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RELATIONSHIP BETWEEN FISCAL DEFICITS AND ECONOMIC GROWTH: FURTHER INSIGHTS FROM NIGERIA

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Abstract

The study had a two-pronged objective; first, it sought to determine the relationship between fiscal deficits and economic growth in Nigeria over a time span of 1990 - 2022; and second, it sought to determine the optimal fiscal deficit level for the economy. Evidence showed that there exists a significant long run relationship between the rate of economic growth in Nigeria and the exogenous variables made up of gross fixed capital formation, labour growth rate, fiscal deficit as a percentage of real GDP, inflation rate, interest rate, trade openness, and financial depth. In addition, findings determined that the best ARDL model is one where growth in real GDP is a function of growth in real GDP lagged by 2 years, investments lagged by 2 years, and financial depth lagged by 2 years while growth in labour, fiscal deficit, and interest rates should be lagged by 1 year. Finally, Inflation rate is not lagged. Also, in terms of the size of fiscal deficits in the Nigerian economy vis-à-vis the real GDP this study determined that the threshold should not exceed 1% as this is the level favourable to economic growth.

Keywords: Budget Deficit, Economic Growth, Fiscal Deficit, Fiscal Policy, Monetary Policy

INTRODUCTION

Over many decades, a plethora of empirical research have been carried out and continue to be carried out on the relationship between economic growth and crucial economic targets such as price stability (Doguwa, 2012), interest rates stability (Njie and Badjie, 2021), balance of payments (Fasanya and Olayemi, 2018), and employment stability (Akeju and Olanipekun, 2015) etc in Nigeria and elsewhere. Umaru, Aliero, and Abubakar (2021) explained that the search for macroeconomic stability continues to be a global target with every economy, particularly the developing economies, being responsible for managing relevant variables to achieve macroeconomic stability and sustainable growth. (p. 23).

Economic Growth has been variously defined. The *Oxford Dictionary* defines economic growth as "the increase in the production of goods and services per head of population over a stated period of time". Todaro (1992) described economic growth as "the steady process by which the productive capacity of the economy is increased over time to bring about rising levels of national income." (p. 489). These definitions imply that economic growth rates are a function of changing aggregate consumption, investment rates, government expenditure, and tax revenues. Where economic growth is insufficient, it is acceptable for an economy to run deficit budgets to stimulate aggregate demand and economic growth. Umaru, Aliero, and Abubakar (2021) also asserted that the growth rate of national output is a key performance indicator for gauging economic productivity.

Perry (2020) described budget deficits as "yearly accrual of debt, or how much expenditures exceed revenues on a yearly basis" (p. 3). On the flip side, this implies that budget surpluses are the amount of government revenues that are over and above government expenditures on an annual basis. Annual budget deficits occur when government expenditures are greater than government revenues as a result of a shortfall in revenue generation or an increase in expenditures, or both. A simpler definition provided by Adeleke and Abdulsalami (2016) is that deficits are the retained revenues of federal government minus total expenditure (p. 4).

There are several bases to justify this present study. First, the relationship between fiscal deficits and economic growth across different economies in general, and Nigeria in particularly, is relatively nascent with the vast majority of studies focussed on developed economies. For example, a search through the open contents on the JSTOR database for "fiscal deficits and economic growth" found 420 journal articles globally; a further filter search of this, for "Nigeria" narrowed the number of available journals articles down to 21. From the "Subject" filter, 6 of the journal articles were on Economics while 1 was on Development Studies while the rest were in areas that were unrelated such as History (4), International Relations (5),

and Ecology and Biology (1) etc. Onwioduokit and Bassey (2013) perhaps captured the status succinctly when they stated that “the effect of fiscal deficits on economic growth has been the subject of extensive research over the past decades and still remains important till date.” (p. 296).

Secondly, in specifying a model of economic growth, previous studies have included variables that may not necessarily be ideal explanatory variables for such a model. Interest rates used are one example; as different types of interest rates exists and in trying to capture the effects of interest rate movements on economic growth studies may use savings rates, prime lending rates, deposit rates etc. Onwioduokit and Bassey (2013) did not expressly state the type of interest rate variable used in their model, but the authors explained that increases in interest rates reduce the growth of consumer spending and growth as consumers are incentivised to save in banks rather than spend (p.17). We can then reasonably assume that Onwioduokit and Bassey (2013) used savings interest rates. Umaru et. al. (2021) on the other hand, made use of prime lending rate, which is the interest rate financial institutions charge their best customers for loans.

In addition, different financial institutions have different savings and prime lending rates, so studies would use weighted average savings rates or weighted average prime lending rates which aggregates the different rates of all the banks (CBN, 2021). A more realistic interest rate to use however, is the treasury bill rate. Note that in a fiscal deficit regime, the Government is the largest borrower in a typical economic growth model, using treasury bills and bonds to borrow from financial institutions or refinance existing borrowings, and crowd out the private sector in the process (Diamond, 1965; Vincent and Clem, 2013) as government fund the fiscal deficits by borrowing from financial institutions and the private sector (Sen and Kaya, 2014; Yusuf, Mohd, and McMillan, 2021). None of the literatures reviewed made use of treasury bill rates as proxy for interest rates effect on economic growth.

Previous studies have also included an exchange rate variable (Umaru, et. al., 2021; Onwioduokit and Bassey, 2013, Onwioduokit and Bassey, 2014); however official exchange rates are arbitrarily fixed by the monetary authority while the market exchange rates that are determined by forces of demand and supply are not officially recognised or recorded. In addition, the trade openness index is a proxy for the foreign exchange variable. Gantman, and Dabós (2018) found that there exists a strong significant relationship between trade openness and real effective exchange rates such that trade openness produces a depreciation of real effective exchange rates. We therefore excluded the Nigerian foreign exchange variable from this study.

Finally, previous studies have made use of certain test and test results when these tests and test returns are not reliable. For example, Onwioduokit and Bassey (2014) made use of the Engel Granger test to test for cointegration when the Augmented Dickey-Fuller (ADF) and the Phillip-Perron (PP) tests they carried out showed that some variables were stationary at level I(0) and others stationery at first difference I(1) when the Bound test for cointegration should have been used as the economic variables were of mixed order of integration. Aero and Ogundipe (2018) also made use of the Johansen test when the results of the ADF test was that all variables were stationary at first difference I(1).

This paper examines the relationship between fiscal deficit and economic growth in Nigeria, from 1990 to 2022, using the linear autoregressive distributed lag (ARDL) methodology. Apart from this investigation, the study also sought to determine the optimal threshold level for deficit financing that enhances economic growth in Nigeria. This was carried out using the non-linear threshold autoregressive (TAR) methodology. This methodology also determined the point from when additional fiscal deficit financing begin to retard economic growth. The analyses using the ARDL and TAR will also test whether or not a threshold time series model provides a better fit to the data than a model without threshold.

