

**Research Article**

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## Public debt and economic growth: What we know today about the Nigerian economy tomorrow

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**Abstract:** With the rising trend in Nigeria's debt profile, this paper investigated public debt and its potential consequence on economic growth through its impact on investment. The study cut across 1981 to 2019 with data from World Bank Development Indicators (WDI) and Central Bank of

Nigeria Statistical Bulletin. The Phillips-Perron unit root tested for stationarity, while the study estimated the model by adopting the Autoregressive distributed lag (ARDL) model. The long-run estimated results report that external debt and investment have a strong positive link with economic growth, while domestic debt and external debt service are inversely related to growth. In ascertaining the threshold level of investment, the estimated result suggests that investment of domestic debt should not fall below 25.41% to avoid an economic downturn. However, investing more than 24.55% of external debt will leave the economy in shambles. Further findings suggest that increased investment of domestic debt and external loans in Nigeria is a blessing and curse, respectively. Therefore, it is recommended that external debt investment be closely monitored to ensure optimal use so that such debts would not be diverted to personal gain.

**Keywords** – Domestic debt, Economic growth, External debt, Investment, Long run, Public debt

### 1. INTRODUCTION

Since the Keynesian revolution of the 1920s and even before, some, if not all, countries have always borrowed to augment the deficit in annual budgets. When the planned expenditure of a nation is above their planned revenue in a given fiscal year, they have to borrow to make up for the deficit (Irina, 2016). The borrowing may come from the domestic economy (domestic debt) or from abroad (external debt). Whether the debt comes from abroad or within the economy, it will need to be paid back in the future. Also, the debt comes at a cost (interest rate) which has to be paid in addition to the debt principal when the debt is due (Rudiger & Stanley, 1994). Public debt's burden, unlike private debt (whose burden is borne by the individual borrower), is borne by all citizens given that the citizens

either pay more taxes which will be used to repay the debt or will have their welfare affected negatively when the fund that would have been used to improve public utility is used instead for debt servicing (Rudiger & Stanley, 1994). In either way, the heat torches every citizen. And what is even more frightening is when borrowing has become a common practice, while what the borrowed fund is used for is either unproductive or even not known to the people who will bear the burden.

Economists have no consensus on the nature of the connection economic growth has with government borrowings. While some theorists favour public borrowing with special caveats, some are wholly against public borrowing either within or outside the economy (Eleana & Ines, 2016). The classical economists holding onto their laissez-faire principle are opposed vehemently to public debt adducing that such would bring wastage of resources and as such reduce the productive capacity of the private sector, which will consequently decrease capital accumulation and economic growth, or at best have a neutral effect in the long run instead of increasing growth as proposed by the Ricardian equivalence. However, following the global depression of the 1920s, Keynes and his adherents highly recommended public borrowing. In their proposition, they suggested that increased government expenditure will necessarily lead to an increase in aggregate demand and output. In their view, a budget deficit that necessitates borrowing is a good thing for economic recovery (Raymond, 2017). What this means, in essence, is that when government reduce tax (which will reduce revenue) and borrow to augment the revenue shortfall, the tax cut will increase disposable income and private expenditure (consumption and investment) and thus adding to the public expenditure (consumption and investment) will push up aggregate demand and in response, the aggregate output will increase leading to a boom in the economy.

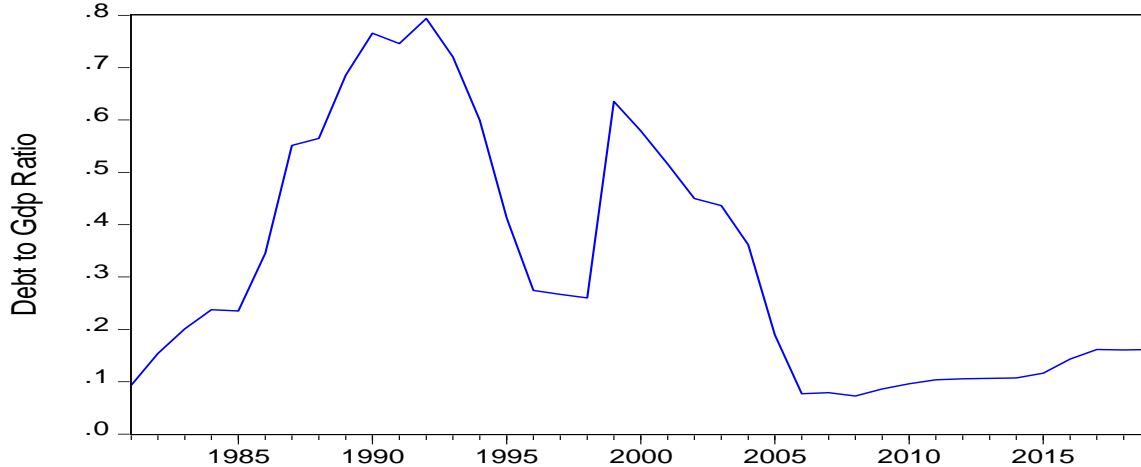
Furthermore, the neoliberal economists maintain that no matter the position of the country in question, increasing public debt portends future economic difficulties, which may be reflected in increased tax or reduced welfare. For the monetarists, public debt causes economic instability instead of acting as a balancing mechanism as enunciated by Keynes. From the standpoint of conventional or current economists, government borrowing promises Keynesian prosperity (economic stability and growth) in the short run. However, the classical economists believe that public borrowing will constitute an economic nuisance punctuated by a reduction in public and private savings and investments, an increase in the interest rate, and a reduction in the capital stock of the economy (Irina, 2016). Be it as it may, the effect of public debt in any economy will depend necessarily on three conditions, as suggested by Irina (2016). The first is whether the debt is a common practice or even a political exercise in a nation second, whether the borrowed funds are used for productive ventures or not, and the third is the rate of debt accumulation and its overall size relative to previous financial commitments of the nation.

