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# Debt-Led-Growth Hypothesis (DLGH) and Productive Constraints: An Empirical Evaluation of African Economies

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**This study investigated the role of productive capacity by testing the debt-led growth hypothesis in 54 African Countries. This study is motivated by the rising nature of external debt following the fallout of the Covid-19 and the neglect of productive capacity in the debt-growth empirical relations, a variable found to be a necessary determinant based on theory. The study employed panel data from 2000 to 2018 and Pooled OLS, Fixed effect and Panel Generalized Method of Moment (GMM) as the panel estimators. Furthermore, two models were estimated for each panel estimator to capture the effect of the introduction of productive capacity on the debt-growth nexus – a model with and without the productive capacity index. The study results showed that the marginal contribution of external debt to growth is negative in the African countries, while productive capacity plays a significant role in the debt-growth nexus. Moreover, productive capacity moderates the relationship between debt and growth and reduces debt's negative impact on growth. The implication is that policymakers need to introduce policies to facilitate the growth-enhancing impact of debt and boost the countries' national income.**

*Keywords: Productive capacity, external debt, economic growth, debt-led-growth hypothesis, African countries*

*JEL: E10, F35, O47*

The emergence of the Coronavirus pandemic has left many nations in severe debt problems and has rekindled researchers' attention on the implication of rising public debt on economic growth. Nations across the globe witnessed a fall in output growth (Benjamin *et al.*, 2021), which is evidenced by the loss of resources and income shock. The reduced net incomes are arising from increased unexpected expenditure on health and social amenities and the health-led financial crisis, which crippled supply chains, businesses, and industries. As a result, expenditure increased by 1.6 percent of gross domestic product (GDP) in low-income countries, 3.4 percent of GDP in developing and emerging economies and 9.3 percent of GDP in advanced economies as of June 2020. Euro Zone lost 8.84 percent, oil-exporting countries and middle east 7.7 percent, other Asia 6.3 percent and the rest of the world 5.9 percent in GDP during the heat of the pandemic. Many governments raised aggregate demand and expenditures to circumvent these scenarios by extending economic welfare or stimulus packages to their citizens and businesses to address the economic decline. Specifically, emerging

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and developing countries borrowed funds from external parties to meet fiscal activities and budgetary operations and improve the growth rates (Benjamin *et al.*, 2020; Gomez and Sosvilla-Rivero, 2017). This process has resulted in substantial outstanding debt in many countries (Yusuf and Mohd, 2021).

While moderate borrowings to promote public capital spending and infrastructural development are crucial to economic growth acceleration, incurring debts beyond the nation's repayment capabilities may have various unpleasant effects on the economy (Joy and Panda, 2020; Yusuf and Mohd, 2021). This puts pressure on the available foreign earnings or domestically generated revenue, increasing the opportunity cost of servicing the debt and adversely impacting the economy. Several theoretical positions exist in literature to explain the implication of the increasing debt accumulation on economic growth. For example, the debt-led growth hypothesis maintains that increasing debt boosts economic performance and promotes growth. It hinges on the positive relationship between debt and economic growth through its impact on aggregate demand. Studies such as Lechtenberg (2017), Nishi (2011), and Xing *et al.* (2021) identified increasing capital accumulation, government's deficit financing and bank loans and monetary transmission, respectively, as the medium through which debt affects aggregate demand. Because wages and prices are rigid in the short run, government expenditure from the borrowed funds boosts economic growth (Whajah *et al.*, 2019; Xing *et al.*, 2021). Therefore, debt accumulation has a distribution effect by impacting aggregate expenditure – consumption, investment, and government expenditures– corroborating the thought of the Keynesians school that debt boosts the macroeconomy by covering the income deficit. It closes the difference between aggregate income and expenditure, thus generating continuous economic growth (Foley, 2003; Xing *et al.*, 2021). Like the Keynesians, the neoclassical growth model also suggests the need for countries with capital and infrastructural deficiencies to borrow for capital accumulation and output improvement (Yusuf and Mohd, 2021).

However, the debt-led growth hypothesis opponents maintain a stance they call 'debt-burdened growth'. The debt-burdened growth emphasizes the negative impact of debt accumulation (Charles, 2008; Foley, 2003; Nishi, 2011). According to them, increasing debt and aggregate expenditure creates inflationary pressure, which forces the monetary authority to raise the interest rate. Although the high-interest rate generates increased capital inflow, it leads to a fall in domestic investment, output, and economic growth (Foley, 2003; Nishi, 2011).

Interestingly, empirical studies are also diverse on the debt-led growth hypothesis arguments. Some authors expect an increase in debt would generate higher output and national income; others argue otherwise. For instance, Reinhart and Rogoff (2010) argued that debt-led growth occurs in the short run. However, in the long run, the positive impact of debt on growth gets to a threshold above in which further accumulation of debt creates a burden on growth. The Reinhart and Rogoff hypothesis,

as this is popularly known, thus suggest that there is a non-linear effect of debt-to-GDP ratio on growth. Over time, debt accumulation reaches a threshold beyond which it impacts economic growth negatively—the negative effect of debt on growth results from its tendency to crowd out investment in the economy. This position suggests that increasing borrowing in the economy has no benefit other than decreasing private and government investment, believing that servicing the debt requires the government to increase taxes, ultimately reducing disposable income and investment.

Some other studies argue in favour of debt (Hsing, 2020; Joshua *et al.*, 2020; Karagoz and Demirhan, 2016; Petrakos *et al.*, 2015; Wibowo, 2017, among others). These studies found that debt promotes economic growth. An equally considerable number of studies argued against debt accumulation because it inhibits economic growth (Gomez and Sosvilla-Rivero, 2017; Kharusi and Ada, 2018; Lim, 2019; Tran, 2020; Whajah *et al.*, 2019; Woo and Kumar, 2015). Other studies such as Checherita-Westphal and Rother (2012), Hsing (2020), Seyram *et al.*, (2019), Tran (2020) and Whajah *et al.*, (2019) examined the debt-led growth hypothesis in a non-linear framework. While the results of these studies are divergent, it was observed that the role of productive constraint in the nexus between debt and economic growth had been neglected in extant literature.

Economies, especially developing economies, face productive constraints which cause gaps between investment and savings. The productive constraints include insufficient infrastructures to facilitate capital accumulation and a reduction in the growth of entrepreneurial capacity (Shiferaw, 2017). The government often seeks to address these productive constraints, which are vital supply-side components in the economy, by borrowing, especially when available funds are insufficient. These supply-side variables constraints affect output by limiting investment and growth of entrepreneurial capacity. As a result, productive constraints affect growth and, thus, is a significant determinant in the debt-growth relations (Foley, 2003; Lima and Meirelles, 2007). Following this thought, this study argues that the debt-growth relation depends on the economy's productive structure and know-how and can influence the relationship between debt and economic growth, thus not considering it can influence the outcome of the growth and development of the nation. We introduce the productive constraint proxied by a multi-dimensional index into the debt-growth framework and investigate its impact on the model. Also, we attempt to investigate the interaction of the productive capacity index and the debt-aggregate demand-growth dynamics. This study, therefore, seeks to answer the following research questions. First, does external debt positively impact economic growth in Africa? Second, does productive constraint play a significant role in the debt-growth nexus?

The negligence of the role of productive constraint in the debt-led growth hypothesis creates a gap in the literature. This study addresses this gap, thus contributing to the existing studies by examining

the importance of productive constraint in the debt-growth framework in Africa following the two-gap theory of economic growth and the debt overhang theory as the theoretical framework. The justification for adopting these theories as the theoretical foundation is that government debt is usually to finance expenditure to improve productive capacity, which bridges the investment and savings gap (Haqa *et al.*, 2020). Moreover, the theories provide insight into the impact of debt on the economy, why government borrow, and how the borrowing finances the government expenditure on the productive capacity to fill the investment gap.

This study is motivated by the following issues: the debt of developing economies have been on the rise in recent times; the divergent view of the impact of debt on the economy; and the neglect of the role of productive constraint in debt-growth relations, since these economies borrow to boost their productive capacity (Haqa *et al.*, 2020). More specifically, Sub-Saharan economies have attracted researchers' interest because of the dwindling export and export revenue, which has made it difficult for these government to finance their budget activities without relying on foreign financial assistance, as observed in the last decade (Edo *et al.*, 2020). Given the fallout of the pandemic and the rise of government debt, it is crucial to re-visit the nexus between debt and economic growth. This investigation would provide insight into the relationship between debt and economic growth in one vein and productive capacity and economic growth on the other hand; while also investigating the interaction between debt-productive-demand and economic growth.