THEORETICAL AND EMPIRICAL REVIEW

Classical economic theory asserts that economies will always be near or at natural levels of real GDP or output which is the level of real GDP that is obtained when the entire resources of each economy are fully employed; subsequently, any effort to increase expenditure will result in an increase in money supply and cause a rise in general price levels (Ogujiuba and Cornelissen, 2020, p. 81). As a result of this assertion, in a typical classical economic model, government fiscal intervention to boost economic growth is not required as the economy's total output and employment levels will not fall below its full employment level (Ogujiuba and Cornelissen, 2020, p. 72).

According to Todaro and Smith (2015), neoclassical economists argued that no or slow economic development was the result of poor resource allocation due to poor pricing policies and unnecessary state intervention in economic activity which slows the pace of economic growth and that if competitive free markets were permitted to flourish, state-owned enterprises, privatized, free trade and export expansion encouraged and foreign investors welcomed, the myriad of government regulations eliminated, both economic efficiency and economic growth will be stimulated(p. 136). For this school of thought, the implications are that during exceptional times when economies fall out of employment or output equilibrium, self-adjustment

mechanisms of free market forces, exist embedded within the market and work to bring the economy back to the natural level of real GDP.

The Great Depression of the 1930s that resulted in chronic unemployment and low levels of national output convinced economists that the classical theory of output and employment determination was inadequate (Mishkin 2012, p. 222). This failure gave rise to a new Keynesian economic theory which disagreed with the classical economic school of thought and instead, viewed the determination of national output and employment in terms of the aggregate demand for goods and services which an economy has the potential to produce, given its resources and technology. In his book the *General Theory of Employment, Interest* and *Money*, Keynes (1936) hypothesised that levels of national income and employment are determined by a country's aggregate demand and aggregate supply; and that equilibrium national income occurs at the point where aggregate demand, represented by consumption and investment expenditure, is equal to aggregate supply, represented by national income at factor cost. This point, Keynes (1936) termed as "*Effective Demand*".

Pollen (2008) explained that the main difference between the two schools of thought is that Classical economists argue that increasing money supply causes an increase in general price levels while Keynesian economists advocate a relationship between money supply and real GDP. The implication of a Keynesian approach to growth in real GDP therefore is that if policies are made that cause interest rate reduction (for example), borrowing cost will reduce which encourages entrepreneurship leading to increases in aggregate demand, GDP and employment. The implication of a Classical approach to growth in real GDP on the other hand, is that policy intervention to encourage increased spendings will result in inflation which will in turn result in unemployment as prices rise above the natural levels and employers respond by reducing wages and employment rates to curtail their costs (Ogujiuba and Cornelissen, 2020, p. 72).

In the *Principles of Political Economy and Taxation*, Ricardo (1821), a classical economist, attempted to reconcile the Classical and Keynesian approaches by introducing his Ricardian Equivalence proposition. Ricardo (1821) posited that government can either finance its expenditure by increasing taxation revenues or by borrowing and deficit financing, however, irrespective of how government chooses to finance its expenditure, the outcome for the economy will be exactly the same or equivalent as rational taxpayers will prepare for the expected increase in future taxation to finance current government expenditure or fiscal deficits by saving an amount similar to current deficit spending, so the net change to total spending will be zero. The implication of Ricardian Equivalence theory is that when a government funds its expenditure via deficit financing with a view to boosting economic growth, private expenditure

will simply drop by an equivalent amount as taxpayers increase their savings, so that the net implication on economic growth is zero.

Barro (1989) extended the Ricardian Equivalence theory by contending that fiscal deficit financing and changes in tax rates will have no effect on economic growth, interest rates and investment as deficit-financed government expenditures or tax changes would both lead to future tax increases. The implication for the economy is that efforts at stimulating economic growth through increased government borrowings will not be ineffective because investors and consumers will increase their savings rates as they expect that government will increase tax rates in the future in order to pay off the borrowings of the past; this will offset any increase in aggregate demand from the deficit-financed government spendings.

The relationship between fiscal deficit and economic growth has been the subject of theories, debates, and empirical studies over many decades and across both developed and developing economies. For developing economies such as Nigeria, some of these empirical studies find that government fiscal deficits have a significant and positive effects on employment and output (Aigbeyisi, 2013; Umaru, Aliero, and Abubakar, 2018; Onwioduokit and Bassey, 2013; Awode and Akpa, 2018; Bose, Haque and Osborn, 2007; Olayungbo and Olayemi, 2018). Some other empirical studies find that evidence of significant and negative relationship between government fiscal deficit and output growth especially for developing economies like Nigeria (Nurudeen and Usman, 2010; Abu, and Abdullahi, 2010; and Sanya and Abiola, 2015), Segun and Adelowokan, 2015, Aero and Ogundipe, 2018). A third group of empirical studies find no or weak evidence of any relationship between government fiscal deficit and growth in output (Vuyyuri and Seshaiah, 2004; Wosowei, 2013; Andoni and Osmani, 2017; Tan, 2006; and Kesavarajah, 2016).

Aluthge, Jibir, and Abdu (2021) find that the contradictory results from the myriad of empirical studies were as a result of the use of different methodologies, study scope, or dataset. The authors concluded that “Irrespective of which of the argument may be more convincing, what remains obvious is that there is need for further studies to go beyond their specifications and methodologies” (p. 140).

There is no consensus on the most appropriate methodology to use in analysing causality relationships between economic growth and predictive variables and prior empirical studies analysing fiscal deficits and output have therefore used different approaches. Vector autoregressive (VAR) models have been used in empirical studies examining the relationship between fiscal deficits and economic growth. (Navaratnam and Mayandy, 2016; Ojo, 2014; Tan, 2006; Obi and Nurudeen, 2009; and Kesavarajah, 2016).

Umaru et. al. (2021) argued that Navaratnam and Mayandy's (2016) use of VAR on a country-by-country basis was inappropriate as it would have been better to adopt a fixed or random effect technique that will bring out the joint effect of the variables across the countries (p. 27). Further, Umaru et. al. (2021) contended that since variables that Ojo (2014) used had different orders of integration, ARDL model would have been a better methodology to adopt than the VAR methodology (p. 28).