Public debt from empirical studies has recorded positive as well as negative impacts on the economic growth of nations. According to Saifuddin (2016), public debt had a positive effect on the investment and growth of Bangladesh's economy. Similarly, Gómez-Puig and Sosvilla-Rivero (2017), studying the effects government borrowings have on the economy of the eurozone area, found that in the short run, public debt affects growth positively, although the effect is dependent on the country involved; while the long-run impact is negative.

In Nigeria, the government debt profile has been disturbingly increasing over time. Yearly, the deficit in the budget has been continuously financed through domestic and external debts with little result to show for its productivity. For instance, Nigeria's total debt outstanding has grown from about ₦10,948.51, ₦14,537.11, ₦18,377.00, ₦20,533.60, and ₦23,295.07 billion in 2015, 2016, 2017, 2018, and 2019 respectively (CBN, 2019) to about ₦33.11 trillion as of March 2021 (DMO, 2021). Also, empirical studies report that public debt negatively impacts growth in Nigeria. Isibor, Babajide, Akinjare, Oladeji and Osuma (2018) discovered in their study that although internal debts affected GDP positively, the external debt had a negative impact. In a similar study, Elom-Obed, Odo, Elom-Obed and Anoke (2017) found that both domestic and external debts significantly and negatively impacted the growth of the Nigerian economy. These results are not doubtful as public funds are glaringly not well invested. For instance, a close look at the Nigerian budgets over time shows that a larger percentage is allocated to

recurrent expenditure rather than capital expenditure that has a greater capacity to increase capital formation. This means that the deficits that lead to borrowing may not have been invested in capital projects.

More so, available data show that Nigeria's total debt to current GDP ratio has been rising steadily in recent times. This is depicted below:



**Figure 1:** Total Debt to current GDP ratio (1981 to 2019)

**Source:** Authors computation with data from CBN, 2019

From figure 1 above, it is evident that the debt to current GDP ratio has been fluctuating over the years but has maintained an upward trend since 2006 up till 2019; rising debt to GDP ratio is not healthy for any economy, especially one with sluggish GDP growth rate like Nigeria. Following Keynesian tradition, borrowing is good during a time of economic downturn to help finance a budget deficit that will later lead to economic recovery. But data show that even when the economy was at its good time, such as in 2014 and 2015, when the GDP annual percentage growth rates were approximately about 6.31% and 2.65%, respectively (WDI, 2019), Nigeria still ran a deficit budget and followed it up with more borrowing. Furthermore, considering the poor economic condition of the Nigerian economy as evidenced by the inadequate power supply, high unemployment rate, and gloomy level of investment in human capital development (Boniface, Oliver, Divine & Chinaza, 2018), the question to ask, therefore, is whether the borrowed funds are appropriately invested.

With the rising debt condition of Nigeria in view and as well bringing to mind the standpoints of various economic schools of thought on debt and GDP growth, this study hence is in time to give a clearer perspective to how government indebtedness affects the growth of the Nigerian economy through its relationship with investment.

## 2. LITERATURE SURVEY

Not being a new field, theories and empirical writings on public debt and the growth of countries abound. This section is dedicated to providing a careful review of such theories and empirical works as relevant to this study.

### 2.1. Theoretical literature

#### *The Dual Gap Theory*

This theory is in support of external borrowing. The dual gap theory recognizes the role of savings and, in furtherance, that of investment in economic growth. It asserts that there is a required level of investment and, by extension, savings needed for economic growth to happen. However, for developing countries, domestic savings are not sufficient to power the needed level of investment necessary for growth to be achieved, a situation that Chukwu Ogbonnaya-Udo and Ubah (2021) describe as the savings-investment gap. Hence for the growth of

developing countries to be achieved, the dual gap theory recommends recourse to external borrowing as a makeup for the required level of investment. The theory argues that for developing countries, domestically generated savings is insufficient to fund the required investment for economic development. Hence, to attain economic development, these countries need to bridge this savings-investment gap through external borrowings or foreign aid.