Following this introduction, the rest of the study is structured as follows: Section two presents the theoretical underpinning and literature review. The third section stipulates the methodology. Sections four and five present the estimated results and discuss the findings, respectively, while section six concludes the study based on the findings. Finally, section seven presents the implication, highlighting the study's limitations and suggestions for future study.

## LITERATURE REVIEW

### Theoretical Underpinnings

#### -Debt Overhang Theory

The debt overhang theory provides a theoretical foundation for this study. The theory is adapted because it explains the relationship between debt and economic growth. The debt overhang theory suggests a negative relationship between debt and economic growth (Duhu *et al.*, 2017; Peter *et al.*, 2021). A debt overhang occurs when the expected debt repayment falls short of the value of debt. In a much broader scope, proponents of the debt overhang theory of debt postulate that a high level of debt decreases the willingness to finance structural and fiscal reforms (Nasir, 2015). Supporters of

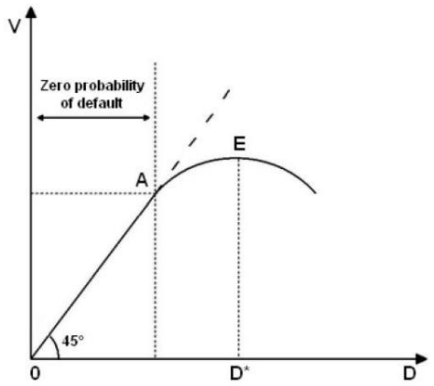
this theory believes that as debt increases beyond the ability of the country to pay back, private investment is cut back due to the expected future rise in tax. Thus, the high debt and high probability of default discourage investments. As a result, higher debt and debt servicing decreases private investments and negatively affect economic growth (Cohen, 1993; Peter *et al*., 2021). In other words, when the debt to GDP ratio is higher than the revenue to GDP ratio, less money is available to provide a favourable business environment for private investment, thus the decline in economic growth. Duhu *et al*. (2017) further describe a debt overhang as a situation where a country's total debt is higher than its capacity to pay back, which creates a decline in the economy because less money is available for capital expenditure as infrastructure, education and health.

Moreover, Edet-Nkpubre (2013) posits that debt negatively affects economic growth through disincentive and illiquidity. The disincentive effect inhibits future investments- decreases investment expenditure generating a downturn in the economy (decrease in economic growth). These activities create a cycle of further decline in economic growth. Furthermore, due to the reduction in economic growth and increase in the debt-GDP ratio, a further disincentive is created in the system, which aggravates the situation leading to stagnation. The illiquidity effect of debt overhang is similar to the crowding-out effect position of the classical school of thought. As the country distribute resources to debt servicing, little or nothing is available for other productive activities. This implies the country allocates more resources to servicing debt rather than capital accumulation, which set in the debt liquidity trap. As a result, servicing debt becomes a liquidity trap because the indebted country struggles to limited available resources between consumption, investment and debt servicing. Thus it reduces the amount of money available for investment and economic growth (Cohen, 1993; Edet-Nkpubre, 2013; Peter *et al*., 2021).

On the other hand, Reinhart *et al*. (2012) emphasizes two channels with which debt affects economic growth: the quantity effect and interest rate risk premium. The quantity effect of investment occurs when the high debt decreases the available resources for private investment. Moreover, this effect sets a further decrease in private investment if the government attempts to reduce the high debt burden by raising taxes, unanticipated inflation or fund transfer from the private sector. On the other hand, the interest rate risk premium involves the rising risk premium on debt because of the uncertainty of payback when due. This leads to a high real interest rate in the long run, which negatively affects investment, consumption of durable goods, and interest-sensitive sectors.

The debt overhang argument of Reinhart *et al*. (2012) and Reinhart and Rogoff (2010) suggest that debt accumulation promotes economic growth to a certain level. However, further accumulation of debt negatively impacts growth as the marginal cost of debt is most likely to exceed its marginal benefit (See Figure 1), which ultimately leads to adverse effects of debt on growth (Fiagbe, 2015;

Whajah *et al.*, 2019). In Figure 1, as long as the debt is between 0 and optimum debt level (D*), the expected repayments are within the county's ability to pay back with little or no default. Surpassing point A as debt (D) further increases raises the default risk. Point E marks the turning point where D* and the risk of actual default reaches a level that causes a decline in economic growth. In essence, the theory postulates that further accumulation of debt creates debt service costs higher than the country's ability to pay back in the future (Musibau *et al.*, 2018). A reasonable level of debt that promotes productive investment boosts economic growth. However, further debt growth above a particular level could slow economic growth.




Source: Agenor (2000)

***Figure 1. Debt Overhang Hypothesis***

### -Two Gap Theory and Productive Constraints

The second theory that provides theoretical justification for the study is the two-gap theory of economic growth. This theory explains how debt interacts with productive capacity and capital investment to boost economic conditions. The two-gap theory is a theory of economic growth that postulates that the financing gap in the economy can be closed by borrowing (Nasir, 2015). The theory is crucial in explaining why nations seek financial assistance (Chenery and Strout, 1996; Gachunga, 2018; Otonne, 2014). The two-gap theory of economic growth stipulates two economic growth and development condition constraints: savings and foreign exchange. The savings constraint requires foreign direct investment for equilibrium within the economy, while the foreign exchange constraint requires foreign aid or external debt to close the gap.

Moreover, according to Rostow stages of economic growth theory, to move from underdevelopment to development requires a certain level of capital investment to boost economic growth (Nasir, 2015; Rostow, 1960). Thus, according to Rostow (1960), the condition for taking off to development requires an investment of at least 5 percent of GDP. Therefore, if the resources within

the economy are not sufficient in developing countries, Rostow suggests financing by external debt. As a result, the government usually borrows funds to finance expenditure to improve their ability to produce goods and services in developing countries, which bridges the investment and savings gap since these economies are characterized by a shortage of national savings (Haqa *et al.*, 2020).

Chenery and Strout (1996), describing the two-gap theory, postulates an accounting identity that shows the necessity of national savings. The postulation explains the difference between the "foreign exchange gap" and the "savings gap", constraining economic growth in developing countries. The savings gap explains the difference between investment and savings, while the "foreign exchange gap" is between imports and exports. As a result, economies mostly opt for foreign aids or external finance to fill the gap and finance their infrastructural, structural and other productive expenditure to aid the export of goods and services (Gachunga, 2018; Otonne, 2014). Using the national income identities, the gross domestic product (GDP) gives the summation of the values of consumption expenditure (C), investment expenditure and government expenditure (I) and net export (NX).

Thus,

$$GDP = C + I + (X - M) \qquad (1)$$

Also, the theory posits that the gross domestic product gives savings (S) and consumption (paid services) (C).

Thus,

$$GDP = C + S \qquad (2)$$

Equating both gaps gives;

$$C + S = C + I + (X - M) \qquad (3)$$

Further simplification gives the equilibrium condition;

$$I - S = M - X \qquad (4)$$

Equation (4) indicates that both gaps are at equilibrium. However, because those who make decisions about investment, savings, import and export are different people, disequilibrium results in the long run, which serves as an impediment to the target growth of the economy. A savings gap occurs when the savings required to meet investment to achieve the target growth is less (Nasir, 2015). As a result, disequilibrium between both gaps ensues, implying that domestic savings are insufficient to meet domestic investment. Since there is an imbalance, the government is confined to external borrowings to fill the gaps. According to Nasir (2015), the government requires external borrowing to fill the savings-investment gap to achieve the desired economic growth. Borrowing, therefore, accelerate economic growth and influences the economy positively (Gachunga, 2018). By implication, the contribution of external debt is questionable if it does not facilitate improvement in the country's

economic performance. This study asserts that productive capacity is the silent but essential facilitator of growth in this growth theory. When the savings and foreign constraints are closed, the end of it is the improvement of the ability of the country to produce more goods and services for growth and development. The improvement in the productive capacity is measured by the increase in the components of the productive capacity index, which include advancement in the human capital, natural capital, structural changes, institutions, among others.