Another regularly used methodology to determine the relationship between fiscal deficit and real GDP is that of the ordinary least squares (OLS) approach (Maji and Achegbulu, 2012; Akinola, 2017; Ojong, Owui, and Effiong, 2013). On Maji and Achegbulu's (2012) use of the OLS methodology, Umaru el.al. (2021) noted that the methodology applied was questionable because use of the OLS technique is inappropriate for a time series data when there are unit root problems associated with the series.

Threshold Autoregressive (TAR) models have become more common as attempts are made to determine threshold fiscal deficits that are beneficial to the economy and levels that are detrimental. (Aero and Ogundipe, 2018; Onwioduokit and Bassey, 2014; Adam and Bevan, 2004). The relationship between fiscal deficit and real GDP in Nigeria has also been studied using the autoregressive distributed lag (ARDL) approach, (Aero and Ogundipe (2018); Sanya and Abiola, 2015; Umaru, et. al., 2021; Ali, Mandara, and Ibrahim, 2018; Andoni and Osmani, 2017). Umaru, et. al. (2021) argued that the findings of Sanya and Abiol (2015) may not be very reliable as the unit root tests conducted indicate that all the variables included in their model were *I* (2).

In addition to methodology issues discussed, several methods also exist for selecting time series data. However, problems may arise in the method of data selection while working with time series data as time series data may be autoregressive, stationary or non-stationery, and may also have a trend, cycle, or be seasonal in nature. Shrestha and Bhatta (2018) explained that "as time series data may possess specific properties such as trend and structural break, common methods used to analyse other types of data may not be appropriate for the analysis of time series data" (p.1).

As discussed by Aluthge, Jibir, and Abdu (2021), using an appropriate methodology for time series data is a critical part of time series analysis as selection of the wrong specification of the model or using wrong method affects research outcomes including biased and unreliable estimations. Shrestha and Bhatta (2018) asserted that the primary method selection for time series analysis is by using the results of unit root test as the test determines the stationarity of the variable (p. 3).

METHODOLOGY

The analyses undertaken in this study involved the use of secondary data collected from the World Bank's World Development Indicators (WBIs), various editions of the Central Bank of Nigeria (CBN) Statistical Bulletin, and the National Bureau of Statistics' Nigerian Gross Domestic Product Reports. The World Bank did not commence compiling Nigerian labour force data until 1990, as a result and since labour force is a major component of the overall data used in this study, the scope of this study ranged from 1990 – 2022. The research methodology involved both qualitative analyses i.e., use of pictorial representations, and quantitative analysis i.e., relying on econometric techniques in the form of the Autoregression Distributed Lag model to determine the relationship between the dependent and independent variables, and the Threshold Autoregression model to allow for analyses of multiple regimes that are governed by the values for our specified threshold variables. Overall, all variables were subjected to statistical analyses and conclusions drawn on the basis of the outcome.

The Autoregressive Distributed Lag (ARDL) Model

Following from the Keynesian approach to economic growth, we start with a simple Keynesian aggregate demand model of an open economy:

$$Y = C + I + G + (X - M) \quad (1)$$

Where, Y is output, C is consumption, I is investments, G is government expenditure, X is export, M is imports, and X – M is net exports.

Tobin (1965) posited that an increase in price levels would lead to an increase in capital investment, and in turn, an increase in growth. This position is feasible as rising rates of GDP can be inflationary. Following the work of Tobin (1965), therefore, we include the inflation variable into the model. Also note that in a dynamic time series model, current states are a function of past states i.e., the value of a dependent variable at a given time t is a function of the value of itself in previous time points, such as t − 1 and t – 2 (Irwin and Wang, 2017).

We then generate the following time series econometric model of output:

$$Y_t = \alpha_o + \alpha_1 Y_{t-1} + \alpha_2 GFCF_t + \alpha_3 DEF_t + \alpha_4 OPN_t + \alpha_5 INF_t + \mu \quad (2)$$

Where, Y_t is output at a particular time, $\alpha_1 Y_{t-1}$ is output lagged by one year, GFCF is gross fixed capital formation and a proxy for investments, DEF is total Government deficit from aggregate expenditure as a percentage of real GDP, OPN is the Trade Openness Index i.e. total imports plus total exports divided by real GDP, and a proxy from net export, INT is the treasury bill rate, FD is financial depth measured as broad money M2 as a percentage of real GDP, INF is the inflation rate and is proxied by the Consumer Price Index (CPI), while μ is the stochastic term.

From the aggregate supply side of the economy, and using the Cobb-Douglas Production function, we derive the following growth model with production or output being a function of capital and labour:

$$Y = AK^{\beta 1} L^{\beta 2} \quad (3)$$

Where, A represents total factor productivity and is a positive constant, K is capital input, L is labour input measured as person-hours worked per year, and β1 and β2 are the output elasticities of capital and labour respectively.

This study made use of the growth rate of real GDP as a proxy for economic growth (the dependent variable) and also to capture the demand and supply sides of the economy. The total explanatory variables used were therefore: the rate of gross fixed capital formation (GFCF), government fiscal deficit (DEF), trade openness index (OPN), interest rate (INT), inflation (INF), and rate of population growth as a proxy for the rate of growth of the labour force (LAB). Interest rate (INT) was included as an additional explanatory variable as Keynes (1936) advocates deficit spending to stimulate employment during economic downturn, of course, the cost of deficit spending is the interest rate charged to finance the deficit.

Following the findings of Odedokun (1996), this study incorporated financial depth (FD) as an important variable into the model. Employing annual data, Odedokun (1996) analysed the effects of financial intermediation on the growth of real GDP as well as effects of the financial sector on the factor inputs engaged in production. The author found that financial intermediation promotes economic growth, and that financial intermediation is at par with export expansion and capital formation ratio, and superior to labour force growth, as partners in promoting economic growth. Functionally, the model for this study can be represented thus:

$$RGDP_t = fRGDP_{t-1}, GFCF_t, LAB, DEF_t, OPN_t, INT_t, INF_t, FD_t) \quad (4)$$

The general form of an ARDL model is specified in Equation 5:

$$y_t = \beta_0 + \sum \beta_l \, y_{t-1} + \sum \delta \, x_{t-1} + \mu_t \quad (5)$$

Where, y_t is the dependent variable, which is a function of its lagged values y_{t-1} as well as the lagged values of the independent variables x, δ denotes the coefficients of the short run dynamics, (Musa, 2020). We can then express the functional form of our model in its econometric linear form:

$$Y_t = \alpha_o + \alpha_1 Y_{t-1} + \alpha_2 GFCF_{t-1} + \alpha_3 LAB_{t-1} + \alpha_4 DEF_{t-1} + \alpha_5 OPN_{t-1} + \alpha_6 INT_{t-1} + \alpha_7 INF_{t-1} + \alpha_8 FD_{t-1} + \mu_t \quad (6)$$

Where, α_0 is the intercepts that represents autonomous national income and α_1, α_2, α_3, α_4, α_5, α_6, α_7, and α_8 are the coefficients of the predictor variables. μ_t is the stochastic or error term that captures the impact of other predictor variables that are not included in the model. A priori expectations are that the value of α_1, α_2, α_3, α_5, α_7, and $\alpha_8 > 0$ and α_6, and $\alpha_7 < 0$.