### ***The Debt Overhang Theory***

Scenarios can exist such that an entity will prefer not to take up profitable investments or developmental projects than borrow to finance such investments or projects. Not because other entities are unwilling to lend to them or that there are better investments or developmental projects they wish to take up but due to its perception that a larger chunk of the return on investment will go into debt servicing. Hence, the creditors reaping the fruits of the investment rather than the entity that invested. It is this type of scenario that debt overhang theory refers to; an entity's large debt burden that makes it impossible to demand additional loans to finance and implement future projects (Chukwu et al., 2021). When there's debt overhang, the current level of investment is affected negatively. This is because the gains from the new investments/projects would be channelled towards debt servicing with little or no incentive left for the entity. In other words, Sachs (1989) opined that the effects of debt overhang are obvious when investors anticipate a tax increase on their returns to the capital for debt service. In a bid to avoid paying these huge taxes, they reduce their investment levels. According to Senadza, Fiagbe, and Quartey (2018), the aftermath of such policy (tax increment for interest earned) clamps down the disposable income that eventually reduces the taxpayer's savings.

### ***Keynesian theory of public debt***

John Maynard Keynes propounded the theory of public debt in 1935. Keynes opined that debt does not thwart the growth and development of an economy, rather, it adds more value to the country's economy. He added that this value addition is achievable on the condition that the debt acquired is channelled towards capital development that would yield profit and enhance financial development. The theory further suggests that if developing countries must borrow, it must be for economic growth and development. This means that the funds must be channelled towards capital projects. The consequence of not channelling these funds towards capital development almost certainly puts the country on the back foot.

The theory of public debt by Keynes suggests that through capital accumulation, debt is a key factor to consider to determine the aggregate level of economic growth. In corroboration with this assertion, Habib and Zurawicki (2002) argue that external remittances, international trade, foreign aid, foreign direct investment, and domestic revenue can also be utilised to create a capital formation that would trigger economic growth. This is not to suggest that huge borrowings directly translate to economic development. However, the utilization of the loans matters as well as the political will to utilize the obtained funds judiciously.

## **2.2. Empirical literature survey**

Ogunjimi (2019) explored the long and short-term impacts of the composition of public debt stock on the various forms of investment in Nigeria. He deployed the Autoregressive Distributed Lag (ARDL) framework between 1981 and 2016. The results showed that internal borrowings improve both private and public investments in both the long-run and short-run. Domestic debt crowds in both private and public investment, but it does not attract FDI while external debt crowds in private investment (in both the long run and short run). Chukwu et al. (2021) explored the impact of Nigeria's public debt on public investment from 1985-2018 using the Auto-regressive Distributed lag (ARDL) model. Public debt reportedly suggests an insignificant effect on public investment in Nigeria in the short run. On their path, Kehinde, Olanike, Oni, and Achukwu (2015) employed the Johansen Co-



integration test and Vector Error Correction Model (VECM) to examine how impactful Nigeria's public debt is on private investment. Their long-term and short-run findings suggest that internal loans crowd out domestic investment, which is in direct opposition to Ogunjimi (2019). However, the result indicates that in the long run, foreign loans crowds in domestic investment.

In the Mexican economy, Sánchez-Juárez and García-Almada (2016) analysed the connection between debt, investment, and economic growth using several econometric models (including the Generalized Method of Moments and Dynamic Models of panel data) for 32 states between 1993 and 2012. The study's objective was to find out if a high debt profile of state governments would enhance public investment. If it does, will an increase in public investment accompany a growth increase across the 32 states of Mexico? Their study reported public debt to be positive and significantly associated with public investment, which enhances economic growth. In their recommendation, they suggested that since a rising public debt stock attracts more public investments, there should be deliberate and transparent monitoring of the multiplier effects to ascertain its effectiveness to the macroeconomic environment.

Akhanolu, Babajide, Akinjare, Oladeji and Osuma (2018) deployed the 2SLS regression with annual data from 1982-2017 to investigate public debt and economic growth relationships in Nigeria. The study revealed that foreign borrowings inversely affect economic growth while domestic loans are positively impacts growth. The study recommended that government should minimize external borrowing. This stance was further confirmed by Ajayi and Edewusi (2020) when they empirically investigated the linkage connecting economic growth and public debt in Nigeria. This study utilized annual data spanning over 37 years (1982-2018). The long-run and short-run analysis suggested that these foreign loans exert a detrimental impact on the economy, while domestic debt was ascertained to exert a positive impact. Their findings corroborate a similar study by Abula and Ben (2016). They investigated the public debt and economic development of Nigeria between 1986 to 2014 on selected variables. Their findings revealed that while foreign loans and their servicing had a minute inverse relationship with economic development, internal borrowings had a direct and strong relationship with economic development, whereas domestic debt servicing was found to be negative and significantly associated with economic development.

However, Elom-Obed et al. (2017) found that both domestic and foreign debts are highly detrimental to economic growth in Nigeria and therefore recommended that government should reduce public debt, whether internal or external. Eze, Nweke and Atuma (2019) restated that an inverse link is associated with public debt (internal and external loans) and economic growth in Nigeria, but this time, the impact of internal debt was reported to be insignificant. Furthermore, Odubuasi, Uzoka and Anichebe (2018) examined the relationship connecting Nigeria's economic growth and external debt. They found capital expenditure and debt stock to be of positive significance to growth, whereas the cost of serving debt is of little significance in determining the level of economic growth. Several researchers and policy-makers have no common ground on the role of public debt on the growth and development of the economy. Their arguments necessitate further studies in this area. It is therefore expedient for a study of the public debt-growth relationship in Nigeria, especially one with a critical examination of the debt-investment-growth linkage.

