., (2016) investigates the key macroeconomic determinants of budget deficit in Sierra Leone from 1980 to 2014. The findings reveal that real GDP, interest rate and exchange rate have a negative impact on the budget deficit while inflation and investment have positive effects, short run results suggest real GDP, interest rate and investment are the key determinants of budget deficit. Saleem et al., (2015) found strong evidence of a positive association between budget deficits and stock prices in Pakistan and showed evidence of a long run negative relationship between budget deficits and stock prices in India for annual time series data covering the period 1990 to 2010. The result was attributed to huge government spending on infrastructure that would enhance industrial development. Neaime (2015) investigates the long-term viability of Lebanon's public debt and exchange rate policies, as well as the current account and budget deficits. The empirical findings point to unsustainable debt and exchange rate policies, suggesting that increasing fiscal deficits have begun to exacerbate current account deficits and the national public debt.

Joshi and Giri (2015) examines how fiscal deficits affect the performance of the stock market in India, using annual data from 1988 to 2012. The long run results indicate a negative but insignificant relationship between budget deficit and stock prices while fiscal deficits influence the stock price in the short run. Bakare et al (2014) determine the long term relationship between budget deficit, money supply and inflation in Nigeria between 1975 and 2012. The overall result between inflation rate and growth of money supply, growth of

budget deficit and growth of external debt indicated that the specified model is statistically significant at 5% level.

Quayes (2010) studies the relationship between budget deficits and stock market prices in the US from 1950 to 2005 by integrating the effects of inflation and demographic structure. The study results showed a negative relationship between budget deficits and stock prices. The results suggest if budget deficits increase by a magnitude of 1% of GDP, then stock prices will fall by more than 75. Saleh (2003) examines the relationship between budget deficit and macroeconomic variables. Findings do not shed any definite light on the relationship between budget and economic variables as with theoretical analysis.

IV. Data and Methodology

The prime objective of this paper is to examine the factors leading to an increase in budget deficit in Nigeria covering the period of 1981q1 to 2016q4. The candidate variables are budget deficit (*BDF*), stock price (*STP*), interest rate (*INT*), External debt (*EXD*), and Exchange rate (*EXR*). Table 1 presents the details of variables unit of measurement and sources.

Table 1: Definition of Variables and Data Sources

Variables	Definition and Measurement of the variables	Sources
BDF	Budget Deficit; measured the differences between government revenue and government expenditures, as a percentage of GDP	CBN
STP	Stock Price; measured as a turnover ratio which is equal to the value of trades of shares on the stock markets divided by market capitalization	CBN
INT	Interest Rate; measured by the Commercial Banks interest rate on time deposit maturing in 12 month	CBN
EXD	External debt measured as a percentage of GNI (Proxy for GDP)	CBN
EXR	Exchange rate; measured as the nominal exchange rate divided by the price deflator	CBN

Note: CBN stand for Central Bank of Nigeria Statistical Bulletin, 2017.

To ascertain the factors governing the behaviour of budget deficit in Nigeria, the following baseline model is modified from Bakare et al., (2014); Abakah and Adusah-Poku (2016) and Mowlaei and Abdian (2018).

$$\ln BDF_{t-1} = \alpha_0 + \alpha_1 \ln STP_{t-1} + \alpha_2 \ln EXR_{t-1} + \alpha_3 \ln INT_{t-1} + \alpha_4 \ln EXD + \mu_t \quad (1)$$

To minimize inconsistency in trend data and make it easier to interpret the results, all variables are transformed to logarithmic form (Juselius et al., 2014). In addition, log transformation appears to produce a series with significantly more homogeneous variance in first differences than a series without logs (Lutkepohl and Xu, 2012). The existence of a long run cointegrating relation among the variables implies a dynamic short run model (error-correction model), which can be estimated and analyse the response of change of each variable on the budget deficit. The vector error correction model corresponding eq. (1) is specified as follows:

$$\Delta \ln BDF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta \ln BDF_t + \sum_{i=0}^{p} \alpha_2 \Delta \ln STP_t + \sum_{i=0}^{p} \alpha_3 \Delta \ln EXR_t + \sum_{i=0}^{p} \alpha_4 \Delta \ln INT_t$$

$$+ \sum_{i=0}^{p} \alpha_4 \Delta \ln EXD_t + \delta_1 ECT_{t-1} + \mu_t \quad (2)$$

where Δ is the first difference operator, p is the lag length and α_i are the coefficients of the variables in the short run dynamics of the error correction model, and ECT_{t-1} denotes the lagged error correction term generated from the cointegrating vector. t and μ are time dynamic and the Gaussian error term to capture unobserved variables in the model.