## Empirical Review

Studies to examine the relationship between debt and economic growth fall into three categories. Generally, these studies found a positive, negative and non-linear relationship between external debt and economic growth which differ across context, periods and methodology. Theoretically and empirically, the impact of debt on economic growth and the role of productive capacity in the debt-growth nexus is unclear.

### -Debt-Led-Growth Hypothesis

Many studies using different methodologies, contexts, and periods observe that external debt promotes economic growth. Increasing debt improves investment and facilitates a higher economic growth rate, supporting the debt-led growth hypothesis suggesting a positive impact on economic growth. For example, in a panel study framework, Wibowo (2017) examined the relationship between economic growth and external debt in 8 South-East Asia from 2006 to 2015 using a Panel Vector Autoregressive (VAR). Findings from the study show that external debt promotes economic growth. Other recent studies with similar results in a single country case include Joshua *et al.*, (2020) and Karagoz and Demirhan (2016). These studies support the theoretical position of the Keynesians and the two-gap model more specifically and suggest that external debt boost deficit financing raises investment and income level.

However, some authors argued against the debt-led growth hypothesis, emphasizing that debt can adversely affect the economy, especially when the borrowed funds are not well utilized. Some of these empirical studies found that external debt inhibits economic growth. For example, Lim (2019) examined the relationship between debt and growth in 41 advanced and emerging economies between 1952Q1-2016Q3. The study employed the estimations techniques of the Panel VAR and Generalized Method of Moments and found that debt affects economic growth negatively. Whajah *et al.* (2019) used a fixed-effect model in 54 African Countries between 2000 and 2016 and found a negative effect of indebtedness on growth. Lartey *et al.* (2018) did similarly but on 50 African countries. Their study employed the estimation techniques of panel ordinary least square and general method of

moments. Both techniques show a significant negative relationship between external debt and economic growth.

Additionally, Fiagbe (2015) and Senadza *et al*. (2017) examine the effect of external debt on growth in 39 selected Sub-Saharan African countries. The studies use GMM to show that external debt negatively affects economic growth, suggesting a direct effect of the debt hypothesis. Seyram *et al*. (2019) did a similar study with the same methodology on 48 Sub-Sarahan African countries from 1990 to 2017. Findings show no evidence of a non-linear relationship between external debt and GDP growth but a linear and harmful effect of debt. Mensah *et al*. (2019), in a study of 38 African economies from 1970 to 2015 using panel Autoregressive distributed lag (ARDL) model, found a significant negative relationship of external debt on economic growth. Gachunga (2018) also did a study on 38 selected Sub-saharan Africa between 1990 and 2016. The study employed Panel GMM and found a significant negative relationship between external debt and economic growth. However, according to the study, external debt is more harmful to middle-income countries than low-income countries. Mumba and Li (2020) found a negative relationship between short term and long-term external debt in the short and long run using ARDL in 9 Southern African countries between 2000 and 2018. Using ten countries, Tran (2020) examined the relationship between external and domestic debt on ASEAN's economic growth. The study employed a fixed-effect panel estimator and argued that an adverse effect of external debt on growth exist in sub-group of lower-middle-income countries. Other studies with negative findings in single-country cases include Kharusi and Ada (2018), and Dey and Tareque (2020). These studies support the classical school of thought and the debt overhang hypothesis and suggest that external debt mostly crowds out public and private investment and decreases income in the long run.

Authors among the opponents of the debt-led growth hypothesis, contrary to the positive and negative effects, observe a non-linear relationship between debt and economic growth. On the non-linearity of the impact of public debt on economic growth, some other studies investigate the debt-growth threshold. Results from these studies suggest a non-linear debt-growth relationship. For example, Gomez and Sosvilla-Rivero (2017) investigate the threshold level beyond which public debt negatively impact economic growth in Euro-Area countries between 1961 and 2015. Using the two-stage least square, all the countries aside from Belgium recorded a negative impact of debt on growth before the threshold. These results show evidence of a U-shape relationship in other selected Euro-Area countries except for Belgium. Tran (2020) identified a similar relationship in the upper-middle-income group of 10 ASEAN countries.

Hsing (2020), on the other hand, found an inverted U-shaped relationship in Bulgaria with a threshold value of 40.96 percent. Checherita-Westphal and Rother (2012) investigated the non-linear

impact of the relationship between debt and growth in 12 Euro area countries and found a threshold value of 90 percent to100 percent. Mensah *et al*. (2019) investigated the threshold of external debt in 38 African economies from 1970 to 2015 using the Panel Autoregressive distributed lag model. The study results show that external debt from 50 percent to 80 percent of GDP negatively affects economic growth. This result shows that external debt positively influences growth below the threshold in the selected countries and negatively above the threshold, as suggested by the debt overhang hypothesis.

However, few studies examined the role of public and private debt on convergence and the causality effect. For example, Gomez-Puig and Sosvilla-Rivero (2018) examined the effect of non-financial debt on economic growth in 10 Euro-Area countries between 1980 and 2015 using a Two-stage least square estimator. Findings from the study show that the effect of public debt on growth is not significant. However, the study found private debt to be a significant determinant of economic growth in these countries, although the direction of impact differs from one country to another. The findings of this study as touching private debt align with the study of Rant *et al*. (2020), which found that private debt and public debt show a significant influence of convergence. Petrakos *et al*. (2015) examined the targeted and non-targeted convergence rate in European Union countries between 1998-2009. Panel data and Two-Stage Least Square findings show that targeted debt leads to growth while non-targeted debt leads to divergence. Wamboye and Tochkov (2015) investigated the effect of external debt on convergence in labour productivity on two respective samples: 32 and 41 Sub-Saharan African countries between 1970-2010 and 1984-2010, respectively, employing a system GMM. The empirical investigation results show that external debt is a determinant of divergence in labour productivity. Musibau *et al*. (2018) examined the causality effect between economic growth and external debt in ECOWAS members countries between 1980 and 2015. The study employs short-run and long-run causality techniques and found the short-run and long-run causality between external debt and economic growth.

From the preceding empirical literature, the impact of public debt, whether domestic debt or external debt, on economic growth, is not clear. As a result of the mixed and divergent views of the impact of debt on economic growth in light of the fallout of the pandemic and increasing public debt of African economies such as Nigeria, Ghana etc., a conclusion cannot be made on the likely impact of external financing. As such, this study proposes to test the null hypothesis that:

$H_{01}$: External debt does not significantly impact economic growth in Africa

### -The Role of Improved Productive Capacity in the Debt-Growth Nexus

In addition, literature on the Debt-led-growth hypothesis and two-gap model further identified determinants of growth aside from the traditional determinants emphasized in the theoretical literature. The debt-led growth hypothesis identified external finance as a significant determinant of growth. On the other hand, the two-gap model identified foreign direct investment, foreign aid or external debt, and improved productive structure as determinants of economic growth. According to literature, variables such as population growth, stock of capital goods, natural resources endowment, and level of technology are the traditional determinant of growth. However, Sadeghi *et al*. (2020) asserted that the importance of traditional growth determinants declined over time while access to skills and technology, institutions and trade agreements in recent times have become essential determinants.

Moreover, Sala-i-Martin *et al*. (2004) identified 18 significant determinants from 67 variables. They included the relative price of an investment, primary school enrollment, and the initial real GDP per capita level. Tran (2020), in the study on the debt-growth nexus, identified population growth and total investment as significant determinants of growth in 10 ASEAN countries, which holds when domestic investment is the leading independent variable. On the contrary, when external investment is the primary independent variable, population growth and inflation rate are significant determinants of growth.

Hsing (2020), employing an extended production function, found gross fixed capital formation significant in the debt-growth hypothesis. Woo and Kumar (2015), like other similar studies, found secondary school enrolment rate, liquid liability, Inflation rate, terms of trade growth rate, fiscal deficit, and banking crisis. Gomez-Puig and Sosvilla-Rivero (2017) found population, gross capital formation percent of GDP, human capital index, openness to trade, and GDP deflator as significant factors that determine growth in the Euro-zone area. Joshua *et al*. (2020) identified foreign direct investment (FDI) as net inflow (% of GDP), trade as percent of GDP (TO), and exchange rate (EXR) official rate as a determinant of economic growth in the debt-growth nexus in South Africa. In the EU, factors that induce growth include population growth, degree of openness, foreign direct investment relative to GDP and corruption index, according to a study done by Rant *et al*. (2020). In a similar context, Checherita-Westphal and Rother (2012) identified private savings, public investment, and total factor productivity as the determinant of growth in that region. Studies such as Lim (2019) in 41 advanced and emerging economies; Whajah *et al*., (2019) in the African context, Gomez-Puig and Sosvilla-Rivero (2018) in Euro Area found factors not different from the determinants identified above in the debt-growth nexus. To the best of the authors' knowledge, no study has attempted to investigate the influence of improved productive capacity as a determinant in the debt-growth nexus. The absence of this variable in the previous studies on debt and economic growth neglect the theoretical position that public debts are used to finance government expenditure to improve the productive capacity and other

capital investment for export promotion. Hence, the study proposes the null hypothesis that:

$H_{02}$: Productive capacity is not a significant determinant of economic growth in the debt–growth nexus.