At the international scene, a study carried out in Bangladesh by Saifuddin (2016) applied the two-stage least square regression method to investigate the public debt-growth relationship. It was reported in the study that the government's borrowings enhance investment as well as economic growth. The empirical findings also suggested that these loans are blessings to economic growth through their positive effect on investment. Using Johansen co-integration and VEC model, Owusu-Nantwi and Erickson (2016) studied Ghana's debt profile and its linkage with economic growth, dwelling on the long-term and causal relationships. The study employed annual data spanning between 1970 and 2012. The outcome of their investigation revealed a bidirectional causality link connecting economic growth and public debt in the short run. Their investigation also reported a long-run positive and robust

relationship linking economic growth and public debt. Based on the findings, debt acquisition for priority projects and well-appraised as well as self-sustained programmes were also recommended.

In Pakistan, Khan, Rauf, Mirajul and Anwar (2016) assessed the linkage that connects economic growth and public debt between 1972 to 2013 by deploying the Auto-regressive distributed lag (ARDL) model. Their empirical findings suggested a positive but weak relationship between economic growth and public debt. On debt-growth linkage in Kosovo, Selimaj, Statovci, Lokaj and Beqiri (2020) reported that prudently utilization of public debt can boost economic growth and financial stability. While misusing it on the other hand will adversely affect the country's economy by creating inflationary pressure. On the investment-economic growth linkage, Adofu and Adegioriola (2020) focused on Nigeria's foreign portfolio investment and economic growth between 1986 and 2018 using the ARDL model. The results of their analysis revealed that the current value and one-period lag of Foreign Portfolio Investment (FPI) showed negative and insignificant impacts on the Gross Domestic Product (GDP). Anichebe (2019) applied the Ordinary least square (OLS) technique to study Nigeria's economic growth and FDI between 1981 and 2017. Based on the long-run analysis, economic growth and foreign direct investment are positively related to each other.

To ascertain the linkage between investment and economic progression, Rahman (2015) studied the Bangladesh economy using time series figures from 1987 – 2011. He utilized the Granger causality test, ADF test, and Co-integration test. The empirical result suggested a positive, significant impact on GDP. Uddin, Chowdhury and Uddin (2015) utilized annual data for the period 1972 to 2011 to study the impact of public investment and GDP in Bangladesh. The econometric techniques deployed (Ordinary Least Squares, Jarque-Bera Test, co-integration, and Pagan Godfrey test) revealed that public investment brings about economic prosperity in Bangladesh. Furthermore, Noman and Sabahat (2017) investigated the investment-growth link and reported investment to significantly enhance economic progress.

### 3. PROBLEM STATEMENT

The rising debt profile of the country, more specifically the debt-to-GDP ratio amidst sluggish growth rate as indicated in figure 1, is worrisome. This raises many questions as to what this holds for the country, especially the coming generations. In today's world, where the focus has shifted from economic growth to sustainable economic growth, it is imperative to analyze the country's indebtedness vis-à-vis the impact on the economy and the future generations. Many contributions in this regard have been made by concerned academics the likes as Akhanolu et al. (2018), Ajayi and Edewusi (2020), Elom-Obed et al. (2017), and Odubuasi et al. (2018), among others. However, this paper intends to consider the role of investment in the debt-growth relationship. More precisely, to ascertain the effect of debt-financed public investments on economic growth in Nigeria. In addition, it shall also examine the threshold analysis to determine the minimum and/or maximum point below or above which investing borrowed funds will negatively affect the growth of the Nigerian economy.

### 4. RESEARCH METHODOLOGY OR METHODS

The econometric model adopted in this paper expresses economic growth as a function of the total debt stock and other factors that relate to debt and growth. The model is expressed thus;

$$GDPPC = \phi + \beta_1 DD + \beta_2 ED + \beta_3 INV + \beta_4 EDS + \mu \text{ -----(1)}$$

Where;

GDPPC denotes gross domestic product per capita, DD stands for domestic debt stock; ED is external debt stock; INV denotes investment (proxied by GCF – gross capital formation, constant 2010 US\$) while EDS denotes external debt service;  $\phi$ ,  $\beta_1 - \beta_4$  are the parameters; and  $\mu$  is the white noise. All the variables aside from GDPPC are in their natural logarithmic form. GDPPC, INV, and EDS are sourced from WDI, while DD and ED are sourced from the Central Bank of Nigeria (CBN) 2019 statistical bulletin.

This paper also utilized yearly time series data from the periods 1981 – 2019. This is because it captures the fluctuations of all the variables in various years. To ensure we achieve the objectives of the paper, we will model equation (1) to include the interactive term that will capture the precise role of public debt in determining economic growth through its relationship with investment.

$$GDPPC = \phi + \beta_1 DD + \beta_2 ED + \beta_3 INV + \beta_4 EDS + \beta_5 (DD*INV) + \beta_6 (ED*INV) + \mu \quad \text{-----}(2)$$

Where;

DD\*INV is the interaction between domestic debt and investment and ED\*INV denotes the interaction linking external debt-investment nexus.

