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Article

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The impact of government debt on economic growth in Nigeria

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Abstract: This study investigated the effect of government debt on Nigeria's economic growth using annual data from 1980 to 2018 and the Autoregressive Distributed Lag technique. The empirical results showed that external debt constituted an impediment to long-term growth while its short-term effect was growth-enhancing. Domestic debt had a significant positive impact on long-term growth while its short-term effect was negative. In the long term and short term, debt service payments led to growth retardation confirming debt overhang effect. The findings suggested that the government should direct the borrowed funds to the diversification of the productive base of the economy. This will improve long-term economic growth, expand the revenue base and strengthen the capacity to repay outstanding debts when due. Fiscal improvements that encourage domestic resource mobilization, efficient debt management strategies and reliance on domestic debt rather than external debt for increased deficit financing to engender greater growth are the main contribution of the study.

Subjects: Economics; Political Economy; History of Economic Thought; Finance

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Abdulkarim Yusuf, who is the corresponding author to this manuscript, is a PhD candidate in the Economics programme at Universiti Sains Malaysia. His research interests are Public sector economics, Financial economics, Agricultural economics, Development economics and Applied econometrics. His career goal is to contribute positively to macroeconomic policy development, mostly in low-income countries and in Sub-Saharan African economies. Dr. Saidatulakmal Mohd. is an Associate Professor of Economics with the School of Social Sciences and currently the Director of Centre for Global Sustainability Studies of Universiti Sains Malaysia. She enjoys a wide range of high-quality publications in several national and international journals with a research interests in social protection, welfare of the elderly, tourism and heritage economics and poverty reduction. Her research works have over the years focused on the dynamic linkages between the various macroeconomic policies in Asian countries and their effect on economic growth and poverty reduction.

PUBLIC INTEREST STATEMENT

Government borrowing becomes necessary when government revenue sources are inadequate to finance growing government expenditures. The Nigerian economy has witnessed poor revenue growth because of over-dependence on volatile oil revenue and low tax capacity. The country's debt stock as a result has increased considerably over the past decades – a trend generally connected with expansion in the size of government expenditures. The associated repayment and servicing of these debts often result in diversion of productive funds towards debt repayments thereby limiting government's ability to provide basic infrastructures that benefit the poor. Efficient use of debt could lead to improved economic growth and better standard of living for the populace. However, resources from debt have not been managed effectively to generate sufficient resources to service and repay such debt at maturity. Consequently, the country had to contend with mounting public debt and debt service payments amid deteriorating growth and rising poverty level.

Keywords: ARDL cointegration; Debt overhang; Debt servicing; Economic growth; Government debt

JEL classification: A22; E62; F16; G18; H26.

1. Introduction

When government revenues fall short of its expenditure, governments borrow. Public debt is thus a critical tool for governments to fund public spending, particularly when it is difficult to raise taxes and reduce public expenditure. Over the years, this process has left most governments with massive outstanding debts. Reasonable borrowings to finance public and infrastructure development are the key to faster economic growth. But excess borrowings without appropriate planning for investment may lead to heavy debt burden and interest payment, which in turn may create several undesirable effects for the economy (Joy & Panda, 2020). For countries with poor economic structure, high public debt is also a critical issue since it can create uncertainty and low economic growth. High debt-to-GDP ratios are also considered a concern for investors, as they can have a negative effect on the stock market and reduces productive investment and employment in the long-run (Saungweme et al., 2019). Public debt, therefore, may be an economic stimulant but when its accumulation gets to a very substantial level, a reasonable proportion of government expenditure and foreign exchange earnings will be used to service and repay the debt with a heavy opportunity costs even for future generations. Moreover, the cost of debt servicing can increase beyond the capacity of the economy to cope, adversely affecting the efforts to address the desired fiscal and monetary policy objectives. In addition, rising debt burdens can restrict the government's ability to pursue more productive investment programmes in infrastructure, education and public health (Johnny & Johnnywalker, 2018). Public debt can be either domestic or external.

The justification for government borrowing has its foundation in the neoclassical growth models, which prescribes the need for capital scarce countries to borrow to increase their capital accumulation and steady-state level of output per capita (Madow et al., 2021). The occurrence of global economic crises has provided further impetus for countries (especially the developing ones) to borrow as they are often confronted with the need for increased expenditure levels and declining capital inflows (Ogbonna et al., 2019). Conventional view suggests that public debt has a positive effect on economic growth in the short-run by stimulating aggregate demand and output. However, theoretical literature continues to point to a negative debt-growth relation in the long run by crowding out private investment. Public debt can crowd-out private investment and threaten economic growth through higher long-term interest rates, higher inflation, and higher future distortionary taxation (Mhlaba et al., 2019). The extensive use of domestic borrowing can have severe repercussions on the economy. Domestic debt service can consume a significant part of government revenues, especially given that domestic interest rates are higher than foreign ones. The interest cost of domestic borrowing can rise quickly along with increases in the outstanding stock of debt, especially in shallow financial markets. In the long-run, higher interest rate would discourage investment and thus crowd out private investment. The lower investment eventually leads to a lower steady-state capital stock and a lower level of output. Therefore, the overall long-term impact of debt would be smaller total output and eventually lower consumption and reduced economic welfare. This is also referred to as the burden of public debt, as each generation burdens the next, by leaving behind a smaller aggregate stock of capital (Ákos & István, 2019).

Nigeria is currently ranked among Sub-Saharan Africa heavily indebted countries with a stunted GDP growth rate, retarded export growth rate, a fast dwindling income per capita and an increasing poverty level. Most of these countries, Nigeria inclusive, have been trapped by hasty and distress borrowing which they are often unable to service. Worse still, they need to borrow more because of the deteriorating world prices of their primary exports (Ogunjimi, 2019). Nigeria's 2005 debt relief provided by the Paris Club of creditors motivated largely by the need to free-up resources for investment and faster economic growth led to a significant decline in the country's debt burden in 2006. Unfortunately, 14 years after, the country is back in bigger debt crisis. Successive governments

have been accumulating debt at an alarming rate while debt servicing cost has again increased astronomically to become a sour point in Nigeria's budgetary process in the last decade. The economy is, therefore, over-burdened with massive government debt and debt service costs that consume more than half of government scarce revenue, narrowing down the fiscal space for government to invest in critical infrastructure that supports private investment and sustain growth.

Rising global interest rates and the increasing debt burden of Nigeria is pointing toward another debt crisis which may not be far ahead. It is evident that unsustainable public debt is discouraging investment and lowering growth in Nigeria, thereby reducing the country's global competitiveness, and increasing financial market susceptibility to international shocks (Ogbonna et al., 2019). Generally, debt sustainability can be explained using either debt to GDP or debt service to revenue ratio. Nigeria's debt to GDP ratio is estimated at about 22%, one of the lowest in the world and much below what is obtainable in most emerging markets. With Nigeria's total public debt below 30% of GDP, the country's debt burden appears to be relatively light compared with many other countries. Meanwhile, debt-to-GDP is not regarded as the best indicator of debt sustainability, especially in a country like Nigeria that has one of the lowest tax-to-GDP ratio (6.1%) in the world. For Nigeria, a better indicator of debt sustainability is the debt service-to-revenue ratio, a metric that reveals whether the government is generating enough revenues to pay down its debts as they mature. The challenge has always been the debt service to revenue ratio which in Nigeria has in recent years risen to worrying levels, leading analysts to ask whether the country is bankrupt and heading to bankruptcy.