Although studies such as Hildalgo and Huasman (2009), Felipe *et al*. (2012), Ferrarini and Scaramozzino (2016), Pugliese *et al*. (2017), and Gao and Zhou (2018) have examined productive knowledge as a determinant of aggregate demand and growth under the growing literature on economic complexities, not within the context of debt–economic growth nexus. These studies show that productive knowledge or economic complexity is essential in the economic development process. Mewes and Broekel (2020) opined that knowledge production is a fundamental determinant of long-term growth and helps explain the uneven growth patterns of world regions. On the issue of production complexity ability to contribute to economic development, literature shows from findings of various research papers that the role of production complexity in growth and development is critical (Anthonelli *et al*., 2020; Ferrarini and Scaramozzino, 2016; Gao and Zhou, 2020; Mewes and Broekel, 2020). Therefore, considering that public debt can be a source of finance to boost production capacity and its components, this study proposes the null hypothesis that:

$H_{03}$: Productive capacity does not significantly interact with external debt in the debt–growth

## METHODOLOGY

### –Estimation Technique

The study employed the Panel Ordinary Least Square, Fixed Effect and Panel Generalised Method of Moments (GMM) estimators. Panel analysis provides sufficient data points for analysis with a short time series. It improves the quality and quantity of the data series better than either time–series or cross–sectional analysis (Wei and Bandara, 2009). The proposed estimators are widely used in the literature on the debt–growth nexus. For example, Woo and Kumar (2015) employed Pooled OLS, Fixed effect, GMM, and Between estimator to examine public debt and long–run economic growth in 38 advanced and emerging countries between 1970 to 2008. Other studies that have employed similar methodology include Rant *et al*. (2020), who worked on 28 EU members' states between 1995–2018; Whajah *et al*. (2019) worked on 54 African countries between 2000 to 2016; and Lartey *et al*. (2018) who worked on 50 African countries from 1980 to 2015 to mention a few. These studies and many more in the literature justified using the methods. Furthermore, combining these techniques ensures

the robustness of findings because each panel estimator has its strengths and weaknesses.

The dynamic estimator of GMM addresses the inherent endogeneity problem in a panel study (Ullah *et al.*, 2018). The GMM estimator provides more efficient standard errors in the phase of endogeneity problem usually encountered in Panel analysis (Ullah *et al.*, 2018; Ullah Ullah *et al.*, 2021). This study thus placed a premium on the result of the Generalized Panel Method of Moments (GMM) in the presence of conflicting results.

### -Estimation Procedure

This study examined the effect of external debt on economic growth with and without the interacting role of productive capacity. First, the study examined the characteristics of the data through descriptive analysis using mean, standard deviation, and correlation. Secondly, the series' stationarity properties to examine the probability of a mean reversion tendency of the data series are examined. Finally, two models were estimated to capture the model with and without the interacting variable. That is the sample with the overall variable and the sample without the interaction effect of productive capacity.

### -Sample and Data

The sample periods covered 19 years from 2000 to 2018, covering annual time series data of 54 African countries. These countries and periods were selected based on the availability of data. The sources of data for the study include the World Development Indicator (WDI) and United Nations Conference on Trade and Development (UNCTAD) Statistics portal. In addition, the data collected from these databases include the productive capacity index (PCI) as a proxy for improved productive capacity, real gross domestic product (RGDP) as a proxy for economic growth, and External debt (DBT) as a proxy for external government finance. Other control variables include trade openness (TOP) as a proxy for globalization, official development assistance (ODA) and foreign direct investment (FDI) as proxies for other foreign capital inflows and exchange rate (EXR) a proxy for macroeconomic stability. Also, the study included a dummy variable to capture the income classification level of the countries since the countries have varying income levels. Tables 1 and 2 (See Appendix-I & II) provided the data information for the series. Table 1 summarised the description of the series in terms of their mean, standard deviation, and normality statistics. While Table 2 presented the correlation matrix. The Jarque-Bera statistics showed that all the series did not follow the expected distribution at a 10 percent significance level except gross domestic product (log). Thus, the need to check for the stationarity properties of the series. More specifically, the real gross domestic product (log), external debt (log), the exchange rate (log), other development assistance

(log), trade openness, foreign direct investment (log) and productive capacity recorded a mean value of 23.04, 21.8, 4.6, 19.74, 0.66,16.69 and 22.99, respectively. Furthermore, the correlation coefficients showed that the series are moderately correlated, indicating that the model is free from collinearity.

### –Model Specification

Adapting the debt overhang and two-gap theory of economic growth and debt and the frameworks and empirical research of Gachunga (2018), Senadza *et al*. (2017), and Seyram *et al*. (2019), the functional representation of the model to examine the role of productive capacity in the debt-growth relationship is expressed as follow:

$$RGDP = f(DBT, EXR, ODA, TOP, FDI, PCI) \qquad (5)$$

Where RGDP is the dependent variable and others are independent variables. The variables except for the productive capacity index and trade openness remains in a transformed form. The econometric model equation (6) shows the re-expression of the functional relationship. Thus, we have:

$$LRGDP_{it} = \pi_0 + \pi_1 LDBT_{it} + \pi_2 LEXR_{it} + \pi_3 LODA_{it} + \pi_4 TOP_{it} + \pi_5 LFDI_{it} + \pi_6 PCI_{it} + \pi_7 (LDBT * PCI)_{it} + \pi_8 (LDBT * ICC)_{it} + \mu_{it} \quad (6)$$

Where LRGDP, LFDI, LDBT, LODA and LEXR are the logarithmic value of the series, while PCI and TOP remain in the level form; $\mu_{it}$= the stochastic error term; and $\pi_i$= the parameter for estimation. $ICC_{it}$ = dummy for country categorization where 1 is high and middle-income countries, and 0 for low-income countries, $LDBT * ICC$ captured the interaction effect of income categorization. $LDBT * PCI$ measured the interacting effect of productive capacity. Estimating the total effect of external debt stock on economic growth requires taking the partial derivative of equation (6) against the debt stock. Thus, we have:

$$\frac{\partial LRGDP}{\partial LDBT} = \pi_1 + \pi_7 PCI + \pi_8 ICC \qquad (7)$$

The magnitude and direction of the interacting variable coefficients show how the interaction between productive capacity and external debt stock affect the debt-growth nexus and how external debt affects high, middle, and low-income African countries.

### –Total Effect of External Debt on Economic Growth with Productive Capacity as Interacting Variable

The interest in the case of the interacting effect of productive capacity is on the sign of $\pi_1$ *and* $\pi_7$.

First, if $\pi_1 > 0$, and $\pi_7 > 0$ then debt positively impacts economic growth, and productive capacity boosts this positive impact. The implication of this to policymakers should be to accumulate debt and finance productive capacity to boost economic growth. Secondly, if $\pi_1 > 0$ and $\pi_7 < 0$ debt positively influences economic growth, and productive capacity adversely affects the positive impact. Such an outcome requires a reduction in productive capacity finance to achieve the long-run benefit of debt. Thirdly, if $\pi_1 < 0$ and $\pi_7 > 0$ then debt harms growth, and improving productive capacity mitigates the negative impact on economic growth. The policy implication is to introduce a policy that will facilitate the growth-enhancing impact of debt. If $\pi_1 < 0$ and $\pi_7 < 0$ then debt harm economic growth and financing productive capacity improves the negative impact. The policy implication is to make both external debt and productive capacity spur growth through well-formulated policy instruments.