We also intend to explore the marginal effect of a change in debt stock on economic growth and how its impact depends on the level of investment through the interactive term. We compute this marginal effect for both domestic and external debt using partial derivatives of equation (2) with respect to domestic debt and external debt respectively.

$$\frac{\partial GDPPC}{\partial DD} = \beta_1 + \beta_5 INV \quad \text{-----}(3)$$

$$\frac{\partial GDPPC}{\partial ED} = \beta_2 + \beta_6 INV \quad \text{-----}(4)$$

Understanding the outcomes of these equations will be a strong base for this study. In equation (3); if  $\beta_1 > 0$  and  $\beta_5 < 0$ , it means that domestic debt is positively related to economic growth, and investment mitigates that positive impact. If  $\beta_1 < 0$  and  $\beta_5 > 0$ , domestic debt is inversely related to growth, but investment has a positive influence. The scenarios above suggest that the growth effect of domestic debt changes with investment level. If by chance, both parameters are negative ( $\beta_1 < 0$  and  $\beta_5 < 0$ ), it means investment worsens the negative impact of domestic debt. But if the parameters are positive ( $\beta_1 > 0$  and  $\beta_5 > 0$ ), domestic debt and investment are blessings to the economy. Similarly, in equation (4), if  $\beta_2 > 0$  and  $\beta_6 < 0$ , it means that foreign loans are positively connected to growth, but investment counteracts that initial positive effect. If  $\beta_2 < 0$  and  $\beta_6 > 0$ , external debt is inversely related to growth but investment has a positive influence. For whatever reason, if the parameters are negative (that is,  $\beta_2 < 0$  and  $\beta_6 < 0$ ), it means investment worsens the negative effect of external debt. But if the parameters are positive ( $\beta_2 > 0$  and  $\beta_6 > 0$ ), external debt and investment are blessings to the economy. This explains the role investment plays in public debt in affecting the growth of the economy.

This study deployed the Autoregressive Distributed Lag (ARDL) model to assess the long-term effect of investment on debt-growth nexus. According to Oliver, Ikechukwu and Okwudili (2020), the ARDL model has gained prominence for the following reasons. First, the challenge associated with endogeneity as well as the difficulties in the testing of hypotheses in the long run with limited coefficients associated with the Engle-Granger method is maneuvered. Secondly, the short-run information dynamics can be integrated simultaneously with the information on the long-term equilibrium without necessarily losing the long-run equilibrium details. Thirdly, this model allows us to use variables of a time series regression in different orders. However, these orders must not be integrated at an order higher than one, meaning that it must be either I(0), I(1), or a mixture of both. Thus, our model derived from equation two (2) becomes;  $GDPPC_t = \phi + \beta_0 GDPPC_{t-1} + \beta_1 DD_{t-1} + \beta_2 ED_{t-1} + \beta_3 INV_{t-1} + \beta_4 EDS_{t-1} + \beta_5 (DD*INV)_{t-1} + \beta_6 (ED*INV)_{t-1} + \mu \quad \text{-----}(5)$ .

According to Pesaran, Shin and Smith (2001), a dynamic unrestricted error correction model (UECM) is gotten after conducting the ARDL bound testing and presented as ARDL-ECM as follows;

$$\begin{aligned} \Delta GDPPC_t = & \phi_0 + \sum_{i=0}^n \beta_{0i} \Delta GDPPC_{t-1} + \sum_{i=0}^n \beta_{1i} \Delta DD_{t-1} + \sum_{i=0}^n \beta_{2i} \Delta ED_{t-1} + \\ & \sum_{i=0}^n \beta_{3i} \Delta INV_{t-1} + \sum_{i=0}^n \beta_{4i} \Delta DS_{t-1} + \sum_{i=0}^n \beta_{5i} \Delta (DD * INV)_{t-1} + \sum_{i=1}^n \beta_{6i} \Delta (ED * INV)_{t-1} + \\ & \beta_0 GDPPC_{t-1} + \beta_1 DD_{t-1} + \beta_2 ED_{t-1} + \beta_3 INV_{t-1} + \beta_4 DS_{t-1} + \beta_5 (DD * INV)_{t-1} + \\ & + \beta_6 (ED * INV)_{t-1} + \mu_{it} \dots \dots \dots (6) \end{aligned}$$

Where  $\Delta$  = difference operator;  $\beta_{0i}$  to  $\beta_{6i}$  are the short-run dynamics of the model;  $\beta_0$  to  $\beta_6$  are the long term dynamics;  $n$  is the number of optimal lag length. To ascertain whether or not there is a co-integrating relationship between the variables, the  $f$ -stat is utilized and computed to test the null hypothesis  $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$  against the alternative hypothesis  $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$  using the upper  $I(1)$  and lower bounds  $I(0)$  values from the model. If  $f$ -stat  $> I(1)$ , the null hypothesis of no co-integration can be rejected, suggesting a long-run relationship. But if  $f$ -stat  $< I(0)$ , no co-integration exists, and the null hypothesis cannot be rejected.