Since the recession experienced in 2016, Nigeria has struggled with a higher debt service to revenue ratio as revenues slid in direct correlation with the fall in oil prices. Nigeria's government spent about 2.45 trillion Nigeria Naira in debt service in 2019 out of total revenue of N4.1 trillion or 59.6% debt service to revenue ratio. The rising cost of Nigeria's debt profile breached a new milestone with the country's debt service as a percentage of revenue rising to 83% in 2020. This suggests that 83% of the revenue generated in 2020 was used to meet debt service obligations and this is worrisome. To service domestic debt, the government spent N1.76 trillion in 2020 as against a budget of N1.87 trillion. For foreign debts, a sum of N553 billion was spent against a target budget of N805.47 billion. The drop here is likely a result of lower interest rates on foreign borrowing as well as very limited borrowing from the foreign debt market during the year. The government only contributed N4.58 billion into its sinking fund instead of the budgeted N272.9 billion. The sinking fund is required to set aside funds that will be used to pay down on other loans such as bonds when they mature in the future. The government incessant borrowing from the domestic market was limiting the private businesses that need credits from assessing funding for business expansion and growth (Ogunjimi, 2019). When a country spends significant parts of its revenue on servicing huge debts, it has very little left to fund critical infrastructures which in turn affect growth negatively. Moreover, the National Bureau of Statistics (NBS) 2019 Poverty and Inequality in Nigeria report, indicated that 40.1% of the total population, or almost 83 million people, live below the country's poverty line of N137,430 (\$381.75) per year, highlighting the low levels of wealth in a country that has Africa's biggest economy.

Despite the revenue shortfalls recorded, government recurrent expenditure (debt and non-debt) remained high and in line with budgetary expectations while the much needed capital expenditure continued to suffer serious decline over the last two decades. The continued depletion in Nigeria's revenue raises the questions around the solvency of the Nigerian economy. With the economy likely on the path to a covid-19 and growing insecurity induced recession, government revenues particularly non-oil revenues could remain depressed for a longer period. This means the government will still need to rely on borrowing to fund its operations, piling more pressure on Nigeria's debt service to revenue ratio. Without major structural policy reforms and a revenue driven fiscal consolidation to stimulate private investment and promote growth, there will be limited resources to fund the budget and provide those infrastructural facilities that stimulate investment and drive long-term growth.

The choice of Nigeria for this study is premised on the aforementioned fiscal quandary created by low revenue generation, escalating government recurrent expenditure, rapid increase in government

debt, dramatic decline in foreign reserve and large-scale accumulation of arrears on external trade payments that is increasing the rate of default and rapid build-up of arrears. The discord between a rapid increase in government debt and debt service payment amidst lower levels of growth and rising poverty levels in Nigeria in recent time is of particular concern to researchers and policy analysts. This uncertainty prompted this study to examine if an escalating debt profile has any effect on economic growth in Nigeria and determine whether such effect (if any) is in the long-run or short-run period. As the pursuit towards debt reduction that will enhance economic growth with a resultant improvement in poverty level intensifies, it is imperative to comprehensively investigate the long- and short-term impact of government debt on economic growth using long period Nigeria-specific debt and growth related data and an advanced econometric method for improved policy formulation. This is necessary to enhance domestic resource mobilization, curtail fiscal deficit, reduce the level of government debt and uphold fiscal discipline that can help reset the economy on a higher growth path. The study findings have direct policy implications, especially on tax and investment decisions and crucial for understanding whether an expansionary fiscal policy that increases the level of public debt will reduce the standard of living in the future. The results are expected to guide policymakers in the design of an optimal public debt strategy that is conducive for Nigeria's economic growth objectives and free up resources for pro-growth government spending. The paper is organised into five sections. Following the introduction, section two presents the overview of the related literature, while section three addresses the methodological issues and research materials. The empirical results are presented and discussed in section four while section five concludes the study and offers policy recommendations based on findings.

1.1. Literature review

Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth. Countries in their early stages of development have small stock of capital and are likely to have investment opportunities with rates of return higher than those in advanced economies. As observed by Pattillo et al. (2004), as long as these countries use the borrowed funds for productive investment and do not suffer from macroeconomic instability, policies that distort economic incentives or sizable adverse shocks, growth should increase and allow for timely debt repayment. When this cycle is maintained over time, growth will affect per capita income positively which is a prerequisite for poverty reduction. These predictions are known to hold even in theories based on the more realistic assumption that countries may not be able to borrow freely because of the risk of debt denial. Nonetheless, the stylised facts in Nigeria showed that despite the steady increase in public debt in recent years, economic growth has remained low with widening level of poverty (Ogunjimi, 2019). From a theoretical standpoint, various schools of thought provided different paradigms on the effect of public debt on economic growth. The debt overhang and debt crowding out hypotheses, which serve as dependable framework upon which this study was built are discussed below:

1.2. The debt overhang hypothesis

Debt overhang theory implies that large borrowing leads to high debt, debt traps and slowing down of economic growth. According to the debt overhang hypothesis, if there exists the likelihood that in the future government debt will be larger than the country's repayment ability, expected debt service costs will discourage further domestic and foreign investment. Potential investors would be discouraged on the assumption that the more there is production, the more they will be taxed by governments to service the public debt and thus they will be less willing to incur investment costs today for the sake of increasing future output (Gordon & Cosimo, 2018). According to Krugman (1988), accumulated public debt act as a tax on future output as well as reduces the incentive for savings and investment. In particular, the theory argued that the requirement to service debt reduces funds available for investment purposes; hence, a binding liquidity constraint on debt would restrain investment and further retard growth. The theory holds that both the stock of public debt and its service affect growth by discouraging private investment or altering the composition of public spending. Debt service may discourage growth by squeezing the public resources available for investment in infrastructure and human capital (Coccia, 2017). The theory further suggests that public debt may have non-linear effects on growth, either through capital accumulation or productivity growth.

Coccia (2017) argued that the resources used to service massive public debt represent resource drain that should have been available to invest in critical sectors that sustain growth. The cost of servicing huge public debts could take a greater part of government scarce revenue leading to distortions and lower levels of growth in developing countries. Debt overhang is a primary cause of stunted economic growth in heavily indebted countries. As Àkos and István (2019) explained in the context of poor countries, servicing of high public debts depletes the revenue of the indebted country to such an extent that the ability to return to growth paths is dim, even if the country implement strong reform programmes. For Krugman (1988), if a country's debt level exceeds the nation's repayment ability, expected debt servicing is likely to be an increasing share of the country's future output level. Thus, investment and growth will be discouraged via expectation of high tax rates on the returns from the domestic economy issued for the existing foreign creditors. The presence of debt overhang prevents private investment programmes due to uncertainty and adverse incentive effects it creates along the way (Spilioti & Vamvoukas, 2015). High debt burden also encourages capital flight through creating risks of devaluation, increases in taxation and thus the desire to protect the real value of financial assets. Capital flight in turn reduces domestic savings and investment, thus reducing growth, the tax base and debt servicing capacity. The diversion of foreign exchange to debt servicing also limits import capacity, competitiveness, and investment and thus growth (Madow et al., 2021).