-Total Effect of External Debt on Economic Growth with Income Level as Interacting Variable

The dummy variable coefficient $(\pi_8)$ implies that the debt growth nexus is significantly affected by the wealth of the economy. First, if $\pi_8 > 0$ and $\pi_1 > 0$ whether the country is rich or poor promotes the positive impact of debt on growth. Secondly, if $\pi_8 < 0$ and $\pi_1 > 0$ whether the country is rich or poor hampers the positive effect of debt on growth. Thirdly, if $\pi_8 > 0$ and $\pi_1 < 0$ whether the country is rich or poor mitigates the negative impact of debt on growth. Lastly, if $\pi_8 < 0$ and $\pi_1 < 0$ whether a country is rich or poor aggravates the negative impact of debt on growth.

-Total Effect of External Debt on Economic Growth with both Productive Capacity and Income level as Interacting Variable

Summarily, if $\pi_1 > 0$, $\pi_7 > 0$ and $\pi_8 > 0$ then the debt positively impacts economic growth and productive capacity and the income level promote this positive impact. Hence, policymakers should increase debt and productive capacity while also generating alternative sources of revenue to boost economic growth. Moreover, if $\pi_1 > 0$, $\pi_7 < 0$ and $\pi_8 > 0$ debt influences economic growth positively, while productive capacity adversely affects the positive impact even though the income level plays a significant role in boosting economic growth. However, if $\pi_1 < 0$, $\pi_7 > 0$ and $\pi_8 < 0$ then debt harms growth, and productive capacity mitigates the negative impact on economic growth while the income level contributes to the negative effect on growth. If $\pi_1 < 0$, $\pi_7 < 0$ and $\pi_8 < 0$ then debt harm economic growth and productive capacity and income level improve the negative impact. Furthermore, if $\pi_1 > 0$, $\pi_7 > 0$ and $\pi_8 < 0$ debt positively influences economic growth, while productive capacity boosts the positive impact while the income level adversely affects the impact of

debt on growth. Also, if $\pi_1 < 0$, $\pi_7 > 0$ and $\pi_8 > 0$ then debt harm growth but productive capacity and income level mitigate the negative impact of debt on growth. In a similar narrative if $\pi_1 > 0$, $\pi_7 < 0$ and $\pi_8 < 0$ then debt led to growth, but productive capacity and income level adversely affect the positive impact of debt on growth.

### –Marginal Effect of External Debt on Economic Growth

Moreover, if the marginal impact on growth ($\pi_1 + \pi_7 PCI + \pi_8 ICC$) increases as debt increases, more debt and productive capacity and being rich generate more economic growth.

Further information on the data collected is presented in Table 3 (see Appendix–III) and shows the description of the variables and a priori expectation of the other control variables.

## RESULTS

### –Panel Unit Root Test

The study examined the stationarity properties using ADF–Fisher, PP–Fisher and Im, Pesaran and Shin (IPS). Since the data distribution did not follow the expectation, it is essential to carry out unit root testing. Besides, dynamic estimators require that the series be mixed stationary at I(1) and I(0) (Kelikume, 2018). Table 4 (see Appendix–IV) showed the result of the unit root test and display that the series are either stationary at I(0) or first difference I(1). More specifically, going by the three tests, exchange rate (log), foreign direct investment (log), other development assistance (log), productive capacity and trade openness are stationary at I(0) at 10 percent significance level or 90 percent confidence interval. In contrast, the other variables of the study are stationary at I(1). These results imply that a dynamic panel estimator and other panel estimators can be applied to estimate the model.

### –Model Estimation

The study model is estimated using three–panel estimator techniques of Generalized Method of Moments, Fixed effect and Pooled Ordinary Least Square method. The Hausman Test suggested the fixed effect model. With the probability value of the Hausman test as 0.000, the null hypothesis does not favour random effect. Checking other diagnostic properties of the estimations showed that the coefficient of determination is around 0.825733 and 0.994252 for both samples' pooled OLS and fixed effect estimation. Narrowing down to each variable, Table 5 (see Appendix–V) presented the estimation results based on the three estimators. The table showed that external debt (log) significantly impacts real gross domestic product (log) at a 1 percent significance level. More specific-

ally, only two estimators presented significant coefficients. The pooled OLS estimator (see the first column of Table 5) showed that external debt (log) impact real gross domestic product (log) positively and significantly under both samples. In contrast, its impact on real gross domestic product (log) is negative and significant for the GMM estimator under both samples (see column three of Table 5).

Moreover, the three estimators showed that the exchange rate (log) is a significant determinant of the real gross domestic product (log) at a 1 percent significance level. Specifically, pooled OLS and fixed effect model (see first and the second column of Table 5) showed adverse and significant effects. In contrast, the GMM showed a positive and significant impact under both samples. In addition, other developmental assistance (log) showed a positive relationship with the real gross domestic product (log) from the three estimators. However, the result of the fixed-effect model is not significant at the 10 percent level under the two samples.

On the other hand, trade openness showed a significant negative relationship only for the GMM estimator under both samples (see column three of Table 5). Similarly, Table 5 further showed that foreign direct investment (log) influences real gross domestic product (log) positively and significantly using the three estimators under both samples at 5 percent. The interaction effect of the income categorization similarly showed a positive and significant effect on the real gross domestic product (log) at a 10 percent significance level. The productive capacity index showed a positive and significant impact on real gross domestic product (log) at a 10 percent significance level. More specifically, the pooled OLS shows insignificant results in both samples. In contrast, the GMM showed an insignificant result in the overall sample at a 10 percent significance level. Therefore, the interaction effect of the productive capacity index is positive and significant with the GMM model.

## DISCUSSION

The diagnostic test-coefficient of determination is 82.6 percent and 99.4 percent, indicating the dependent variable variation caused by the explanatory variables in the pooled OLS and fixed effect estimation model. Moreover, a similar variation in the dependent variable in the sample with the overall variables ensued.

For the pooled OLS model, the study has shown that the inclusion of the moderating variable of productive capacity does not significantly influence the model at a 10 percent level of significance. Meaning external debt indicates a positive and significant impact on growth, with the productive capacity not significantly moderating this impact. At the same time, the income level represented as LDBTICC further boosts the positive impact by about 0.022 percent and 0.023 percent on average (see Table 5). The coefficients are 0.712745 without the moderating variable and 0.674136 with the

moderating variable implying that a 1 percent increase in external debt boosts economic growth by 0.7127 percent and 0.6741 percent, respectively in both cases on average. These results align with the Keynesian school of thought and suggest that external debt is an asset to the economy and can boost income. Studies such as Wibowo (2017) and Karagoz and Demirhan (2016) also found similar results.

However, for the panel GMM result, the study has shown that the productive capacity index plays a significant role in the debt-led growth hypothesis. Although, unlike the pooled OLS model, external debt impact economic growth negatively and significantly at 1 percent level of significance, and productive capacity play a significant role in mitigating the negative impact of external debt on economic growth, aligning with the classical school of thought position. In this case, efficient use of External debt ameliorates its harmful impact. Empirical studies such as Senadza *et al*. (2017), Mensah *et al*. (2019), Lim (2019), and Gachunga (2018) found similar results as touching the debt-growth nexus. The coefficient of −0.013695 without the moderating variable and −0.047572 with all the variables included indicating a 1 percent increase in external debt, reduces economic growth by 0.014 percent and 0.048 percent, respectively, at a 1 percent level of significance. Although the moderating role of productive capacity captured by LDBTPCI (see the third column of Table 5) reduces the negative effect by 0.0016 percent.

In comparison, the income level mitigates the negative impact by 0.0176 percent (see the third column of Table 5). However, without the moderating role of productive capacity in the sample, the income level of the countries mitigates the negative impact by 0.025119 percent. Though, the marginal effect on growth is still negative (−0.047572+0.017562+0.001673), indicating that overall the effect of debt on growth is harmful even when the role of productive capacity and income level play out.

For the other control variables, productive capacity is a positive determinant of economic growth. More significant for GMM estimation. Other positive determinants of economic growth identified in the study include other developmental assistance, trade openness and foreign direct investment. They align with studies such as Gomez-Puig and Sosvilla-Rivero (2017) and Joshua *et al*. (2020). Moreover, this study has shown that the exchange rate shows a mixed impact on economic growth based on different estimations. The pooled OLS shows a negative determinant, while the fixed effect and GMM estimates show a positive determinant on the average at a 10 percent significance level.