Threshold Autoregressive (TAR) Model

As the aim is to determine the optimal fiscal deficit level that is good for economic growth, this study makes use of the Threshold Autoregressive (TAR) method as a class of non-linear time-series models (Tong 1978, Hansen, 1996). According to Wong and Lee (2005), "this model specifies that individual observations can fall into discrete classes based on the value of an observed (threshold) variable" (p. 52). This is because it is important to test whether or not a threshold time series model provides a better fit to the data than a model without threshold such as with the ARDL model.

Based on the variables already specified and the framework introduced by Tong (1978), the threshold equation is specified as:

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 DEF_{t-1}[I_t(DEF_t < K^*)] + \varphi_3 DEF_{t-1}[I_t(DEF_t > K^*)] + \alpha_4 GFCF_{t-1} +$$
$$\alpha_4 GFCF_{t-1} + \alpha_5 LAB_{t-1} + \alpha_6 DEF_{t-1} + \alpha_7 OPN_{t-1} + \alpha_8 INT_{t-1} + \alpha_9 INF_{t-1} + \alpha_{10} FD_{t-1} + \mu_t \quad (7)$$

Where, I is a dummy variable with a value of 1, if $DEF_t > K^*$ or 0 of $DEF_t < K^*$ and K^* is the optimum fiscal deficit threshold level of DEF i.e. deficit/RGDP that is to be estimated at 1% to 8%. φ_2 is the effect of DEF below the threshold level, and φ_3 is the effect of DEF above the threshold level. The optimum threshold is the one that produces the residual sum of squares (RSS) with the smallest value while maximising the adjusted R^2 (Onwioduokit & Bassey, 2014, p. 175). Other variables remain as already discussed. A priori expectations are that the value of $\varphi_1, \varphi_2, \alpha_5, \alpha_6, \alpha_7$, and $\alpha_8 > 0$ and α_3, and $\alpha_4 < 0$.

RESULTS

Descriptive Data Analyses

The average growth rate of GDP from 1990 – 2022, was 4.29 per cent. while the average total deficit financing is -2.45 per cent of GDP with a standard deviation of 2 indicating that while the Nigerian economy ran an average deficit financing of 2.45 per cent in the period, it was still able to achieve an economic growth rate of 4.29 per cent during that same period.

Table 1. Descriptive Data Analysis (EViews 10 output)

Variable	Count	Mean	Std. Dev.	Std Error of Mean
RGDP Growth	33	4.287737	3.958301	0.689052
Investment Rate (GFCF)	33	2.234503	12.25311	2.132993
Labour Growth Rate (LAB)	33	2.598275	0.104918	0.018264
Deficit % of GDP (DEF)	33	-2.452930	2.008385	0.349615
Inflation Rate (INF)	33	18.08475	16.10790	2.804026
Interest Rate (INT)	33	11.48263	5.586132	0.972421
Trade Openness (OPN)	33	35.84887	9.417354	1.639351
Financial Depth (M2/GDP)	33	18.16751	6.123293	1.065929

Correlation Matrix

Table 2 shows the correlation coefficients between all the possible pairs of values. It shows for example, that fiscal deficit is positively correlated to real economic growth rate, growth in labour force, and trade openness of the economy but negatively correlated with interest rates, inflation, and financial depth. The relationship as indicated in the results is consistent with economic theory in the case of inflation and growth in real GDP (particularly in a Keynesian expectations). It should however be noted that in general, descriptive statistics only show the direction and strength of relationships and not causation. The strongest level of correlation (0.626) is between growth in labour force and growth in real GDP, while the weakest level of correlation (0.015) is between interest rates and growth in real GDP.

Table 2. Correlation Results (EViews 10 output)

Correlation Probability	RGDP	GFCF	LAB	DEF	INF	INT	OPN	FD
RGDP	1.000							

GFCF	0.208	1.000						
	0.2461	-----						
LAB	0.626	0.041	1.000					
	0.0001	0.8225	-----					
DEF	0.3828	0.020	0.443	1.000				
	0.0284	0.9112	0.0099	-----				
INF	-0.420	-0.135	-0.211	-0.231	1.000			
	0.0149	0.4544	0.2376	0.1963	-----			
INT	0.015	0.098	0.079	-0.401	0.358	1.000		
	0.9356	0.5864	0.6602	0.0206	0.0405	-----		
OPN	0.383	0.127	0.545	0.372	-0.108	0.300	1.000	
	0.0277	0.4802	0.0010	0.0333	0.5492	0.0896	-----	
FD	-0.172	-0.130	-0.105	-0.099	-0.274	-0.483	-0.424	1.000
	0.3398	0.4713	0.5616	0.5849	0.1224	0.0044	0.0139	-----

Test for Stationarity (Unit Root Test)

The test for unit root was carried out on all the variables in the model to determine whether or not all the variables in the series are stationarity. Most economic and business data are known to exhibit non-stationary property which makes them predisposed to spurious or unreliable result (Aero and Ogundipe, 2018). To avoid this, all variables are required to be

stationary at level or at first difference. To test for the stationarity of our time series data set, the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979) and Philip Perron (PP) test (Philip and Perron, 1988) are employed. The ADF and PP tests are more suitable when the sample period is more than 25 but less than 50 (Arltova and Fedorova, 2016).

For the null hypothesis (H_0), it was specified that the variable has a unit root i.e., variable is non-stationary, while for the alternative hypothesis (H_1), it was specified that the variable has no unit root i.e., variable is stationary. The results in Table 3 and Table 4 show the stationarity level of the variables. RGDP and GFCF stationary at level (I(0)) while LAB, DEF, INF, INT, INF, OPN, and FD are seen to be stationary of order 1 (i.e. they attained stationarity at first difference).

Table 3. Augmented Dickey-Fuller Test Result (EViews 10 output)

Variable	Prob.	Status
RGDP Growth	0.0093	I(0)
Investments (GFCF)	0.0000	I(0)
Labour Growth Rate (LAB)	0.4834	I(1)
Deficit % of GDP (DEF)	0.0019	I(1)
Inflation Rate (INR)	0.0000	I(1)
Interest Rate (INR)	0.0036	I(1)
Trade Openness (OPN)	0.0001	I(1)
Financial Depth (M2/GDP)	0.0010	I(1)

Notes: I(0) means stationarity at level, and I(1) means stationarity at first difference.