If there is co-integration, the long-run coefficient is then estimated using the unrestricted error correction model (UECM) to obtain the short-run dynamics.

$$\begin{aligned} \Delta GDPPC_t = & \phi_0 + \sum_{i=0}^n \beta_{0i} \Delta GDPPC_{t-1} + \sum_{i=0}^n \beta_{1i} \Delta DD_{t-1} + \sum_{i=0}^n \beta_{2i} \Delta ED_{t-1} + \\ & \sum_{i=0}^n \beta_{3i} \Delta INV_{t-1} + \sum_{i=0}^n \beta_{4i} \Delta DS_{t-1} + \sum_{i=0}^n \beta_{5i} \Delta (DD * INV)_{t-1} + \sum_{i=1}^n \beta_{6i} \Delta (ED * INV)_{t-1} + \\ & \beta_0 GDPPC_{t-1} + \beta_1 DD_{t-1} + \beta_2 ED_{t-1} + \beta_3 INV_{t-1} + \beta_4 DS_{t-1} + \beta_5 (DD * INV)_{t-1} + \\ & + \beta_6 (ED * INV)_{t-1} + \psi ECM_{t-1} + \mu_{it} \dots \dots \dots (7) \end{aligned}$$

Where  $ECM_{t-1}$  is the error correction term obtained after testing the relationship in the long-run equilibrium,  $\psi$  signifies the speed of adjustment ensuing as a result of a short-run shock from the long-run equilibrium.

## 5. DATA ANALYSIS AND DISCUSSIONS

### Stationarity test

In as much as this technique does not necessarily require the series to be stationary at a particular level, it is, however, noteworthy that the order of integration should be below  $I(2)$ . Hence, we shall test the stationarity to confirm whether the ARDL model is suitable. The Phillips-Perron stationarity test results in table 1 below reveal that GDPPC and EDS are stationary at levels, whereas all the other variables are stable at order one, that is,  $I(1)$ . This result confirms that the ARDL model is appropriate for the analysis of the data.



**Table 1: Phillips-Perron stationarity test result**

Variables	P-P t-stat	5% test critical values	P-value	Order of Integration
GDPPC	-4.202431	-2.941145	0.0021	I(0)
DD	-4.566508	-2.943427	0.0008	I(1)
ED	-4.725979	-2.943427	0.0005	I(1)
INV	-4.821283	-2.943427	0.0004	I(1)
EDS	-3.744232	-2.941145	0.0072	I(0)
DD*INV	-4.780156	-2.943427	0.0004	I(1)
ED*INV	-4.798648	-2.943427	0.0004	I(1)

Source: Authors' Computation

### Co-integration result

The bound test result in table 2 shows the existence of co-integration since the f-statistic (6.774504) is greater than the upper class boundary values at all levels (1% = 4.43; 5% = 3.61; 10% = 3.23).

**Table 2: Bounds test for cointegration relationship**

Null Hypothesis: No co-integration				
ARDL (1, 2, 1, 3, 0, 2, 1)				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.774504	10%	2.12	3.23
k	6	5%	2.45	3.61
		1%	3.15	4.43

Source: Authors' Computation

### Long-run impact

**Table 3: Long-run error correction estimates**

Dependent variable: GDPPC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DD	-72.659877**	27.976747	-2.597152	0.0177
ED	119.535526**	34.630084	3.451783	0.0027
INV	17.967858**	8.558262	2.099475	0.0494
EDS	-0.217849	1.091554	-0.199577	0.8439
DD*INV	2.857203**	1.172609	2.436621	0.0248
ED*INV	-4.874619**	1.437672	-3.390635	0.0031

\*\* indicates significance at 5% level.

Source: Authors' Computation

The long-term impact result in table 3 indicates that internal loans (domestic debt) have a strong and inverse association with the economy. This result is in corroboration with the study of El-Mahdy and Torayeh (2009), who reported domestic debt to have an inverse effect on growth. Other findings from Atique and Malik (2012), Akhter and Hassan (2012), Babu, Kiprop, Kalio and Gisore (2015), Elom-Obed et al. (2017) and Lucy, Collins and Ernest (2016), among others, also found domestic debt to be detrimental to the economy. The link between growth and external debt in this study is positive. The magnitude of this impact is significant, therefore indicating that foreign loans (external debt) are a robust determinant of economic growth. Our finding corroborates (with Egbetunde (2012), Ahlborn and Schweickert (2015), Sanchez-Juarez and Garcia-Almada (2016), Adeniran, Azeez and Aremu (2016), Owusu-Nantwi and Erickson (2016), Thao and Truong (2019) that all reported positive outcomes when they studied debt-growth link across different economies.

Exploring the contributions of other variables, we observe that investment is a highly positive driver of economic growth in Nigeria. Saifuddin (2016) and Saungweme and Odhiambo (2020) also reported a positive and strong association between economic growth and investment in Bangladesh and South Africa, respectively. Linking external debt service and growth, our analysis reports a negative and insignificant relationship. This partly corroborates the work of Nwannebuike, Ike and Onuka (2016), who reported the variables to be negative and significantly related when they investigated the link between growth and external debt in Nigeria. Shah and Pervin (2012) and Kasidi and Said (2013) also found this relationship negative. However, they all agreed that the relationship is a strong one as opposed to this study that finds it weak.