1.3. Debt crowding-out hypothesis

According to the debt crowding out hypothesis, higher debt service payments can increase a country's budget deficit, thereby reducing public savings if private savings do not increase to offset the difference. This, in turn, may either drive up interest rates or crowd out the credit available for private investment, thereby depressing economic growth. When government increases borrowing to fund higher spending, or reduce taxes, it crowds-out private sector investment through higher interest rates. If increased borrowing leads to higher interest rates by creating higher demand for money and loanable funds and thus higher prices, the interest rate sensitive private sector will likely reduce investment due to lower rate of returns. A fall in business-fixed investment will hurt long-term supply-side economic growth, that is, potential production growth. This crowding-out effect is weakened by the fact that government spending through the multiplier increases the demand for private sector products, thereby stimulating fixed investment via the acceleration effect (Joy & Panda, 2020).

Government deficit financing through domestic and external borrowing might result in increased interest rates, lower disposable income and higher wages all of which reduces the profitability of businesses and by extension private investment. This may consequently discourage or crowd-out private investment and decrease the production level in an economy (Spilioti & Vamvoukas, 2015). The Keynesian economists maintained that fiscal expansion have the proclivity to increase aggregate demand for private sector goods through the fiscal multiplier, thereby stimulating the growth of private investment. Higher government spending financed by borrowing leads to a fall in private sector saving. This is for two main reasons: First, with expansionary fiscal policy, private sector savers buy government bonds and so have fewer savings to fund private sector investment. Also, higher government borrowing tends to push up interest rates and these higher interest rates crowd-out private investment. Furthermore, by shifting the tax burden to the future generations, current borrowing crowds out private investment (Gordon & Cosimo, 2018). The classical economists are of the view that public debt is deleterious to the economy, particularly if public borrowing reduces both the financial discipline of the budget process and the private sector's access to credit. This proposition argued that public debt repayments, mostly foreign, crowds out economic growth by discouraging private investment and deterring potential foreign investors. However, the Ricardian equivalence hypothesis purports that fiscal stabilization efforts have a neutral impact on economic growth. This hypothesis is based on the presumption that variations in government expenditures and revenues are matched by changes in private savings (Saungweme et al., 2019).

In the monetarist view, the expansion in government expenditures after a relatively short transition period, displace or crowd-out an equivalent magnitude of private expenditures. Businesses compete with government in bond markets for a limited amount of funds. Increasing government expenditure without any improvement in money supply increases production, profit and transaction demand for money (Ogunjimi, 2019). Given a constant money supply, increased transaction demand for money and increased in supply of debt in the market, drive up interest rates. The increase in interest rates reduces business spending and perhaps even government expenditures. The net result of the crowding-out hypothesis is that government sector growth, inevitably, comes at the expense of the private sector of the economy, unless the money supply rises during the process (Khan & Gill, 2014). This crowding out effect impedes the effectiveness of the government to influence the economy through fiscal policies.

1.4. Empirical review

The nexus between public debt and economic growth has been the subject of several empirical studies with mixed results. Findings from these studies in support of conventional wisdom tend to suggest that debt below a certain threshold can promote economic growth while debt well above this threshold could retard growth. This sub-section highlights some empirical works related to debt and economic growth from cross-national and Nigeria studies.

Pattillo et al. (2004) in their study assessed the non-linear impact of external debt on growth using a panel data of 93 countries over 1969–1998 and found that the impact of debt on growth can be very different at low levels of debt and at high levels. At high levels of debt, doubling debt from any initial debt level will reduce per capita income growth by about 1% point while high debt reduces growth mainly by lowering the efficiency of investment. At low levels, however, the effect was generally positive but often not significant. Meanwhile, the negative impact of high debt on growth operated through both a strong negative effect on physical capital accumulation and on total factor productivity growth. However, the study is cross-country in nature whose results cannot be directly applied to Nigeria. Adofu and Abula (2010) using OLS regression technique and annual data from 1986 to 2005, investigated the empirical relationship between domestic debt and economic growth in Nigeria. The results showed that domestic debt had affected the growth of the economy negatively. The study focused on domestic debt which constitute a segment of total debt stock and used an estimation technique that cannot produce robust coefficient estimates about the study variables.

Egbetunde (2012) using the vector autoregressive method and annual data from 1970 to 2010, analysed the causal nexus between public debt and economic growth in Nigeria. The findings of the VAR model revealed that there exists a bi-directional causality between disaggregated components of public debt and economic growth in Nigeria. The study was based on data whose results may have been overtaken by recent development in government debt position and did not include any control variables. Babu et al. (2015) explored the effect of domestic debt on economic growth in East African countries over the period 1990–2010 adopting the Solow-Swan growth model augmented for debt. The Hausman specification test was used to select the panel fixed-effect model, which was corrected for heteroscedasticity. The results showed that domestic debt had a significant positive effect on economic growth in East African countries. However, the study findings are based on cross-country data whose results cannot be directly applied to Nigeria.

Udeh et al. (2016) using OLS method and annual data spanning the period 1980–2013 examined the impact of external debt on economic growth in Nigeria. The study modelled GDP as a function of external debt stock, debt service payments and exchange rate. The empirical results indicated that external debt stock and debt service payments impacted growth negatively while exchange rate showed a positive impact. The study concentrated on external debt which is a fraction of total debt stock and used the OLS estimation technique that cannot separate the long- and short-run effect of external debt on growth. Elom-Obed et al. (2017) using the Vector Error Correction Model (VECM) and annual data from 1980 to 2015, analysed the relationship between public debt and economic growth

in Nigeria. The variables used in the study included RGDP, foreign debt, domestic debt, and domestic private savings. The study findings revealed a significant negative impact of foreign and domestic debt on economic growth in Nigeria. The study suffered from significant variable omission bias and adopted an inadequate estimation technique that cannot generate reliable coefficient estimates about the study variables. Gómez-Puig and Sosvilla-Rivero (2017) explored the relationship between government debt and economic growth of Euro Area countries using time series data for the period 1961–2013 and the ARDL method. The results indicated a significant negative influence of public debt on long-run performance of the Euro Area member states while the short-run effects may be positive depending on the country. The study looked at Euro countries and provided a basis to examine the impact of public debt on economic growth from a Nigerian-specific perspective.

Thao (2018) analysed the effect of government debt on economic growth in six ASEAN countries, namely, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam over the period 1995–2015. The General Method of Moments (GMM) estimation technique was adopted to measure the effect of government debt indicators on economic growth. The findings revealed a significant and positive impact of public debt, FDI, GFCF and real effective exchange rate on economic growth while population growth had a significant negative effect on the growth rate of these countries. The study was based on ASEAN countries data whose findings cannot be directly applied to Nigeria. Akhanolu et al. (2018) examined the effect of public debt on economic growth of Nigeria using annual data from 1982 to 2017 and two-stage least square regression technique. The study modelled GDP as a function of internal debt, external debt, savings and capital expenditure. The results revealed that external debt had a significant negative impact on growth while internal debt showed a positive impact. However, the study suffered from significant variable omission bias and the methodology used was inadequate in accounting for complex relationship between the study variables.