## CONCLUSION

This study has provided new insight into the debt-led growth hypothesis in Africa and the role and

interaction effect of productive capacity. The combination of three estimators: pooled OLS, fixed effect and Panel GMM, show that the productive capacity and income level mitigate the negative effect of external debt on economic growth, and the overall impact of debt on growth is negative aligning with the position of the classicalist and previous empirical findings. The study also provided insights into the possible strong growth determinants, including other developmental assistance, trade openness, foreign direct investment, and exchange rate.

## IMPLICATIONS

Amid conflict on the possible effect of external debt on economic growth, various schools of thought have divergent views. The debt overhang theory posits that external debt is harmful to the economy. On the contrary, the Keynesian school of thought asserts that external debt is an asset to the economy and can boost investment, facilitate deficit financing, and promote higher income. This study contributes to the literature on the debt-growth hypothesis in some ways. It provides insights into the role productive capacity plays in the nexus, a variable largely neglected in the literature. The study argues that internal and external borrowing's desired effect would not be realized if the nation's productive capabilities were not considered. Therefore, theoretically, the study explored the two-gap theory of economic growth to highlight the importance of productive capacity, show how the inherent constraints identified by the theory inhibit the productive structure and capacity and demonstrate the relevance of external debt- a form of foreign aid-in closing the gap and meeting the productive needs of the nation.

Secondly, the study's empirical findings show that productive capacity plays a significant role in the debt-growth nexus. Productive capacity reduces the negative impact of debt on growth in Africa. By implication, policymakers in Africa need to introduce policies that will facilitate the growth-enhancing impact of debt and focus on improving their ability to produce goods that will help them grow.

Thirdly, the study also contributes to the literature methodologically. The study is the first to introduce the productive capability index-a multi-dimensional index to measure the productive resources, entrepreneurial capacity and the productive structure of an economy- in the debt-growth nexus.

## LIMITATIONS AND FUTURE DIRECTIONS

This study is limited in a few ways that could serve as a future direction for research. Firstly, this study focuses on the external debt-growth nexus. Future studies can extend this to capture domestic debt and possibly public debt using the same model and estimation technique, an area of originality.

Instead of using the external debt variable, the public debt, which involves the addition of both domestic and external debt, could be utilized.

Furthermore, a complementary study can be done in other continents to examine the role productive capacity plays in the debt-growth nexus in developed economies providing a general understanding of the significance of the productive capacity and income level in a different context. Because developed countries tend to have a higher productive capacity index than developing countries, investigating the role of productive capacity in a developed domain would be an exciting adventure. Nevertheless, again, these are areas of novelty for future research hitherto neglected or ignored.

## REFERENCES


Agénor, P. R. (2000). *The economics of adjustment and growth*. Academic Press.

Benjamin, O., Jimoh, S., Otonne, A., Benjamin, S., & Oyolola, F. (2021). Social distancing and the effects of covid-19 pandemic: A study of the six regions of the world. *Journal of Insurance and Financial Management*, 4(5): 92-117.

Charles, S. (2008). Corporate debt, variable retention rate and the appearance of financial fragility. *Cambridge Journal of Economics*, 32 (5): 781-795.

Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the Euro Area. *European Economic Review*, 56(7):1392-1405. https://doi.org/10.1016/j.euroecorev.2012.06.007

Cohen, D. (1993). Low investment and large LDC debt in the 1980's. *The American Economic Review*, 83(3): 437-449.

Dey, S. R., & Tareque, M. (2020). External debt and growth: Role of stable macroeconomic policies. *Journal of Economics, Finance and Administrative Science*, 25(50): 185-204. https://doi.org/10.1108/JEFAS-05-2019-0069

Duhu, I. G., Ojiya, E. A., & Amadi, U. (2017). Mounting domestic debt and debt servicing debacle: Implications for economic growth in Nigeria. *International Journal of Research in Humanities and Social Studies*, 4(7): 1-12.

Edet-Nkpubre, A. (2013). Exploring the nexus between external debt management and economic growth. *International Journal of Economic Resources*, 412, 43-65.

Edo, S., Osadolor, N. E., & Dading, I. F. (2020). Growing external debt and declining export: The concurrent impediments in economic growth of Sub-Saharan African countries. *International Economics*, 161, 173-187. https://doi.org/10.1016/j.inteco.2019.11.013

Felipe, J., Kumar, U., Abdon, A., & Bacate, M. (2012). Product complexity and economic development. *Structural Change and Economic Dynamics*, 23(1): 36-68. https://doi.org/10.1016/j.strueco.2011.08.003

Ferrarini, B., & Scaramozzino, P. (2016). Production complexity, adaptability and economic growth. *Structural Change and Economic Dynamics*, 37, 2-61. https://doi.org/10.1016/j.strueco.2015.12.001

Fiagbe, A. K. (2015). *The effect of external debt on economic growth in Sub-Saharan Africa*. Unpublished doctoral dissertation, University of Ghana, Ghana. http://197.255.68.203/handle/123456789/8399

Foley, D. (2003). Financial fragility in developing economies. *Development Economics and Structuralist Macroeconomics, Aldershot: Edward Elgar*, 157-168.

Gachunga, M. J. (2018). The impact of external debt on economic growth in Sub-Saharan Africa. *Academic Journal of Economic Studies*, 4, 57-63.

Gao, J., & Zhou, T. (2018). Quantifying China's regional economic complexity. *Physica A: Statistical Mechanics and its Applications*, 492: 1591-1603. https://doi.org/10.1016/j.physa.2017.11.084

Gomez-Puig, M., & Sosvilla-Rivero, S. (2017). Heterogeneity in the debt-growth nexus: Evidence from EMU countries. *International Review of Economics and Finance*, 51, 470-486. https://doi.org/10.1016/j.iref.2017.07.008

Gomez-Puig, M., & Sosvilla-Rivero, S. (2018). Public debt and economic growth: Further evidence for the Euro Area. *Acta Oeconomica*, 68(2): 209-229. https://doi.org/10.1556/032.2018.68.2.2

Haqa, M., Khan, A. A., & Akram, M. (2020). Public debt, private investment, and economic growth: Empirical evidence from Pakistan. *IIU Journal of Economics and Finance*, 1(2): 35-48.

Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*, 106(26): 10570-10575. https://doi.org/10.1073/pnas.0900943106

Hsing, Y. (2020). On the relationship between economic growth and government debt for Bulgaria: Test of the Reinhart-Rogoff hypothesis. *Theoretical and Applied Economics*, 27(4): 187-194. https://doi.org/10.1016/j.heliyon.2020.e04009

Joshua, U., Adedoyin, F. F., & Sarkodie, S. A. (2020). Examining the external-factors-led growth hypothesis for the South African economy. *Heliyon*, 6(5): e04009.

Joy, J., & Panda, P. K. (2021). An empirical analysis of sustainability of public debt among BRICS nations. *Journal of Public Affairs*, 21(2): 1–14. https://doi.org/10.1002/pa.2170

Karagoz, M., & Demirhan, A. (2016). Is really debt a man's whip?. *Procedia Economics and Finance*, 38, 421–429. https://doi.org/10.1016/S2212-5671(16)30213-1

Kelikume, I. (2018). An estimation of inflation threshold for Africa. *International Journal of Management, Economics and Social Sciences*, 7(4): 283–300.

Kempa, B., & Khan, N. S. (2017). Spillover effects of debt and growth in the Euro Area: Evidence from a GVAR model. *International Review of Economics & Finance*, 49, 102–111. https://doi.org/10.1016/j.iref.2017.01.024

Kharusi, S. A., & Ada, M. S. (2018). External debt and economic growth: The case of emerging economy. *Journal of Economic Integration*, 33(1): 1141–1157.

Lartey, E. Y., Musah, A., Okyere, B., & Yusif, N. (2018). Public debt and economic growth: Evidence from Africa. *International Journal of Economics and Financial Issues*, 8(6): 35–45. https://doi.org/10.32479/ijefi.7057

Lechtenberg, L. (2017). The debt-to-threshold effect on output: A country-specific analysis. *Aisthesis: Honors Student Journal*, 8(1): 26–34.

Lim, J. J. (2019). Growth in the shadow of debt. *Journal of Banking & Finance*, 103, 98–112. https://doi.org/10.1016/j.jbankfin.2019.04.002

Lima, G. T., & Meirelles, A. J. (2007). Macrodynamics of debt regimes, financial instability and growth. *Cambridge Journal of Economics*, 31(4): 563–580.