However, the interaction between domestic debt and investment on economic growth suggests a strong positive connection. The empirical findings also reveal a robust inverse connection linking external debt-investment nexus and economic growth. This significant relationship suggests a robust impact on the economy. Hakimi, Boussaada and Karmani (2019) reported similar results when studying foreign borrowings, investment, and growth relationships for poor economies. They attributed this relationship to poor management of debt. Zouhaier and Fatma (2014) also examined the debt-growth link, and the result of the study also reported that the interaction between external debt and investment has an inverse effect on growth. To further support our analysis, Akinyeke, Oboba, Obiekwe and Fadayomi (2020) advised governments to first consider internal borrowing before looking towards foreign loans. However, excessive domestic borrowings would inevitably breed financial instability that will crowd out the private sector (Panizza, Sturzenegger & Zettelmeyer, 2010). This would then make external borrowing unavoidable, which others term 'a necessary evil'. Although the researchers further explained that if the external debt would be efficiently utilized, it can finance productive investments, but this will be at a cost, which is repayment at a rate of interest.

### Short Run result and analysis

The short-run (error correction model) result is represented in table 4. The results suggest a significantly negative parameter of the error-correction term at a 5% significance level. This validates our earlier assertion of a long-run association between the regressand and the regressors. The magnitude of this coefficient (-1.19) explains the speed of adjustment back to the equilibrium of about 119%.

**Table 4:** Short-run estimation

Dependent variable: GDPPC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DD)	-80.488574	56.591022	-1.422285	0.1712
D(ED)	83.906593	57.770199	1.452420	0.1627
D(INV)	16.788502	11.671931	1.438365	0.1666
D(EDS)	-0.259588	1.301395	-0.199469	0.8440
D(DD*INV)	2.961006	2.300094	1.287341	0.2134
D(ED*INV)	-3.508514	2.414386	-1.453170	0.1625
CointEq(-1)	-1.191595**	0.179011	-6.656530	0.0000

\*\* indicates significance at 5% level.

**Source:** Authors' Computation

From the above results in table 3, we ascertained the interactive effect of public (internal and foreign) debt and investment on economic growth in Nigeria. We shall now find the threshold of domestic debt if we equate equation 3 to 0 (zero). That is;

$$\frac{\partial GDPPC}{\partial DD} : \beta_1 + \beta_5 INV = 0$$

Recall that  $\beta_1$  = long-run coefficient of domestic debt = -72.66 and  $\beta_5 = 2.86$ . We shall determine the threshold level of investment whereby any spike above the level changes the sign of growth. This is done by substituting the values of  $\beta_1$  and  $\beta_5$  in the equation.

$$\begin{aligned}\frac{\partial GDP}{\partial DD} &: -72.66 + 2.86INV = 0 \\ \frac{\partial GDP}{\partial DD} &: 2.86INV = 72.66 \\ \frac{\partial GDP}{\partial DD} &: INV = 25.41\%\end{aligned}$$

To further confirm whether the effect of domestic debt on growth differs with investment level, we compute the marginal effect of investment at various levels. First, when investment is at its minimum, and second, when it is at maximum level. This is found in the descriptive statistics in table 5 below.

**Table 5:** Descriptive statistics

	GDPPC	DD	ED	INV	EDS
Mean	0.520830	6.434443	6.295299	24.04544	21.41205
Median	1.472867	6.800453	6.450699	23.71055	21.35010
Maximum	12.45747	9.566100	9.107468	25.12169	22.89883
Minimum	-15.45037	2.415253	0.846383	22.97715	20.02139
Std. Dev.	5.324854	2.183983	2.006706	0.661244	0.655127
Observations	39	39	39	39	39

**Source:** Authors' Computation

At minimum, we calculate thus;

$$\begin{aligned}\frac{\partial GDP}{\partial DD} &: -72.66 + 2.86(22.98) \\ \frac{\partial GDP}{\partial DD} &= -6.94\end{aligned}$$

At maximum, we calculate thus;

$$\begin{aligned}\frac{\partial GDP}{\partial DD} &: -72.66 + 2.86(25.12) \\ \frac{\partial GDP}{\partial DD} &= -0.82\end{aligned}$$

This, therefore, is in conformation with the expectation of the coefficients as earlier explained in equation 3. An increase in investment reduces the negative threats of domestic debts.

We shall take a similar approach to identify the interaction of external debt and investment on economic growth.

Equation 4 shall also be equated to 0 (zero)

$$\frac{\partial GDP}{\partial ED} : \beta_2 + \beta_6 INV = 0$$

$\beta_2$  = coefficient of external debt = 119.54;  $\beta_6 = -4.87$ . Substitute these values into the equation

$$\begin{aligned}\frac{\partial GDP}{\partial ED} &: 119.54 - 4.87INV = 0 \\ \frac{\partial GDP}{\partial ED} &: -4.87INV = -119.54 \\ \frac{\partial GDP}{\partial ED} &: INV = 24.55\%\end{aligned}$$

The investment threshold on external debt is 24.55%; any increase in investment beyond this level will inversely affect the economy. We shall also ascertain whether or not the nexus connecting external debt and economic growth is influenced by investment. To find out, we compute investment at the minimum and maximum levels.