Mhlaba et al. (2019) employ the ARDL method and quarterly data from 2002 to 2016 to examine the long-run and short-run effects of public debt on economic growth for South Africa. The study modelled GDP as a function of gross and net debt, investment, inflation and terms of trade. The empirical results indicated a significant negative impact of public debt on economic growth. The study was based on South African data and provided a basis to examine the impact of government debt on economic growth from a Nigerian-specific perspective. Saungweme and Odhiambo (2019) explored the causal relationship between government debt, debt servicing and economic growth in Zambia for the period 1979 to 2017 using a dynamic multivariate ARDL approach. To achieve this objective, RGDP was modelled as a function of stock of public debt, fiscal balance and savings as a share of GDP. The empirical results indicated a unidirectional causal relationship from economic growth to public debt in Zambia. The study findings supported the hypothesis that the pace of economic growth matters in defining the level of public sector indebtedness. The study setting was in Zambia thereby creating a geographic gap and the need for a Nigerian-specific study.

In differing from most empirical studies previously conducted for the Nigerian economy, the current study contributed to the literature in three ways. Firstly, the current study is a country-specific study whereas some previous studies have been panel based. This is significant since the panel-based studies tend to generalize the findings from a singular regression estimate for a host of economies with varying country-specific characteristics. Secondly, previous Nigerian studies (Adofu & Abula, 2010; Akhanolu et al., 2018; Egbetunde, 2012; Elom-Obed et al., 2017; Udeh et al., 2016) have adopted the two-stage least square, VECM, OLS and VAR estimation techniques which are inadequate in generating consistent and robust coefficient estimates about the study variables, thereby providing a gap in the methodology used. The current study adopted the more advanced ARDL method, which allows for a more robust cointegration relations between a mixture of I(0) and I(1) variables that perform exceptionally well with small sample sizes. Through this method, it becomes methodologically possible to deal with model selection, estimation, inference and determine the long- and short-term effects of government debt on economic growth in Nigeria simultaneously. Additionally, the ARDL method also postulates the speed of adjustment to restore the economy to long-term

equilibrium growth path after a shock. This is a key methodological contribution of the study as researchers are often puzzled with the selection of variables for models.

Thirdly, most empirical studies on this topic were more engrossed with investigating the impact of external debt (Pattillo et al., 2004; Udeh et al., 2016; Kharusi & Ada, 2018; Kengdo et al., 2020, etc) on economic growth in emerging economies. Thus, conducting a study on only a fraction of a whole may not give an accurate picture of the complex relationship that exists between public debt and economic growth in Nigeria as external debt constitutes only a portion of government debt stock. Besides, most of the Nigerian empirical studies reviewed, haphazardly selected their target and control variables in modelling the relationship between government debt and economic growth thereby failing to account for some important variables suggested in the literature. The current study incorporated more government debt and growth-related variables in its empirical model to overcome variable omission bias and guide against the identified gap in variables used from previous studies. This study thus, conducted a multivariate analysis of the nexus between government debt indicators and economic growth in Nigeria that will assist in recommending whether domestic debt or external debt helps to stimulate greater level of investment and economic activities in Nigeria. Furthermore, the study uses a relatively longer and high frequency data spanning 39 years than those used in many previous studies. The importance of a longer time series data set in any co-integration analysis cannot be over-emphasized. Also, relying on the findings, this study proffers valuable, pertinent, and practical recommendations for improved policy formulation.

2. Research methods and materials

2.1. Research design

This study adopted the quantitative method and descriptive research design using already existing data to provide empirical answers to the research problems. Descriptive research designs help provide answers to the questions about who, what, when, where and how connected with a research problem. A descriptive research design cannot conclusively establish answers to the why problems associated with a research. It is used to generate information on the current state of the phenomenon and to explain what exists with respect to variables (Joy & Panda, 2020).

2.2. Nature and sources of data

The data used in this study were gathered from secondary sources. These data were time series data collected using the desk survey approach from Central Bank of Nigeria (CBN), the Debt Management Office (DMO), World Bank and IMF statistical database. The macroeconomic variables on which data were collected included the Real Gross Domestic Product (RGDP), External Debt Stock (EDS), Domestic Debt Stock (DDS), Debt Service Payments (DSP), Foreign Reserve Position (FRP) all in millions of United States Dollars, effective Interest Rate (INTR), Gross Fixed Capital Formation as a percentage of GDP (GFCF) and Foreign Direct Investment inflow as a percentage of GDP (FDI). Considering the limitations of data availability, all variables cover a period of 39 years from 1980 to 2018 making a total of 312 observations. There is a dearth of published data on quarterly government debt, so all variables were taken on an annual basis in nominal terms and in rates as obtained from their different sources. Secondary data were selected as these data had already been checked by experts and other regulatory bodies prior to their publication. However, there was no doubt envisaged about the reliability of the secondary data used, but the possibility of random errors has not been overlooked.

2.3. Econometric specification

To investigate the impact of government debt on economic growth in Nigeria, an open multivariate debt-growth model allowing for key control variables was specified following the lead of Gómez-Puig and Sosvilla-Rivero (2017) with slight modifications to suit the requirements of the current study. Recent studies such as Madow et al. (2021) suggest that it is better to focus on a core set of explanatory variables that have been shown to be consistently associated with growth and evaluate the importance of other variables conditional on inclusion of the core set. The choice of the dependent and independent variables used in this study considered underlying economic theories and

available empirical literatures on the impact of government debt on economic growth in developing countries. The dependent variable used in this study to proxy economic growth was the real GDP (which is an inflation adjusted GDP), for the debt variables, the indicators of government debt were disaggregated into domestic and external debts components. This disaggregation was informed by the need to evaluate the individual effects of various indicators of government debt on the long- and short-term economic growth of Nigeria. Other than the debt variables, different explanatory variables were used to control for other factors that influence economic growth. These control variables were used in this study to intermediate the nexus between government debt and economic growth in Nigeria. Such variables included debt service payment, foreign reserve position, interest rate, gross fixed capital formation and foreign direct investment. These variables are known to be consistently associated with growth in the findings of Barro and Sala-i-Martin (2004). Such a rich environment can overcome variable omission bias, eliminate spurious regression results, increase the general validity and efficiency of the test statistics (Saungweme et al., 2019).

Macroeconomic variables at levels tend to show geometric growth and required taking their logarithms to linearize their movement through time. The study, therefore, transformed RGDP, EDS, DDS, DSP and FRP into their natural logarithm form to reflect the elasticity of the respective variables. The log transformation allows the interpretation of the coefficients as elasticities. The ARDL form of the regression equation estimated was specified in equation 1 as follows:

$$\Delta \text{LOGRGDP}_t = \beta_0 + \sum_{i=0}^q \beta_1 \text{LOGEDS}_t + \sum_{i=0}^q \beta_2 \text{LOGDDS}_t + \sum_{i=0}^q \beta_3 \text{LOGDSP}_t + \sum_{i=0}^q \beta_4 \text{LOGFRP}_t + \sum_{i=0}^q \beta_5 \text{INTR}_t + \sum_{i=0}^q \beta_6 \text{GFCF}_t + \sum_{i=0}^q \beta_7 \text{FDI}_t + \phi_8 \text{LOGRGDP}_t + \phi_9 + \Delta \text{LOGEDS}_t + \phi_{10} \Delta \text{LOGDDS}_t + \phi_{11} \Delta \text{LOGDSP}_t + \phi_{12} \Delta \text{LOGFRP}_t + \phi_{13} \Delta \text{INTR}_t + \phi_{14} \Delta \text{GFCF}_t + \phi_{15} \Delta \text{FDI}_t + \text{ECM}$$

(Equation1)

Where: RGDP = (Proxy for economic growth) Dependent variable

EDS, DDS, DSP, FRP, INTR, GFCF and FDI = Independent variables of the model.