Mensah, L., Allotey, D., Sarpong-Kumankoma, E., & Coffie, W. (2019). What debt threshold hampers economic growth in Africa?. *International Journal of Development Issues*, 19(1): 25–42. https://doi.org/10.1108/IJDI-03-2019-0056

Mewes, L., & Broekel, T. (2020). Technological complexity and economic growth of regions. *Research Policy*, 104156. https://doi.org/10.1016/j.respol.2020.104156

Mumba, C. S., & Li, J. H. (2020). The impact of external debt on economic growth: Evidence from Southern Africa. *Journal of Finance and Economics*, 8(3): 135–141. https://doi.org/10.12691/jfe-8-3-6

Musibau, H. O., Mahmood, S., Ismail, S., Shamsuddin, Z., & Rashid, N. (2018). Does external debt cause economic growth? An experience from ECOWAS member countries. *International Journal of Academic Research in Business and Social Sciences*, 8(11): 1256–1264. http://dx.doi.org/10.6007/IJARBSS/v8-i11/5167

Nasir, W. A. (2015). Emerging theoretical approach for sustainable external debt and economic growth. *Malaysian Journal of Business and Economics*, 2(2): 85–94.

Nishi, H. (2011). Formalizing debt-led and debt-burdened growth regimes with endogenous macrodynamics of minskian financial structure: A long-run analysis. Documento de Trabajo núm. E-10-016, Kyoto University, Graduate School of Economics, Marzo.

Otonne, A. (2014). *External debt and the Nigerian economy: Threshold analysis.* Unpublished Bachelor dissertation, University of Lagos, Nigeria.

Peter, D. O., Olohungbebe, S. A., & Okoye, C (2021). The effect of debt burden on economic development in Nigeria. *American Journal of Humanities and Social Sciences Research*, 5(5): 232–241.

Petrakos, G., Artelaris, P., & Kallioras, D. (2015). *Debt-led convergence in the European Union*. Discussion Paper Series (21), 1, 1–18, School of Engineering, University of Thessaly.

Pugliese, E., Chiarotti, G. L., Zaccaria, A., & Pietronero, L. (2017). *Economic complexity as a determinant of the industrialization of countries: The case of India*. Cambridge: Cambridge University Press.

Rant, V., Marinč, M., & Porenta, J. (2020). Debt and convergence: Evidence from the EU member states. *Finance Research Letters*, 101617. https://doi.org/10.1016/j.frl.2020.101617

Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review*, 100(2): 573–78. https://doi.org/10.1257/aer.100.2.573

Reinhart, C. M., Reinhart, V. R., & Rogoff, K. S. (2012). Public debt overhangs: Advanced-economy episodes since 1800. *Journal of Economic Perspectives*, 26(3): 69–86. https://doi.org/10.1257/jep.26.3.69

Rostow, W. W. (1960). The United States in the world arena. *Naval War College Review*, 13(6): 122–123.

Sadeghi, P., Shahrestani, H., Kiani, K. H., & Torabi, T. (2020). Economic complexity, human capital, and FDI attraction: cross country analysis. *International Economics*, 164, 168–182. https://doi.org/10.1016/j.inteco.2020.08.005

Sala-i-Martin, X., Doppelhofer, G., & Miller, R. I. (2004). Determinants of long-term growth: A bayesian averaging of classical estimates (BACE) approach. *American Economic Review*, 94(4): 813–835.

Senadza, B., Fiagbe, K., & Quartey, P. (2017). The effect of external debt on economic growth in Sub-Saharan Africa. *International Journal of Business and Economic Sciences Applied Research*, 11(1): 61–69.

Seyram, S., Matuka, A., & Dominic, N. (2019). External debt and economic growth: Two-step system GMM evidence for Sub-Saharan Africa countries. *International Journal of Business*, 6(1): 39–48.

Shiferaw, A. (2017). *Productive capacity and economic growth in Ethiopia*. CDP Background Paper No. 34, Department of Economics and Social Affairs, United Nations.

Tran, T. P. (2020). The impact of external and domestic public debt on economic growth in ASEAN: A panel-data analysis of per capita income growth for different groups of countries. *Economia*, 70(1): 9–70.

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, 71, 69–78. https://doi.org/10.1016/j.indmarman.2017.11.010

Ullah, S., Zaefarian, G., & Ullah, F. (2021). How to use instrumental variables in addressing endogeneity? A step-by-step procedure for non-specialists. *Industrial Marketing Management*, 96, A1–A6. https://doi.org/10.1016/j.indmarman.2020.03.006

Wamboye, E., & Tochkov, K. (2015). External debt, labour productivity growth and convergence: Evidence from Sub-Saharan Africa. *The World Economy*, 38(5): 856-877. https://doi.org/10.1111/twec.12166

Wei, W., & Bandara, Y. M. (2009). FDI spillovers: The strategy for Chinese economic development. In WTO, *Accession and Socio-Economic Development in China*: 111-134, Chandos Publishing.

Whajah, J., Bokpin, G. A., & Kuttu, S. (2019). Government size, public debt and inclusive growth in Africa. *Research in International Business and Finance*, 49, 225-240. https://doi.org/10.1016/j.ribaf.2019.03.008

Wibowo, M. G. (2017). Public debt and economic growth in the South East Asian countries. *Signifikan: Jurnal Ilmu Ekonomi*, *6*(1): 177-188.

Woo, J., & Kumar, M. S. (2015). Public debt and growth. *Economica*, *82*(328): 705-739.

Xing, X., Xiong, W., Guo, J., & Wang, Y. (2021). The role of debt in aggregate demand. *Finance Research Letters*, 39, 101653. https://doi.org/10.1016/j.frl.2020.101653

Yusuf, A., & Mohd, S. (2021). The impact of government debt on economic growth in Nigeria. *Cogent Economics and Finance*, 9(1): 1-19. https://doi.org/10.1080/23322039.2021.1946249

Appendix–I

| Variable | Obs. | Mean | Std. Dev. | Min | Max | Jarque-Bera |
|---|---|---|---|---|---|---|
| LRGDP | 1007 | 23.04020 | 1.598273 | 18.61715 | 26.86928 | 0.909076 |
| LDBT | 912 | 21.70771 | 1.425080 | 18.41955 | 25.65018 | 15.72731*** |
| LEXR | 988 | 4.603477 | 2.368746 | -3.112977 | 9.855789 | 40.11031*** |
| LODA | 1024 | 19.74282 | 1.360166 | 12.79386 | 23.19804 | 72.74924*** |
| LTOP | 1026 | 0.662776 | 0.443175 | 0.000000 | 5.611313 | 12229.38*** |
| LFDI | 608 | 16.69133 | 3.177645 | 1.724355 | 22.76346 | 216.8508*** |
| PCI | 1026 | 22.99596 | 4.389105 | 12.57652 | 37.38910 | 121.4317*** |
| LDBTPCI | 912 | 487.7586 | 99.51410 | 267.6814 | 873.2977 | 145.4962*** |
| LDBTICC | 912 | 11.94531 | 11.05778 | 0.000000 | 25.65018 | 276.5090*** |

Source: Authors' computation using EViews 10
Note: *** *p*-value < 0.001

***Table 1. Data Statistics***

Appendix–II

| | LEXDEBT | LEXDEBTICC | LEXDEBTPCI | LEXR | LFDI | LODA | LRGDP | PCI | TOP |
|---|---|---|---|---|---|---|---|---|---|
| LEXDEBT | 1 | | | | | | | | |
| LEXDEBTICC | 0.493 | 1 | | | | | | | |
| LEXDEBTPCI | 0.620 | 0.623 | 1 | | | | | | |
| LEXR | -0.407 | -0.455 | -0.554 | 1 | | | | | |
| LFDI | 0.504 | 0.301 | 0.418 | -0.306 | 1 | | | | |
| LODA | 0.558 | -0.036 $^{ns}$ | 0.175 | -0.088$^{*}$ | 0.220 | 1 | | | |
| LRGDP | 0.885 | 0.516 | 0.588 | -0.436 | 0.564 | 0.542 | 1 | | |
| PCI | 0.346 | 0.572 | 0.948 | -0.497 | 0.308 | -0.016 $^{ns}$ | 0.356 | 1 | |
| TOP | 0.019$^{ns}$ | 0.177 | 0.168 | -0.363 | 0.212 | -0.203 | 0.036 $^{ns}$ | 0.208 | 1 |