Table 4. Phillips-Perron test Result (EViews 10 output)

Variable	Prob.	Status
RGDP Growth	0.0068	I(0)
Investments (GFCF)	0.0000	I(0)
Labour Growth Rate (LAB)	0.0376	I(1)
Deficit % of GDP (DEF)	0.0000	I(1)
Inflation Rate (INR)	0.0010	I(1)
Interest Rate (INR)	0.0000	I(1)
Trade Openness (OPN)	0.0000	I(1)
Financial Depth (M2/GDP)	0.0004	I(1)

Note: I(0) means stationarity at level, and I(1) means stationarity at first difference.

Autoregressive Distributed Lag Results

Auto Regressive Distributed Lag was estimated using Eviews 10. Eviews evaluated 4374 model and ARDL(2, 2, 1, 1, 0, 1, 2, 2) was selected to be the best model to test the relationship between the endogenous variable (Dependent Variable) RGDP Growth and the

exogenous variables (Independent variables or regressors) GFCF, LAB, DEF, INF, INT, OPN, and FD. See Table 5 below.

Table 5. ARDL Model Specification (EViews 10 output)

Dependent Variable: RGDP Growth
Method: ARDL
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 4374
Selected Model: ARDL(2, 2, 1, 1, 0, 1, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RGDP Growth (-1)	0.537892	0.202173	2.660550	0.0208
RGDP Growth (-2)	-0.334062	0.206476	-1.617918	0.1316
GFCF	-0.136639	0.074353	-1.837701	0.0910
GFCF (-1)	-0.145835	0.057656	-2.529373	0.0264
GFCF (-2)	-0.101520	0.062284	-1.629965	0.1291
Labour Growth Rate	-27.75782	24.14694	-1.149537	0.2727
Labour Growth Rate (-1)	57.57287	31.56563	1.823910	0.0932
Deficit % of GDP	0.501457	0.527791	0.950105	0.3608
Deficit % of GDP (-1)	-1.815108	0.492830	-3.683027	0.0031
Inflation Rate	-0.186394	0.056570	-3.294901	0.0064
Interest Rate	0.163070	0.125955	1.294661	0.2198
Interest Rate (-1)	-0.430603	0.127544	-3.376107	0.0055
Trade Openness	-0.158008	0.092792	-1.702815	0.1143
Trade Openness (-1)	0.150803	0.086290	1.747631	0.1060
Trade Openness (-2)	-0.173926	0.080697	-2.155303	0.0521
Financial Depth (M2/GDP)	-0.697446	0.220447	-3.163773	0.0082
Financial Depth (M2/GDP) (-1)	0.701180	0.292611	2.396285	0.0337
Financial Depth (M2/GDP) (-2)	-0.570929	0.237310	-2.405838	0.0332
C	-53.15864	28.60330	-1.858480	0.0878

R-squared	0.875665	Mean dependent var	4.172906
Adjusted R-squared	0.689163	S.D. dependent var	3.783493
S.E. of regression	2.109400	Akaike info criterion	4.607410
Sum squared resid	53.39483	Schwarz criterion	5.486306
Log likelihood	-52.41486	Hannan-Quinn criter.	4.893908
F-statistic	4.695207	Durbin-Watson stat	2.552715
Prob(F-statistic)	0.004543		

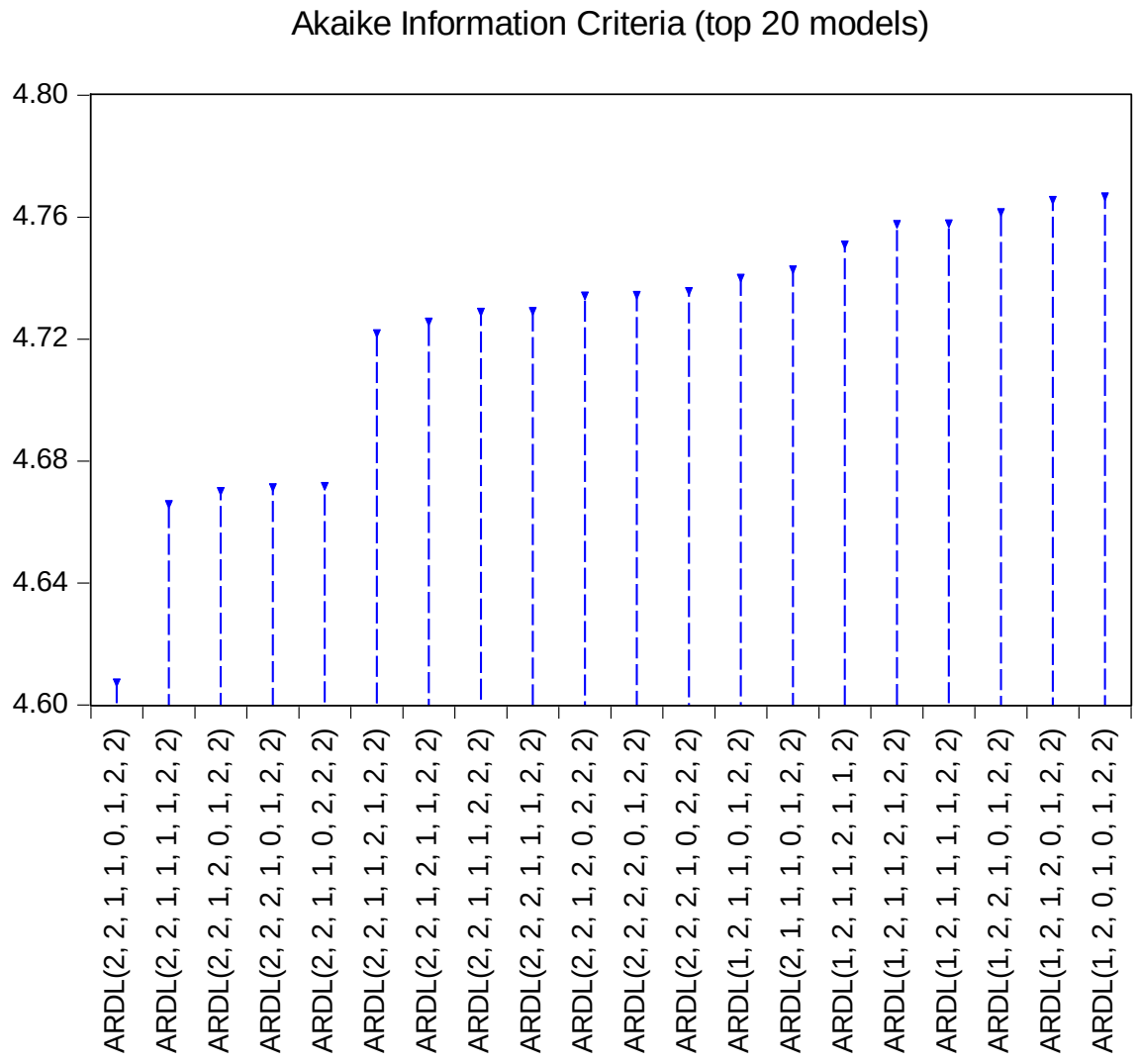
As a result, the best ARDL model for our data is formulated as follows:

$$RGDP_t = C + \alpha_1 RGDP_{t-2} + \alpha_2 GFCF_{t-2} + \alpha_3 LAB_{t-1} + \alpha_4 DEF_{t-1} + \alpha_5 OPN_{t-2} + \alpha_6 INT_{t-1} + \alpha_7 INF_t + \alpha_8 FD_{t-2} + \mu_t \quad (8)$$

Where: RGDP Growth, GFCF, OPN, and FD are lagged by 2 years, LAB, DEF, and INT are lagged by 1 year, and INF is not lagged.

To confirm the appropriateness of the selected model ARDL(2, 2, 1, 1, 0, 1, 2) in Table 5 as the best model, we make use of the *Akaike Information Criteria*. The Akaike information criterion (AIC) is a mathematical method that is used for evaluating how well a model fits the data it was generated from. In statistics, AIC is used to compare different possible models in order to determine which one of the models is the best fit for the data series. In terms of the decision of the best-fit model according to AIC, it is the model that explains the greatest amount of variation using the fewest possible number of independent variables. From Figure 1, the best fit is that marked as ARDL(2, 2, 1, 1, 0, 1, 2, 2) because it has the lowest number of variables out of the 20 models shown in the diagram below.

Figure 1. Akaike Information Criteria (AIC) (EViews 10 output)



Co-Integration Test Analysis

To test for cointegration of the variables, the more popular tests are the Johansen Test and the Engle-Granger Test; however, these tests are preferred when the test for stationarity shows all variables are stationary at level. When some of the variables are stationery at level while others are stationary at first difference, it is better to make use of the Bounds Test for cointegration. According to Sam, McNown, and Goh (2019), the cointegration testing approach called the autoregressive distributed lag (ARDL) bounds test is popular, as it breaks the traditional restriction of cointegration tests in that the tested variables must be non-stationary, and all the variables are integrated of the same order. Some researchers favour this approach as many of the applications involve economic variables of mixed or unknown order of integration. The conventional cointegration testing restriction, as in the Engle-Granger test (1987) or the Johansen test (1991, 1995), raises problems in conducting cointegration analysis involving mixed orders of variables (p. 130).

From the foregoing, since the variables are integrated of different orders, the bounds test was used to measure the relationships that exist amongst the variables.

Table 6. Bounds Test for Cointegration Result (EViews 10 output)

Model	F-Stat	Signif.	I(0)	I(1)	Decision
ARDL(2, 2, 1, 1, 0, 1, 2, 2)	3.756980	5%	2.23	3.50	Estimate ECM Long Run Model
Model	t-Stat	Signif.	I(0)	I(1)	Decision
ARDL(2, 2, 1, 1, 0, 1, 2, 2)	-3.237429	5%	-2.86	-4.57	Undefined

Decision rule is that if the F or t-statistic value is less than the I(0) value, do not reject the null hypothesis of no level relationship then estimate Auto Regressive Distributed Lag (ARDL), but if the F or t-statistic value is greater than the I(0) value, reject the null hypothesis of no level relationship and conclude that there exists a long run relationship then estimate Error Correction Model (ECM). The result on table 6 shows that there exists a long run relationship between the endogenous variable (Dependent Variable) RGDP Growth and the exogenous variables (independent variables or regressors) GFCF, LAB, DEF, INF, INT, OPN, and FD with F-statistic of 3.756980 which is greater than I(1) value of 3.5 at 95% confidence interval.

Figure 2 below shows that the residuals are normally distributed with probability of 0.8731 which is greater than 0.05 confidence interval for rejecting the null hypothesis of residual are normally distributed. Therefore, the Error correction model is a good fit.

Figure 2. Diagnostic Test (EViews 10 output)

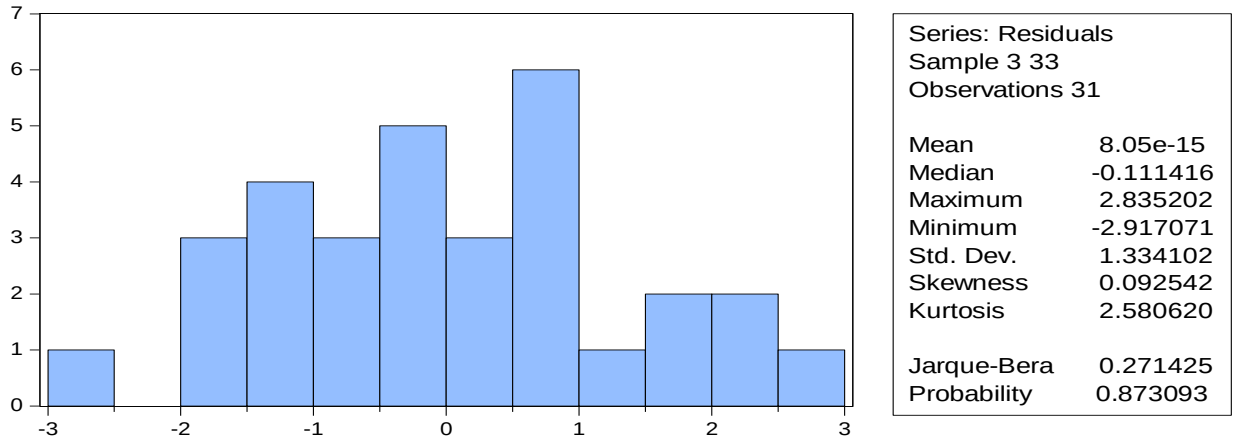


Table 7. ARDL Error Correction Regression (EViews 10 output)

ARDL Error Correction Regression
Dependent Variable: D(RGDP_GROWTH)
Selected Model: ARDL(2, 2, 1, 1, 0, 1, 2, 2)
Case 3: Unrestricted Constant and No Trend
Sample: 1 33
Included observations: 31