V. Result and Discussion

Prior to the estimation of equation (1), the properties of the data have to be examined to determine the stationarity of the data whether at levels, first difference or second difference. Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) test were used. The results of the unit root tests are presented in Table 2 and 3. It is clear from the tables that all the variables are stationary at first difference because the probability values of all the variables are less than 1%. This is an indication that the data are not nonsensical i.e. they do not have a spurious relationship.

Table 2: Unit Root Test Results at Level

Variables	Test	t-Statistics	Prob. Value	Status	I(d)
lnBDF	ADF	-0.719477	0.8373	Not stationary	Unknown
	PP	-0.887172	0.7900	Not stationary	Unknown
lnINT	ADF	-2.436551	0.1337	Not stationary	Unknown
	PP	-2.447106	0.1309	Not stationary	Unknown
lnEXR	ADF	-1.278909	0.6383	Not stationary	Unknown
	PP	-1.252759	0.6503	Not stationary	Unknown
lnSTP	ADF	-0.912310	0.7819	Not stationary	Unknown
	PP	-0.700119	0.8423	Not stationary	Unknown
lnEXD	ADF	-0.876105	0.7933	Not stationary	Unknown
	PP	-0.652003	0.8540	Not stationary	Unknown

Table 3: Unit Root Test Results at First Difference

Variables	Test	t-Statistics	Prob. Value	Status	I(d)
⊗lnBDF	ADF	-6.629787*	0.0000	Stationary	$I(1)$
	PP	-11.89053*	0.0000	Stationary	$I(1)$
⊗lnINT	ADF	-4.581031*	0.0002	Stationary	$I(1)$
	PP	-4.241788*	0.0008	Stationary	$I(1)$
⊗lnEXR	ADF	-4.996189*	0.0000	Stationary	$I(1)$
	PP	-9.586997*	0.0000	Stationary	$I(1)$
⊗lnSTP	ADF	-3.698998*	0.0051	Stationary	$I(1)$
	PP	-4.304201*	0.0006	Stationary	$I(1)$
⊗lnEXD	ADF	-4.023281*	0.0018	Stationary	$I(1)$
	PP	-6.742506*	0.0000	Stationary	$I(1)$

Note: * indicate Significance at the 1% level.

Since the result of the unit root tests results in Table 3 confirmed that all the series [lnBDF, lnINT, lnEXR, lnSTP, and lnEXD] are stationary at first difference, $I(1)$, this allow us to conduct cointegration test using Johansen approach (Johansen and Juselius, 1990). The result of the cointegration test is presented in Table 4. Based on the trace statistics and the maximum Eigenvalue statistics there exists one cointegrating relation implying that the variables have a long run relationship.

Table 4: Results of Johansen Cointegration Test

Trace Test			
No. Cointegration Equation	Statistic	5 % Critical value	Prob
None *	90.24751	69.81889	0.0005
At most 1	46.41232	47.85613	0.0679
At most 2	22.99658	29.79707	0.2462
At most 3	10.26407	15.49471	0.2610
At most 4	1.850375	3.841466	0.1737
Maximum Eigenvalue			
No. Cointegration Equation	Statistic	5 % Critical value	Prob
None *	43.83519	33.87687	0.0024
At most 1	23.41573	27.58434	0.1564
At most 2	12.73252	21.13162	0.4771
At most 3	8.413692	14.26460	0.3382
At most 4	1.850375	3.841466	0.1737

Note: * indicate significant at the 1% level.