β_0 = Constant. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 = Long-run coefficients to be estimated while ϕ_9 until ϕ_{15} represent the short-run coefficients of the respective variables in the model.

ECM = Error Correction Term which measures the speed of adjustment and t = time trend consisting of years from 1980 to 2018. Δ stands for the first difference operator and i is the lag indicator. Since the above is a single equation, endogeneity is less of a problem because it is free of residual correlation (Rahman & Islam, 2020).

In accordance with economic theory, it is expected that $\theta_1, \theta_2, \theta_5$ and θ_7 can either be positive or negative, that is $>$ or $<$ 0. θ_4 and θ_6 are expected to be positive, that is, $>$ 0 and θ_3 negative, that is $<$ 0.

2.4. Data estimation technique

The study uses the Autoregressive Distributed Lag (ARDL) approach to co-integration proposed by Pesaran et al. (2001) to empirically analyse the long- and short-run impact of government debt on economic growth in Nigeria. This method presents some significant advantages over the two alternatives commonly used in empirical literature: the single-equation procedure developed by Engle and Granger (1991) and the maximum likelihood method postulated by Johansen, 1995 and Juselius, 1995) which is based on a system of equations that require sample period to be very long and all variables to be integrated of order 1 or I(1). First, the ARDL bounds testing method consents to the study of long-run relationships between variables, irrespective of whether they are stationary at levels (I(0)), first difference (I(1)) or fractionally integrated. This helps to circumvent some of the common problems encountered in time series empirical research, such as the absence of unit root tests power and confusion about the stationarity properties of the study variables. Pesaran et al. (2001), further

maintained that the dependent variable should be stationary at first difference (I(1)) to ensure the significance of the co-integrating relationship whereas the independent variables can either be stationary at first difference (I(1)) or at levels (I(0)).

Second, the ARDL method allows for the simultaneous estimation of the short-run and long-run impact of public debt on economic growth, removing the problems associated with omitted variables and the occurrence of autocorrelation. Third, although the results from the estimation process derived from the Engle & Granger, and Johansen & Juselius methods are not efficient and consistent for studies with small sample size, Pesaran and Shin (1999) specified that the short- and long-run parameters calculated using the ARDL technique are reliable and efficient for small sample analysis that can be compared to what we have in this study. Furthermore, the ARDL model can accommodate greater number of variables in comparison to vector autoregressive (VAR) models and more flexible with respect to lag structure since it can accommodate different optimal lag structure for different variables in the model, which is not applicable in the other co-integration methods (Rahman & Islam, 2020).

3. Results and discussion

Although the correlations between explanatory variables and the Variance Inflation Factor (VIF) results are not presented here due to space constraint, this study as part of its preliminary analysis attempted to test for the level of linear dependency among the explanatory variables of the study using the Pearson correlation and the Variance Inflation Factor methods. The Pearson's correlation test found no significant evidence of any strong multicollinearity problem. The highest correlation coefficient between the paired regressors was 73%, that is, below the threshold level conventionally set at 80%. Absence of multicollinearity problem was further confirmed by value of VIF test for multicollinearity, which were below 10, the conventional threshold size (Coccia, 2017).

3.1. Stationarity test for study variables

Before carrying out the ARDL co-integration exercise, the study tested for the order of integration of the variables to ensure that none of the examined variables was stationary at second difference, since the ARDL bounds test fails to provide robust results in the presence of I(2) variables. The study thus, employed two types of widely recognised unit root tests of Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) to check for the stationarity properties of the study variables to guard against spurious regression. Both tests were conducted at levels and first difference. The results of the unit root tests are presented in [Table 1](#).

From the results in [Table 1](#), the study can correctly conclude that none of the study variables was integrated of order two. Moreover, the study variables have a mixed order of integration while the dependent variable (RGDP) was stationary at first difference which fulfil the requirements for using the ARDL estimation technique for our empirical analysis. Having satisfied the necessary and sufficient conditions for using the ARDL estimation method, the researcher was therefore certain that the co-integration analysis using this method will generate valid and reliable regression results.

3.2. ARDL bounds test of co-integration

The bounds test procedure is based on the F-test for investigating the presence of long-run linkage between the examined variables and it test for the joint significance of lagged level variables involved in the model. For the F-test, the selection of maximum lag length is very important. The observations in the study are annual and sample size is 39 with 8 parameters. For such a small sample size as suggested by Pesaran et al. (2001), the study selected a maximum lag length of 3. The estimated bounds and F-test results are summarised in [Table 2](#).

Based on the results in [Table 2](#), the computed F-statistic value of 9.9123 is greater than the upper bound critical value of 4.26 at 1% significance level describing that there exists a unique co-integration relationship between economic growth and the indicators of public debt. This suggests that these variables co-move in the long-run and any short-run deviation in their relationships

would return to equilibrium in the long-run. Having established the presence of co-integrating relationship among the variables, the next step in the ARDL approach was to determine the long-run coefficients for equation 1.

3.3. Long-run impact of public debt on economic growth in Nigeria

To determine the long-run impact of public debt on economic growth in Nigeria, the study estimated the conditional ARDL long-run model for equation 1. The study used the Akaike Information Criteria (AIC) to guide the choice of the lag length, selecting 3 as the maximum number of lags for both the dependent variable and the regressors. The long- and short-run coefficients from equation 1 were therefore estimated using an optimally determined lag length of (3, 2, 3, 3, 3, 2, 3, 3) and the results are presented in [Table 3](#).

The long-run coefficient of External Debt Stock (LOGEDS) portrayed a negative relationship with economic growth that was significant at 1% level. Based on the results in [Table 3](#), a percentage increase in the stock of external debt other things remaining equal, was associated with about 0.23% decline in RGDP. The negative sign of this variable is consistent with a-priori expectation, debt overhang hypothesis and suggests that government borrowing from external sources has not been efficiently utilized in expanding the productive base of the economy that will engender long-term economic growth. For public policy perspective, the results provide additional arguments for external debt reduction to support longer-term economic growth prospects in Nigeria. Several studies such as Saxena and Shanker (2018), Kharusi and Ada (2018), and Mhlaba et al. (2019) found similar results in India, Oman, and South Africa, respectively.