Source: Authors' computation using EViews 10
Note: All correlations are significant at $^{***}$ *p*-value < 0.001 except * and ns, $^{*}$ *p*-value < 0.05, ns= Not Significant

***Table 2. Correlation Matrix***

Appendix–III

| Variable | Data | *a priori* Expectation | Unit of Measure |
|---|---|---|---|
| LGDP | Gross Domestic Product (log) | NA | Constant 2010 US$ |
| PCI | Productive capacity index | Positive | Unit |
| LDBT | External debt stocks (log) | Positive/Negative | Long-term DOD current US$ |
| LODA | Net official development assistance received (log) | Positive | Constant 2015 US$ |
| TOP | Trade Openness | Positive/Negative | Percent (%) |
| LFDI | Foreign direct investment, net inflows (log) | Positive | BoP, current US$ |
| LEXR | Official exchange rate (log) | Positive/Negative | LCU per US$, period average |
| ICC | Income classification dummy | NA | |

Source: Authors' presentation

***Table 3. Data Information***

Appendix–IV

| Test Variable | IPS Constant | Constant and Trend | ADF-Fisher Constant | Constant and Trend | PP-Fisher Constant | Constant and Trend |
|---|---|---|---|---|---|---|
| LDEBT | 4.74753(1.0000) | 4.03787(1.0000) | 56.8759(0.9995) | 49.7600(1.0000) | 54.7391(0.9998) | 52.4292(0.9999) |
| LDEBTICC | 5.70668(1.0000) | 3.63435(0.9999) | 17.5041(1.0000) | 24.8172(0.9995) | 20.1634(1.0000) | 27.2398(0.9982) |
| LDEBTPCI | 6.90721(1.0000) | 0.10877(0.5433) | 45.8911(1.0000) | 86.6416(0.7422) | 44.2086(1.0000) | 89.4514(0.6684) |
| LEXR | -10.6863(0.0000)*** | -0.28673(0.3872) | 328.304(0.0000)*** | 122.225(0.0841)† | 327.481(0.0000)*** | 155.541(0.0005)*** |
| LFDI | -4.86622(0.0000)*** | -2.06275(0.0196)*** | 146.341(0.0000)*** | 122.877(0.0005)*** | 156.794(0.0000)*** | 149.912(0.0000)*** |
| LODA | -6.14128(0.0000)*** | -6.65644(0.0000)*** | 211.805(0.0000)*** | 218.191(0.0000)*** | 236.520(0.0000)*** | 232.172(0.0000)*** |
| LRGDP | 4.24156 (1.0000) | 1.86774(0.9691) | 123.688(0.0913)† | 95.5268(0.7115) | 137.348(0.0158)* | 122.090(0.1086) |
| PCI | 5.73574(1.0000) | -1.31634(0.0940)† | 48.0858(1.0000) | 125.597(0.1185) | 52.1237(1.0000) | 146.804(0.0077)*** |
| TOP | -1.47761(0.0698)† | 0.23841(0.5942) | 149.828(0.0006)*** | 110.594(0.1812) | 370.558(0.0000)*** | 120.628(0.0602)† |
| ΔLDEBT | -15.4559(0.0000)*** | -11.7074(0.0000)*** | 398.656(0.0000)*** | 296.341(0.0000)*** | 410.815(0.0000)*** | 332.110(0.0000)*** |
| ΔLDEBTICC | -10.9620(0.0000)*** | -8.45875(0.0000)*** | 206.857(0.0000)*** | 155.890(0.0000)*** | 212.100(0.0000)*** | 173.709(0.0000)*** |
| ΔLDEBTPCI | -20.7474(0.0000)*** | -17.3148(0.0000)*** | 535.599(0.0000)*** | 408.569(0.0000)*** | 585.836(0.0000)*** | 544.312(0.0000)*** |
| ΔLEXR | -16.6131(0.0000)*** | -15.1565(0.0000)*** | 446.799(0.0000)*** | 373.709(0.0000)*** | 503.533(0.0000)*** | 476.382(0.0000)*** |
| ΔLFDI | -18.7740(0.0000)*** | -7.98710(0.0000)*** | 428.768(0.0000)*** | 310.400(0.0000)*** | 744.348 (0.0000)*** | 450.752(0.0000)*** |
| ΔLODA | -30.7245(0.0000)*** | -26.5946(0.0000)*** | 835.452(0.0000)*** | 653.829(0.0000)*** | 1762.14(0.0000)*** | 805.389(0.0000)*** |
| ΔLRGDP | -18.1299(0.0000)*** | -17.3156(0.0000)*** | 663.107(0.0000)*** | 375.566(0.0000)*** | 708.635(0.0000)*** | 474.083(0.0000)*** |
| ΔPCI | -22.7217(0.0000)*** | -19.0172(0.0000)*** | 644.264(0.0000)*** | 453.240(0.0000)*** | 1015.92(0.0000)*** | 563.462 (0.0000)*** |
| ΔTOP | -18.3932(0.0000)*** | -15.3728(0.0000)*** | 476.353(0.0000)*** | 374.064(0.0000)*** | 764.537(0.0000)*** | 440.499(0.0000)*** |

Source: Authors' computation using Eviews 10

Notes: Δ is first difference operator. a. stationary at 10% level of significance; probability values in parentheses

*** *p*-value < 0.001, ** *p*-value < 0.01, * *p*-value < 0.05, † *p*-value < 0.1

***Table 4. Panel Unit Root Result***

Appendix–V

| | **Without Moderating variable** | **All variables** | **Without Moderating variable** | **All variables** | **Without Moderating variable** | **All variables** |
|---|---|---|---|---|---|---|
| VARIABLES | Pooled OLS | | Fixed Effects | | Panel GMM | |
| LDBT | 0.712745*** | 0.674136*** | -0.000437 | -0.033761 | -0.013695*** | -0.047572* |
| | (0.034357) | (0.137519) | (0.019044) | (0.055203) | (0.003078) | (0.022014) |
| LEXR | -0.050334*** | -0.049124*** | -0.033837*** | -0.033379*** | 0.042965*** | 0.039296*** |
| | (0.016115) | (0.016661) | (0.011751) | (0.011780) | (0.005509) | (0.003781) |
| LODA | 0.210596*** | 0.211990*** | 0.003901 | 0.003915 | 0.021689*** | 0.020490*** |
| | (0.034376) | (0.034739) | (0.011798) | (0.011805) | (0.004276) | (0.003675) |
| LTOP | -0.146045 | -0.138593 | 0.060586 | 0.061370 | 0.028387** | 0.018799† |
| | (0.105008) | (0.108194) | (0.038861) | (0.038903) | (0.013070) | (0.009874) |
| LFDI | 0.081319*** | 0.081704*** | 0.007221* | 0.006915† | 0.003284*** | 0.003209*** |
| | (0.010839) | (0.010929) | (0.003612) | (0.003645) | (0.000536) | (0.000476) |
| PCI | -0.009665 | 0.118456 | 0.142702*** | 0.107745* | 0.018442*** | -0.017393 |
| | (0.009740) | (-0.370573) | (0.004613) | (0.054544) | (0.002367) | (0.018662) |
| LDBTICC | 0.022450*** | 0.022969*** | 0.058834* | 0.052514* | 0.025119*** | 0.017562*** |
| | (0.003829) | (0.004231) | (0.024292) | (0.026217) | (0.005062) | (0.006270) |
| LDBTPCI | | 0.001510 | | 0.001559 | | 0.001673† |
| | | (0.005207) | | (0.002424) | | (0.000913) |
| Constant | 2.388988*** | 3.206244 | 19.26436*** | 20.10020*** | | |
| | (0.680761) | (2.899678) | (0.336451) | (1.342421) | | |
| AR (2) *p*-value | | | | | 0.0000 | 0.0000 |
| Hausman (*p*-value) | | | 0.0000 | | | |
| Observations | 548 | 548 | 548 | 548 | 400 | 400 |
| R-squared | 0.825733 | 0.825760 | 0.994252 | 0.994257 | | |

Source: Authors' computation using Eviews 10
Values in parentheses are standard errors of the coefficients
*** *p*-value < 0.001, ** *p*-value < 0.01, * *p*-value < 0.05, † *p*-value < 0.1

***Table 5. Regression Results***