ECM Regression Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-53.15864	7.719384	-6.886384	0.0000
D(RGDP Growth (-1))	0.334062	0.124496	2.683320	0.0199
D(GFCF_)	-0.136639	0.030687	-4.452691	0.0008
D(GFCF_(-1))	0.101520	0.025127	4.040201	0.0016
D(Labour Growth Rate)	-27.75782	11.33434	-2.449001	0.0306
D(Deficit % of GDP)	0.501457	0.276446	1.813942	0.0948
D(Deficit % of GDP (-1))	2.705589	0.204263	13.24565	0.0057
D(Deficit % of GDP (-2))	1.451858	0.192864	7.527865	0.0172
D(Interest Rate)	0.163070	0.075877	2.149119	0.0527
D(Trade Openness)	-0.158008	0.052710	-2.997714	0.0111
D(Trade Openness (-1))	0.173926	0.039816	4.368267	0.0009
D(Financial Depth M2/GDP)	-0.697446	0.148905	-4.683826	0.0005
D(Financial depth M2/GDP (-1))	0.570929	0.149679	3.814347	0.0025
CointEq(-1)*	-0.796169	0.115413	-6.898435	0.0000

R-squared	0.857575	Mean dependent var	0.093333
Adjusted R-squared	0.775119	S.D. dependent var	3.535058
S.E. of regression	1.676381	Akaike info criterion	4.155797
Sum squared resid	2.081657	Schwarz criterion	2.664055
Log likelihood	-2.547660	Hannan-Quinn criter.	1.965231
F-statistic	64.92387	Durbin-Watson stat	2.703393
Prob(F-statistic)	0.000007		

Note: * p-value incompatible with t-Bounds distribution

The result in table 7 show that the cointegration equation effect is statistically significant at 99% confidence interval and it retains the fact that POP has a positive and statistically significant effect on RGDP and the F-statistic 0.000 shows that the model is a good fit.

Threshold Autoregressive Results

The results based on repeated estimation of the TAR model for the different values of expected threshold (k) are given in Table 8. The first column labelled K gives the range over which the search for a threshold is conducted. The dummy variable I1_DEF represents the effect of deficit beyond the chosen threshold (K) value. While JI_DEF represents the effects for a deficit higher than the threshold value. From Table 8, the minimization of RSS can be seen at the threshold point of 1%, where the RSS records the lowest value of 133.72 while the adjusted R^2 from the estimation at 1% yields the highest value of 55.5%.

From the Table 8, the coefficient of deficit dummy for deficit above threshold (JI_DEF) carries a negative sign, indicating that when deficit is higher than -1%, the effect on economic growth may be negative in Nigeria. While the positive sign of the I1_DEF shows that deficit < −1% may be beneficial to economic growth in Nigeria. Thus, the threshold level for fiscal deficits in Nigeria is identified at 1%. This result is however different from the result of the empirical literature of Aero and Ogundipe (2018) and Umaru, et al (20210 as their empirical study showed an accepted threshold percentage of 5% and 2.02% respectively as the optimum budget deficit threshold for GDP expansion in Nigeria.

For the Nigerian economy, the 1% threshold level for fiscal deficit will cause growth to increase by about 1.49%. When the threshold level of fiscal deficit exceeds this acceptable level, economic growth in Nigeria will decrease by approximately 0.88%

Table 8. Threshold Autoregressive Result (EViews 10 output)

K	Variable	Coefficient	Std. Error	t-Statistic	Prob.	RSS	Adj_R^2
1%	RGDP_GROWTH (1)	0.3478	0.1953	1.7809	0.0894	133.72	0.5550
	I1_DEF	0.8782	0.3753	2.3401	0.0292		
	J1_DEF	-1.4941	1.9098	-0.7824	0.4427		
	DEF_(-1)	-0.8820	0.3984	-2.2137	0.0381		
	GFCF_(-1)	-0.0830	0.0388	-2.1420	0.0441		
	LAB_(-1)	-1.0940	8.9880	-0.1217	0.9043		
	INF_(-1)	0.0005	0.0400	0.0122	0.9904		
	INT_(-1)	-0.3300	0.1308	-2.5228	0.0198		
	OPN_(-1)	0.2410	0.0764	3.1521	0.0048		
	FD_(-1)	0.0030	0.1032	0.0291	0.9770		
	C	0.4644	21.1228	0.0220	0.9827		

2%	RGDP_GROWTH (1)	0.349023	0.208215	1.676262	0.1085	144.01	0.5207
	I1_DEF	0.924311	0.397999	2.322392	0.0303		
	J1_DEF	1.104308	1.201366	0.919210	0.3684		
	DEF_(-1)	-0.869240	0.424537	-2.047504	0.0533		
	GFCF_(-1)	-0.073081	0.040591	-1.800446	0.0862		
	LAB_(-1)	2.136516	9.625903	0.221955	0.8265		
	INF_(-1)	-0.022162	0.038389	-0.577297	0.5699		
	INT_(-1)	-0.294956	0.132800	-2.221048	0.0375		
	OPN_(-1)	0.213675	0.076342	2.798903	0.0108		
	FD_(-1)	-0.005702	0.116538	-0.048927	0.9614		
	C	-6.407297	23.37694	-0.274086	0.7867		
3%	RGDP_GROWTH (1)	0.338586	0.202239	1.674191	0.1089	143.39	0.5228
	I1_DEF	0.897761	0.389307	2.306050	0.0314		
	J1_DEF	0.709207	0.697246	1.017155	0.3207		
	DEF_(-1)	-0.854310	0.411937	-2.073882	0.0506		
	GFCF_(-1)	-0.072794	0.039886	-1.825044	0.0823		
	LAB_(-1)	1.638693	9.054242	0.180986	0.8581		
	INF_(-1)	-0.016560	0.039735	-0.416748	0.6811		
	INT_(-1)	-0.297722	0.132723	-2.243178	0.0358		
	OPN_(-1)	0.204693	0.078716	2.600391	0.0167		
	FD_(-1)	-0.022050	0.108510	-0.203209	0.8409		
	C	-4.805464	21.45189	-0.224011	0.8249		
4%	RGDP_GROWTH (1)	0.351363	0.203376	1.727652	0.0987	142.98	0.5241
	I1_DEF	0.889055	0.390240	2.278229	0.0333		
	J1_DEF	0.696781	0.632766	1.101167	0.2833		
	DEF_(-1)	-0.844816	0.411669	-2.052174	0.0528		
	GFCF_(-1)	-0.075127	0.039513	-1.901300	0.0711		
	LAB_(-1)	1.749894	9.048099	0.193399	0.8485		
	INF_(-1)	-0.017321	0.038554	-0.449279	0.6578		
	INT_(-1)	-0.312946	0.138791	-2.254803	0.0349		
	OPN_(-1)	0.205513	0.077180	2.662772	0.0146		
	FD_(-1)	-0.035548	0.117364	-0.302884	0.7650		
	C	-4.804907	21.42080	-0.224310	0.8247		
5%	RGDP_GROWTH (1)	0.324221	0.200568	1.616512	0.1209	139.74	0.5349
	I1_DEF	0.796779	0.406828	1.958513	0.0636		
	J1_DEF	0.313334	0.822137	0.381121	0.7069		
	DEF_(-1)	-0.595107	0.513594	-1.158711	0.2596		
	GFCF_(-1)	-0.072420	0.039132	-1.850672	0.0783		
	LAB_(-1)	6.412285	10.70307	0.599107	0.5555		
	INF_(-1)	-0.009288	0.039800	-0.233362	0.8177		
	INT_(-1)	-0.268344	0.134836	-1.990155	0.0598		
	OPN_(-1)	0.175492	0.087096	2.014919	0.0569		
	FD_(-1)	-0.075101	0.128485	-0.584514	0.5651		
	C	-15.94944	25.14745	-0.634237	0.5328		
6%	RGDP_GROWTH (1)	0.348187	0.204234	1.704845	0.1030	143.72	0.5217
	I1_DEF	0.907719	0.388296	2.337699	0.0294		
	J1_DEF	0.760407	0.677198	1.122871	0.2742		
	DEF_(-1)	-0.790424	0.472119	-1.674206	0.1089		
	GFCF_(-1)	-0.073558	0.039777	-1.849274	0.0785		