The long-run coefficient of Domestic Debt Stock (LOGDDS) indicated a positive impact on economic growth that was significant at 1% level. From [Table 3](#), a percentage increase in domestic debt stock holding other explanatory variables constant triggered an increase of about 0.61% in long-term economic growth. The positive effect of domestic debt on economic growth showed that government borrowing from the domestic capital market accelerated the growth of private investment through its multiplier effect on private sector production activities. This suggests that the rate of returns on investment of the borrowed funds sufficiently cover the cost of servicing the debt and the domestic interest rate. The result demonstrated that Nigeria's domestic debt stock was not oversized and the use of government domestic borrowing to finance government spending had a beneficial impact of improving total factor productivity, thereby accelerating growth. The result is consistent with a-priori expectation and extant studies of Khan and Gill (2014), Babu et al. (2015), Anyanwu and Erhijakpor (2015), and Thao (2018) who reported a significant positive impact of domestic debt on economic growth of Pakistan, East African countries and six ASEAN countries, respectively, in the long-run.

The long-run coefficient of Debt Service Payment, consistent with a-priori expectation was accompanied by a negative effect on economic growth and is significant at 1% level. Based on [Table 3](#), a percentage point increase in debt service payment was expected to decrease economic growth by approximately 0.14% ceteris paribus. The result confirmed the crowding-out and debt overhang hypothesis which argued that when government debt accumulation trend borders on financial profligacy, the debilitating effect of servicing such debt constitute a drain of scarce foreign exchange that could have been used for productive investment in infrastructure thereby impeding growth. The result is consistent with the findings of Saxena and Shanker (2018) and Madow et al. (2021) who reported a significant negative impact of debt service payment on long-term economic growth in India and African countries, respectively.

From [Table 3](#), the long-run coefficient of Foreign Reserve Position (LOGFRP) consistent with a-priori expectation elicited a positive impact on economic growth and was significant at 1% level. A percentage increase in stock of international reserves, other things remaining equal, enthused an increase of about 0.26% in long-term economic growth. Foreign reserves are external assets of a country that are readily available to and controlled by the monetary authorities for meeting balance of payments financing needs, for intervention in exchange rate markets to safeguard the currency stability and the normal

functions of domestic and external payment systems. In Nigeria, the benefits of stockpiling foreign reserves in addition to the afore-mentioned also include serving as safety measure for shocks and instability occurring from time to time in the oil market, bolstering Nigeria’s credit ratings and credit worthiness and serving as shock absorber during periods of unprecedented natural calamities (Johnny & Johnnywalker, 2018). The result in support of conventional wisdom indicated that efficient management of the stock of foreign reserves could be a key factor in stimulating long-term economic growth in Nigeria. The result supports the findings of Kashif and Sridharan (2015) and Kashif et al. (2017) who reported a significant positive effect of foreign reserves holding on long-term economic growth in Malaysia, India, and Brazil, respectively.

The long-run coefficient of effective interest rate (INTR) from Table 3 showed a positive impact on economic growth that was significant at 5% level. A percentage increase in interest rate is expected to motivate an increase of about 0.02% in economic growth. This supports the McKinnon (1973) and Shaw (1973) hypothesis which suggested that a high interest rate would increase savings and bank credit thereby stimulating economic growth. The result confirmed the findings of Bağcı and Ergüven (2016), Kengdo et al. (2020) who found a significant positive effect of real interest rate on long-term economic growth in Turkey and Southern African Development Countries (SADC), respectively. The long-run coefficient of Gross Fixed Capital Formation (GFCF) in agreement with a-priori expectation displayed a positive effect on economic growth and was significant at 1% level. Based on Table 3, a percentage increase in GFCF ceteris paribus, activated an increase of about 0.014% in economic growth. The results established the fact that the level of domestic investment significantly promotes long-term economic growth in Nigeria. The result validated previous empirical studies of Thao (2018), Kharusi and Ada (2018) who reported a significant positive relationship between domestic capital formation and long-term economic growth in six ASEAN countries and Oman, respectively.

According to Table 3, the long-run coefficient of Foreign Direct Investment (FDI) in conformity with a-priori expectation showed a negative relationship with economic growth and was significant at 1% level. A percentage increase in FDI inflow, holding other explanatory variables constant retarded economic growth by about 0.14%. Although FDI tends to boost economic growth via the spill over effect on total factor productivity and technology transfer, the long-run results suggested the opposite effect of FDI displacing or crowding-out domestic investment and hence long-term economic growth in Nigeria if maintained over time. The result corroborates the findings of Fantessi (2015) and Thao (2018) who found a significant negative relationship between FDI inflow and long-term economic growth in ECOWAS and ASEAN countries, respectively.

Table 1. Stationarity tests results for study variables

Variables	ADF Test			PP Test		
	Level	1st Diff.	Remark	Level	1 st Diff.	Remark
LOGRGDP	-0.2765 ⁿ	-2.9764**	I(1)	0.7257 ⁿ	-2.9220**	I(1)
LOGEDS	-2.6098 ⁿ	-4.3209***	I(1)	-2.4950 ⁿ	-4.3209***	I(1)
LOGDDS	-1.3887 ⁿ	-6.0363***	I(1)	-2.0167 ⁿ	-6.1448***	I(1)
LOGDSP	-4.3001***	-5.7071***	I(0)	-4.1965 ^a	-16.634***	I(0)
LOGFRP	-1.3268 ⁿ	-5.2298***	I(1)	-0.7567 ⁿ	-6.9563***	I(1)
INTR	-4.5801***	-4.6246***	I(0)	-3.8730***	-12.9479***	I(0)
GFCF	-3.7111***	-4.8168***	I(0)	-3.2915**	-4.8973***	I(0)
FDI	-2.7419*	-8.8426***	I(0)	-2.6287*	-8.8509***	I(0)

Notes: ***, ** and * correspond to 1%, 5% and 10% significance level, respectively, while “n” denotes Not Significant. Source: Author’s E-Views 9.5 Computations.

Table 2. ARDL bounds test of co-integration results

	Model	F-Statistic	K	Critical Values			Decision
				%	Lower Bound I(0)	Upper Bound I(1)	
LOGRGDP = f(LOGEDS, LOGDDS, LOGDSP, LOGFRP, INTR, GFCF, FDI)		9.9123	7	1%	2.96	4.26	Reject H ₀ and accept H _A . Co-integration exists.
				2.5%	2.60	3.84	
				5%	2.32	3.50	
				10%	2.03	3.13	

3.4. Short-run effects of public debt on economic growth in Nigeria

To determine the short-run impact of public debt on economic growth in Nigeria, the study proceeded to estimate an Error Correction Model (ECM) associated with the long-run relationship from equation 1 using the optimally determined lag length. Table 4 presents the short-run coefficients of the impact of public debt on economic growth in Nigeria.

The error correction term (ECM(-1)) representing the speed of adjustment needed to restore equilibrium in the dynamic model after a disturbance, follows a priori expectation as it was both negative and statistically significant at 1% level. Its value of -0.6323 implies that a shock to economic growth in the current period will be restored at a speed of adjustment of about 63.23% in the next period. Put differently, the rate of adjustment of a short-run disequilibrium in economic growth was moderately fast as about 63% of the divergence in economic growth as a result of a current period shock will converge towards long-run equilibrium in the next period.