As shown in Table 4 the trace statistic of 90.247, which is greater than 69.818 at 5% critical value with a probability value of 0.0005. Similarly, the maximum eigenvalue statistic is also consistent with the trace statistics with a value of 43.835 which is greater than the 5% critical value of 33.876 with a probability value of 0.0024. The result from the two tests, therefore, reject the null hypothesis that there is no co-integrating equation. Thus, this outcome confirms the presence of a long run relationship among the variables.

Table 5: Normalized Co-integrated Coefficients for Long Run Estimates

LBDF	lnEXR	lnEXD	lnSTP	lnINT
1.000000	0.735847	-0.762410	-0.082083	6.779538
	(0.15110)	(0.17051)	(0.09516)	(0.72660)
	[4.86996]***	[-4.47126]***	[-0.86254]	[9.33052]***

: * indicate significant at 1% level.

The normalized cointegrating equation is reported in Table 5. The log of exchange rate (lnEXR) is positive and highly significant. This means that a 1% change in exchange rate may bring about change in budget deficit in Nigeria. This finding is consistent with the work of Alam et al., (2020) The log of external debt is negative and statistically significant at 1% level. This indicates that the government is short on resources, a decline in external debt would minimize the budget deficit. As a result, spending will be cut, mostly on disproportionate expenditures. This result contradicts the work of Al-Quada and Jaradat (2018) and Neaime (2015). The log of stock price is negative but not significant, which is consistent with the result of Joshi and Giri (2015). The log of interest rate is positive and statistically significant at 1% level. This implies an increase in interest rate will spur a budget deficit. This concurs with the findings of Bangura et al., (2016).

The result of the short-run (VECM) analysis is reported in Table 6. The results show that one year lag of budget deficit is positive and statistically significant in explaining the behaviour of budget deficit in Nigeria. This implies that a 1% increase in the previous value of the budget deficit can significantly change the current budget deficit by approximately 0.3%. This is consistent with the work of Al-Qudah and Jaradat (2018). The past value of the exchange rate is positive and statistically significant suggesting that any change can aggravate the budget deficit. On the contrary, external debt, interest and stock prices all have an inverse relationship with budget deficit, but they are not statistically significant. The value of the ECT is negative and statistically significant. The estimate of the lagged ECT is -0.108. This indicates that short-run deviations towards long-run would be corrected by 0.11% in budget deficit function quarterly.

Table 6: Vector Error Correction Model Results

Variables	Coefficients	Standard error	*t*-statistics
Constant	0.0576	0.0371	1.5514
ΔlnBDF_{t-1}	0.2728	0.0666	4.0923*
ΔlnEXR_{t-1}	1.0350	0.1243	8.3258*
ΔlnEXD_{t-1}	-0.0731	0.2081	-0.3515
ΔlnSTP_{t-1}	-0.4816	0.4451	-1.0820
ΔlnINT_{t-1}	-0.0046	0.5816	-0.0079
ECT_{t-1}	-0.1085	0.0342	-3.1736*

Note: *Significance at the 1% level.

VI. Conclusion and Policy Implications

The paper ascertained whether stock prices, exchange rate, interest rate and external debt determine the behaviour of budget deficit, in Nigeria. The paper also reviewed some theories and empirical studies that illuminated the relationship between the variables under consideration. Besides, the paper highlighted the structure of the budget deficit in relation to various macroeconomic and financial variables in Nigeria. Unit root tests were conducted and results proved that all the variables are stationary at first difference. The Johansen cointegration test suggested only one cointegrating vector. The long run and short run results indicate that exchange rate, interest rate and one year lag of budget deficit are the leading determinants of budget deficit in Nigeria. In the same way, the estimate reveals that about 0.11% of the errors in the short run are corrected in the long run. Based on the empirical results, we drew some policy implications in order to maintain fiscal balances in Nigeria. First, the government should display a high sense of transparency in the fiscal operations to bring about realistic fiscal surplus. Second, any fiscal surplus should be directed to productive investments in order to diversify the economy and reduce the likelihood of potential budget deficits and extra-budgetary funds.

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