	LAB_(-1)	2.798714	10.12410	0.276441	0.7849		
	INF_(-1)	-0.015477	0.042840	-0.361277	0.7215		
	INT_(-1)	-0.286003	0.136938	-2.088556	0.0491		
	OPN_(-1)	0.201959	0.084766	2.382539	0.0267		
	FD_(-1)	-0.023328	0.111668	-0.208908	0.8365		
	C	-7.837408	24.20600	-0.323780	0.7493		
7%	RGDP_GROWTH (1)	0.344495	0.202425	1.701841	0.1035	143.39	0.5228
	I1_DEF	0.870887	0.403632	2.157626	0.0427		
	J1_DEF	1.042990	0.546911	1.907056	0.0703		
	DEF_(-1)	-0.923659	0.460749	-2.004691	0.0581		
	GFCF_(-1)	-0.074471	0.039551	-1.882910	0.0736		
	LAB_(-1)	0.698576	9.409091	0.074245	0.9415		
	INF_(-1)	-0.028150	0.043022	-0.654317	0.5200		
	INT_(-1)	-0.303357	0.134628	-2.253300	0.0351		
	OPN_(-1)	0.215391	0.076247	2.824912	0.0101		
	FD_(-1)	-0.013039	0.105973	-0.123041	0.9032		
	C	-2.344754	22.62724	-0.103625	0.9184		
8%	RGDP_GROWTH (1)	0.344495	0.202425	1.701841	0.1035	143.39	0.5228
	I1_DEF	0.870887	0.403632	2.157626	0.0427		
	J1_DEF	1.042990	0.546911	1.907056	0.0703		
	DEF_(-1)	-0.923659	0.460749	-2.004691	0.0581		
	GFCF_(-1)	-0.074471	0.039551	-1.882910	0.0736		
	LAB_(-1)	0.698576	9.409091	0.074245	0.9415		
	INF_(-1)	-0.028150	0.043022	-0.654317	0.5200		
	INT_(-1)	-0.303357	0.134628	-2.253300	0.0351		
	OPN_(-1)	0.215391	0.076247	2.824912	0.0101		
	FD_(-1)	-0.013039	0.105973	-0.123041	0.9032		
	C	-2.344754	22.62724	-0.103625	0.9184		

CONCLUSIONS

The study sought to find out relationship between fiscal deficits and economic growth in Nigeria over a time span of 1990 - 2022 and to determine the optimal fiscal deficit level for the Nigerian economy. The evidence from the Bounds Cointegration test shows that there exists a significant long run relationship between the rate of economic growth in Nigeria and the exogenous variables made up of gross fixed capital formation, labour growth rate, fiscal deficit as a percentage of real GDP, inflation rate, interest rate, trade openness, and financial depth.

Our study determined that the best ARDL model is one where growth in real GDP is a function of growth in real GDP lagged by 2 years, investments lagged by 2 years, and financial depth lagged by 2 years while growth in labour, fiscal deficit as a percentage of real GDP, and interest rates should be lagged by 1 year. Finally, Inflation rate is not lagged. Also, in terms of the size of fiscal deficits in the Nigerian economy vis-à-vis the real GDP this study determined that the threshold should not be more than 1% as this is the level favourable to economic growth.

Our study also showed that with the exception of inflation and financial depth, there are positive relationships between growth in real GDP and all the other independent variables especially the growth in the labour force. In maximizing these relationships and also achieving the 1% threshold, government should adopt policies that will (1) harness the potentials of the growing labour force (e.g., enabling environment for and funding private business, MSME and entrepreneurism schemes), (2) reducing the size of fiscal deficits and reducing current crowding out of the private sector (who are unable to readily access cheap bank credits for business expansion), this will also growth investments and reduce interest rates, (3) work to reduce inflationary growth as we find a negative relationship between the growth of GDP and inflation, as well as the growth in real GDP and money supply (M2), and (4) a deliberate focus on the external sector that generates net exports from commodities and import substitution which in turn strengthens the domestic currency.

Finally, in government's attempts at infrastructural and other capital expenditure, they should be mindful of (1) inflationary effects of the expenditures, (2) exceeding the 1% threshold when fiscal deficits become harmful to the growth of the economy, (3) the rising fiscal deficits effects on interest rates, and (4) over-reliance of excessive importation as a means to develop the economy.

This paper provides abundant opportunities to extend our research outcomes in this area of study. First, by dropping the labour force growth rate variable, the scope period can be extended as far back as the 1960s so that future studies investigate whether substantially increasing the scope period provides new or additional insights. Secondly, the use of other econometric methods beyond ARDL or different datasets (e.g. with two or more lags of the dependent variable might be included in the model as predictor variables.) may be considered, as using multiple methods to address a research question serves to further validate research outcomes. Finally, future research can focus on reverse causation that investigates whether economic growth has any impact on fiscal deficits, and if it does, at what rate of economic growth does one expect to start observing reduction in fiscal deficits.

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