From Table 4, the current year value of RGDP was significantly affected by the lagged or previous years' value of RGDP. Specifically, a percentage increase in one year lagged value of RGDP D(RGDP (-1)) showed a negative effect on current year value of RGDP and was significant at 1%. Similarly, a percentage increase in two years lagged value of RGDP (D(RGDP(-2))) retarded the current level of economic growth and was significant at 1% level. The coefficient of present level of external debt stock D(LOGEDS) in contrast with the long-run results exhibited a significant positive relationship with the current rate of economic growth and was significant at 1% level. Thus, a percentage increase in the present level of external debt, holding other explanatory variables constant, inspired an increase in current level of RGDP by approximately 0.10%. The result supports the proposition by Barro (1990) which suggested that while external debt stock may crowd-out capital and reduce output in the long-run, in the short-run, it can stimulate aggregate demand and output but also that a tipping point exists, above which an increase in external debt stock has a detrimental effect on economic performance. However, the coefficient of the one-year lagged measure of external debt stock (LOGEDS(-1)) in agreement with the long-run result indicated a negative effect on the current rate of economic growth that was significant at 1% level.

Table 3. ARDL long-run estimated results

Variables	Coefficients	Standard Error	t-Statistics	Prob. Value
LOGEDS	-0.2252	0.0236	-9.5815	0.0001***
LOGDDS	0.6139	0.0625	9.8178	0.0001***
LOGDSP	-0.1417	0.0388	-3.6491	0.0107***
LOGFRP	0.2574	0.0461	5.5839	0.0014***
INTR	0.0227	0.0068	3.3139	0.0161***
GFCF	0.0135	0.0033	4.0715	0.0066***
FDI	-0.1449	0.0147	-9.9670	0.0001***

The estimated coefficient of present level of domestic debt stock D(LOGDDS) in contrast with the long-run results was negatively related to the current rate of economic growth and significant at 1% level. Based on Table 3, a percentage increase in the present level of government domestic debts, holding other explanatory variables constant, inspired a fall in current level of RGDP by approximately 0.17%. The result indicated that government accumulation of domestic debt results in higher tax on future output and thus crowds-out private investment and retards growth in the short-run. However, the coefficient of one-year lagged measure of domestic debt stock (LOGDDS(-1)) in agreement with the long-run result showed a negligible positive effect on the current rate of economic growth while a percentage increase in the two-year lagged value of domestic debt, D(LOGDDS (-2)) was associated with a positive effect of increasing the current rate of RGDP by about 0.05% that was significant at 5% level.

Table 4 showed evidence of a significant negative relationship between the present level of debt service payment D(LOGDSP) and the current rate of economic growth at the 5% level of significance, suggesting that a percentage increase in the present level of debt service payment will, other things remaining equal, produce a decrease of about 0.012% in the current rate of economic growth. In contrast with the long-run result however, the one period lagged value of debt service payment D (LOGDSP(-1)) demonstrated a positive relationship while the two-year lagged value of debt service payment D(LOGDSP(-2)) also showed a positive effect on current level of economic growth and were both significant at 1% level. In conformity with the long-run results, the present level of foreign reserve holding D(LOGFRP) was associated with a positive effect on current rate of economic growth that was significant at 1% level, indicating that a percentage increase in current level of foreign reserve holding, motivated about 0.9% increase in current rate of economic growth. The one-year

Table 4. Short-run estimated ARDL results

Variables	Coefficients	Std. Error	t-Statistics	Prob. Value
D(LOGRGDP(-1))	- 1.1533	0.1699	-6.7862	0.0005***
D(LOGRGDP(-2))	- 0.8460	0.1201	-7.0453	0.0004***
D(LOGEDS)	0.1034	0.0089	11.6239	0.0000***
D(LOGEDS(-1))	- 0.0377	0.0056	-6.6730	0.0005***
D(LOGDDS)	- 0.1743	0.0171	-10.1696	0.0001***
D(LOGDDS(-1))	0.0146	0.0167	0.8781	0.4137 [∇]
D(LOGDDS(-2))	0.0475	0.0151	3.1523	0.0198***
D(LOGDSP)	-0.0124	0.0040	-3.0841	0.0215**
D(LOGDSP(-1))	0.1066	0.0089	12.0197	0.0000***
D(LOGDSP(-2))	0.0509	0.0065	7.8020	0.0002***
D(LOGFRP)	0.0860	0.0077	11.2294	0.0000***
D(LOGFRP(-1))	-0.1059	0.0097	-10.8807	0.0000***
D(LOGFRP(-2))	0.0342	0.0076	4.4774	0.0042***
D(INTR)	-0.0120	0.0012	-9.7322	0.0001***
D(INTR(-1))	0.0019	0.0007	2.8359	0.0297***
D(GFCF)	0.0077	0.0007	11.6302	0.0000***
D(GFCF(-1))	-0.0022	0.0008	-2.7782	0.0321**
D(GFCF(-2))	-0.0022	0.0007	-3.2637	0.0172***
D(FDI)	0.0188	0.0036	5.1685	0.0021***
D(FDI(-1))	-0.0034	0.0039	-0.8511	0.4274 [∇]
D(FDI(-2))	0.0116	0.0026	4.3659	0.0047***
Constant	7.9710	0.6087	13.0961	0.0000***
ECM(-1)	- 0.6323	0.0482	-13.1077	0.0000***

Table 5. Short-run diagnostics tests results

Test	Null Hypothesis	F-Statistic	Prob. Value
Jarque-Bera	There is Normal Distribution	1.4867	0.4755
Breusch Godfrey	No Serial Auto-Correlation	5.5859	0.0695
Breusch-Pagan-Godfrey	No Heteroscedasticity	1.0499	0.5261
Ramsey RESET	No misspecification	0.1571	0.7081

period lagged value of the variable $D(\text{LOGFRP}(-1))$ showed the opposite effect of decreasing investment and the current rate of economic growth that was significant at 1% level while the two-year lagged value of the variable $D(\text{LOGFRP}(-2))$ revealed a positive relationship with the current RGDP growth that was significant at 1% level.

In contrast with the long-run result, the current interest rate $D(\text{INTR})$ was associated with a negative effect on current level of economic growth that was significant at 1% level, supporting the neoclassical view that low interest rate promotes investment and economic growth. Low interest rates encourage economic agents to undertake investment activities thereby stimulating growth. The one-year lagged value of interest $D(\text{INTR}(-1))$ indicated a positive effect on current rate of economic growth that was significant at 5% level. The coefficient of present level of domestic capital formation $D(\text{GFCF})$ in conformity with the long-run results exhibited a significant positive effect on the current rate of economic growth and was significant at 1% level. The result suggests that domestic investment was an important factor which promoted economic growth in Nigeria during the reviewed period. The lagged values of the variable however demonstrated the opposite effect of retarding the current rate of economic growth that was significant at 5% level at one and two-year lagged level, respectively. Unlike the long-run result, [Table 4](#) showed evidence of a significant positive impact of present level of FDI inflow $D(\text{FDI})$ on the current rate of economic growth at 1% level of significance, suggesting that a percentage increase in present level of FDI inflow will generate an increase of about 0.02% in the current rate of economic growth *ceteris paribus*. FDI is an important source of capital, which complements domestic investment, creates new job opportunities and is the main channel through which technology transfer takes place. The transfer of technology and technological spill overs lead to an increase in factor productivity and efficiency in the utilization of resources, which promote growth. The one-year lagged value of FDI inflow $D(\text{FDI})$ showed a negligible negative effect on the current rate of economic growth while the two-year lagged value of FDI inflow ($D(\text{FDI}(-2))$) exposed a positive relationship that was significant at 1% level.