At a minimum, we calculate thus;

$$\begin{aligned}\frac{\partial GDP}{\partial ED} &: 119.54 - 4.87(22.98) \\ \frac{\partial GDP}{\partial ED} &: 7.63\end{aligned}$$

At maximum, we calculate thus;

$$\begin{aligned}\frac{\partial GDP}{\partial ED} &: 119.54 - 4.87(25.12) \\ \frac{\partial GDP}{\partial ED} &: -2.79\end{aligned}$$

This result conforms with our a priori expectation, as explained in equation 4. Although external debt boosts the economy, investments of such debts beyond a certain threshold are detrimental to growth.

## 6. RESEARCH IMPLICATIONS

This paper examined the effect of debt-financed public investments on Nigeria's economic growth. To achieve this, we utilized an open macroeconomic model that comprises both domestic and external debt as well as other variables (external debt service and gross capital formation). We deployed the ARDL bound testing approach and established a long-run association among the variables. Our result suggested that debt service has an inverse and weak effect on the economy (Mbah, Agu & Umunna (2016). The public debt and investment relationship is a matter that is directly associated with accountability and transparency (Sánchez-Juárez & García-Almada, 2016). In 2019, transparency international classified Nigeria as the 155th country (out of 180 countries) in terms of combatting corruption – the country's worst ranking since 2015.

Although not proven, the figures of expenditure on public investment are likely not accurately reported. Thus, its impact on the statistical exercise may not be associated as positive to economic growth in Nigeria. Sánchez-Juárez and García-Almada (2016) added that corruption in the public sector is a universal enigma. Therefore, citizens may not always believe the information published by the authorities, especially when it involves objectives like a public investment. However, the outcome of this interaction may not be unconnected with the poor utilization of these loans. Monogbe, Dornubari and Emah, (2015) opined that public debt becomes burdensome when the monies borrowed are used for allowances and salary payments rather than projects that would yield the required marginal returns to service the principal. Diaz (2010) found that in Mexico, external loans were predominantly channeled towards financing the government deficit. This is an obstacle to investment that thwarts economic growth. Similarly, the Public Finance Management of Nigeria (2018) reported that ₦844.88 billion was borrowed to service debt-related commitments that were due during the implementation of the 2017 budget. This is to say that external loans contradicted the government's pledge to utilize borrowed funds for the development of crucial infrastructures. Recall that the estimated results of this study showed a negative behaviour between public debt and investment. It becomes expedient for policymakers to dig more into a similar study and proffer solutions.

The core objective of this research is to incorporate investment, as stated before in the examination of the association that connects both public debt and economic growth. In line with the above results, we recommend close monitoring of external debt investment. This is because, when governments borrow, they use future resources of subsequent administrations to meet current needs. Thus this delicate choice has to be fully justified such that it complies with the golden rule of government spending. This rule states that a government should only increase borrowing to invest in projects that will pay off in the future. It is recommended that the government's funding should not be wholly from debt but through taxation and other sources. In addition, anti-corruption agencies like the Code of Conduct Bureau, Independent Corrupt Practices and other Related Offences Commission (ICPC), and Economic and Financial Crimes Commission (EFCC) in the country should impose stern penalties on those involved in the diversion of public funds. Finally, if a loan transparency cycle is established for project identification, monitoring, and evaluation as well as loan repayment, public debt would be pivotal to the economic growth and development of the country.

## 7. CONTRIBUTIONS TO SCIENTIFIC COMMUNITY AND FUTURE RESEARCH

This paper has added to the stock of literature on the public debt-investment-growth link, thus, researchers in this specialty and students can consult this document to improve their understanding. The study has also contributed to economic theory by proposing a framework that could eliminate the diversion of public funds in the country, and by extension, to the whole world in the form of academic writing. The paper also suggested a threshold level of public investment of government borrowings that would accelerate economic growth.

## 8. CONCLUSION

Public debt is a good option to finance public investment and accelerate economic growth, provided it is utilized in the appropriate channels. This is relatively unlikely, especially in developing nations (as seen in Nigeria) due to the structure of the incentives configured for the political elites in power. The objective of this study was to investigate the role of debt-financed public investments on economic growth in Nigeria. The long-run estimated results showed that external debt and investment have a strong positive link with economic growth. While the investment of domestic debt is of positive significance to the economy, external debt investment is highly detrimental. Therefore, to maintain positive growth, the estimated result of the interactive analysis suggests that a minimum of 25.41% of domestic debt be invested. However, investing more than 24.55% of external debt will cause an economic downturn. Thus, what we know today about the Nigerian economy tomorrow is that the economy will thrive more when domestic debts are optimally invested, while investment of foreign loans above the specified threshold level will affect the economy negatively.

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