3.5. Short-run diagnostic tests

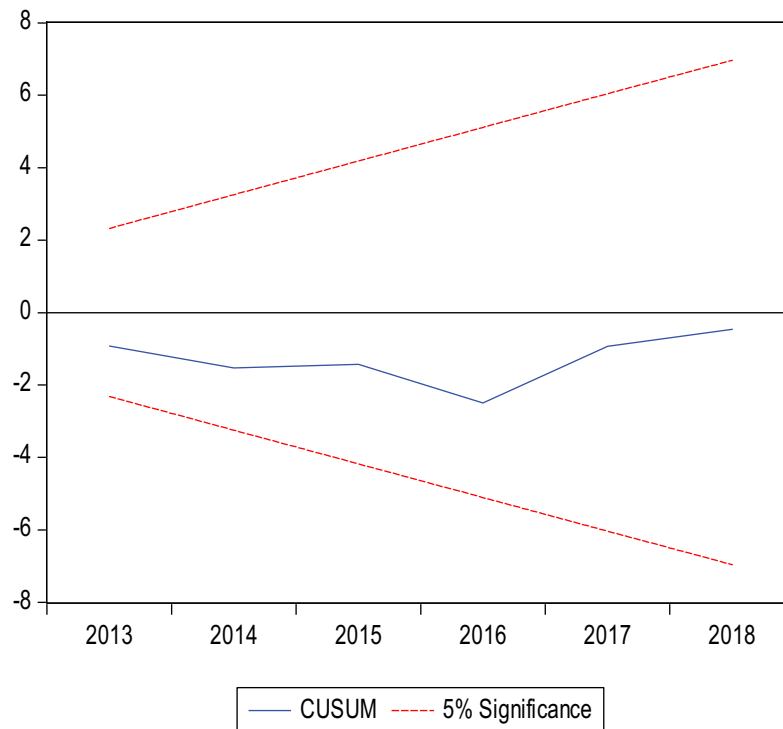
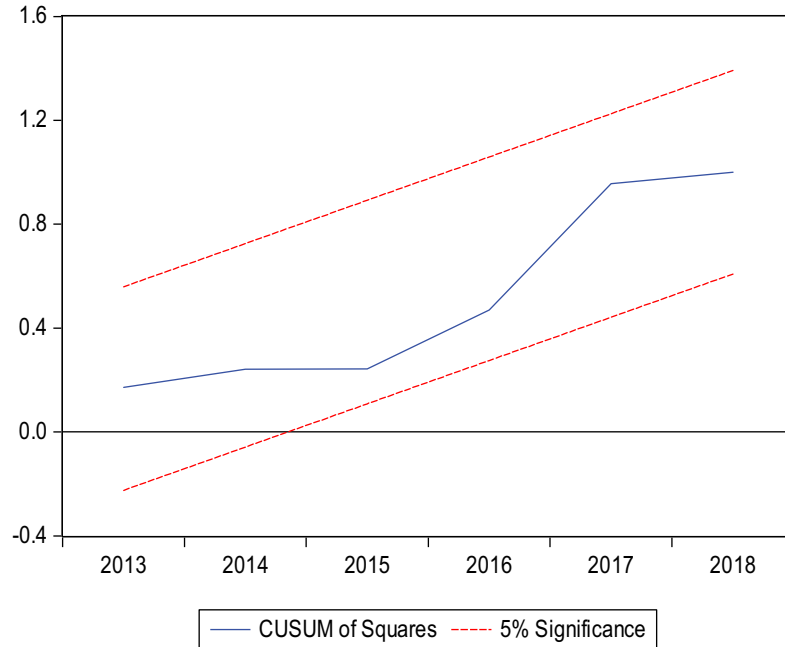
Various diagnostic and robustness tests performed to ensure that the errors are well-behaved, and the econometric estimates are reliable and stable are reported in [Table 5](#).

The respective diagnostics checking statistics reported in [Table 5](#) failed to reject the null hypothesis, thus indicating no evidence of non-normality, serial correlation, heteroscedasticity, and model misspecification error. Similarly, the parameters stability test conducted via CUSUM and CUSUM of squares tests ([Figures 1](#) and [2](#)) indicated that the parameters of the estimated model are within the critical bounds at a significant level of 5% suggesting that the estimated model was dynamically stable and the estimated results are reliable and satisfactory for policy inferences.

4. Conclusion and recommendations

This study investigated the long- and short-run impact of government debt on economic growth in Nigeria using annual time series data covering the period 1980–2018. To accomplish this task, a growth model function was specified and estimated using disaggregated components of public debts and a set

Figure 1. Stability test (CUSUM) TEST Stability tests (CUSUM) of squares test..



of control variables such as debt service payment, foreign reserve position, effective interest rate, gross fixed capital formation and FDI inflow. The ARDL cointegration approach was used for data analysis after achieving data stationarity. The empirical results indicated that external debt retarded long-term economic growth while its short-run effect was growth-enhancing. Domestic borrowing showed a significant effect of promoting economic growth in the long-run and an opposite effect of curbing growth in the short-run. Debt service payment significantly reduced growth in the long- and short-run while foreign reserves position and gross domestic investment accelerated growth in the long- and short-

run. Interest rate significantly improve growth in the long-run but inhibited growth in the short-run. Foreign direct investment inflow exhibited a crowding-out effect on growth in the long-run while its short-run effect was significant and positive. The coefficient of co-integrating equation indicated a moderately fast adjustment speed parameter of 63% convergence to long-run equilibrium after a shock while the parameter stability and robustness checks proved that the estimated parameters of the model are structurally and dynamically stable.

As for policy implications, projects to be financed with government borrowing should be properly appraised and their technical feasibility, financial viability and economic desirability ascertained before the funds are committed. This would help to restore financial discipline and curtail the misapplication and inefficient management of public debts. Domestic debt rather than external debt will stimulate higher rate of economic growth in Nigeria. This is because the repayment of the principal and interest on such domestic debt is a reinvestment into the economy which would usually have a multiplier effect on domestic investment in the economy. But with respect to external debt, more resources would be needed to repay and service the debt and this would weaken the anticipated positive effect of this debt on economic growth. Fiscal reforms that boost domestic revenue generation by broadening the revenue base, improving the capacity to tax, and curtailing unproductive government expenditure should be encouraged. Furthermore, government should ensure that borrowings are done on terms that are consistent with entrenching debt sustainability and borrowed funds are productively invested in the value-added sectors of the economy to engender greater growth in the long-run. This is necessary if the country is to outgrow its debt problem, restore creditworthiness and achieve sustainable growth.

As in every empirical analysis, the results of this study must be regarded with caution since they are based on a country specific characteristic, data spanning a certain period and a given econometric methodology. Although the present study offers fresh insights on the impact of government debt on economic growth in Nigeria, it is subject to some limitations related essentially to data availability and the econometric methodology. Future research in this area might examine possible non-linear effects of public debt on economic growth in Nigeria using a time varying modelling technique such as the Quantile ARDL.

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