

Research Article

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Impact of external debt on sectoral performance: Comparative study of Nigeria and Botswana

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Abstract: Impacts of public debt remains unclear in Africa due to some heterogeneous macroeconomic fundamentals. Hence, this study focuses on a highly indebted nation, Nigeria, and Botswana, with a relatively low debt profile. The study utilizes the dual gap theoretical framework and deploys the Autoregressive Distributed Lag (ARDL) model to study external debt, and its influence on sectoral performance in Nigeria and Botswana between 1981 and 2019. The study focuses on the following three sectors; service, agriculture and industry with data from World Development Indicators (WDI). Findings reveal that only agricultural sector is influenced positively by external debt in Botswana, while external debt in the long run has a significantly detrimental impact in the Nigerian agricultural sector. We therefore, recommend both governments to be prompt in monitoring of loans, right from when it is acquired to how it is being spent.

Keywords – Agricultural sector, Botswana, Economic growth, Industrial sector, Nigeria, Public debt, Service sector

1. INTRODUCTION

For the past couple of years, discussions on the external debt of less developed economies, especially African countries have gained momentum. The criticalness of this issue is exacerbated by the mounting external debt levels and incidence of poverty in Africa coupled with burden of the debt servicing. With low revenue and level of domestic economic activities that characterized most African countries, internally generated funds are unfeasible (Ehikioya, Omankhanlen, Osuma & Inua, 2020). Hence, African countries tend to rely on external borrowings and foreign assistance to harness and grow their economies (Ugwuegbe, Okafor & Akarogbe, 2016). However, there are growing concerns from scholars on the misallocation of these funds to less efficient ventures and sectors. The implications of misapplication of external borrowings funds is enormous, particularly it could savor the debt

servicing burden as well as dispossess the country of investment in physical infrastructure and other critical areas that drive development in the host country (Soludo, 2003).

The continuous reliance of most African countries on external borrowing to finance their deficit budget has raised concerns given that the huge borrowing has not generated expected outcome with respect to investment expansion required for growth. Consequently, external debt stock has outstripped economic growth in the continent (World Bank, 2019). This is evident in the rise of external debt-to-GNI ratio that was about 9.2% in 2012 to 34.2 % in 2017 (World Bank, 2019). The extent of debt distress threatening the continent is alarming, for example, the sum of external debt profile in Sub Saharan Africa (SSA) rose to US \$625b in 2019 from US \$439b in 2015 (Mutiu, Abdulfatai & Rasheed, 2020; World Bank, 2019). Greater part of this increased external debt stock was driven by sharp increase in borrowing by two of the continent’s economies, Nigeria and South Africa (SA), where external debt stock rose by 29% and 21% respectively, while other Sub-Sahara African (SSA) countries expanded external debt stock recorded 11% on average (World Bank, 2019).

In spite of the debt relief granted to most Heavily Indebted Poor Countries (HIPC) and Multilateral Debt Relief Initiative (MDRI) Nigeria benefitted from as well as some other countries in SSA, external debt stock has doubled since 2010 (World Bank, 2019). For instance, external debt stock in Nigeria was about US \$39.90 billion in 2004 but due to debt relief by 2006 it was around US \$9.6 billion and started rising again in 2011 to US \$21 billion (World Bank, 2019). The trend of external debt stock in Nigeria and Botswana from 1981 to 2019 is shown in figure 1 below.

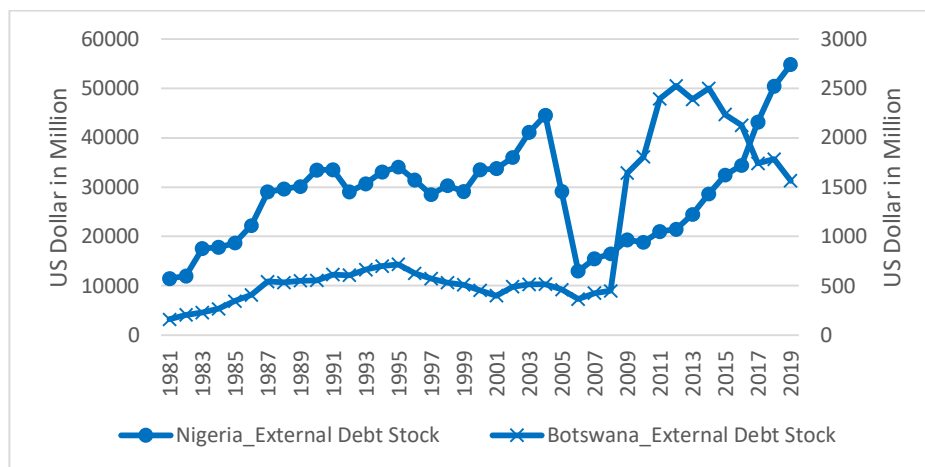


Figure 1: Trend of External Debt Stock (EDS) in Nigeria from 1981 to 2019

Source: The World Bank International Debt Statistics data stream (2021).

The figure 1 illustrates an outline of external debt stock for Nigeria at the right hand vertical axis, and for Botswana at the left hand vertical axis. Figure 1 reveals that by 2016 external debt stock shut up from US \$28.628 billion in 2014 to US \$34.39 billion and US \$54.832 billion in 2019 (World Bank, 2021). Although Nigeria’s external debt profile has been on the growth trajectory for decades, it has not attained the thresholds detrimental to the nation’s growth as stipulated by the IMF’s 56% thresholds for nations in Nigeria’s peer group (Festus & Saibu, 2019). Though this might be the basis for the continuous rise in the government borrowing, however, the concern of the policy makers in the nation is that if the external borrowings reach a certain threshold, servicing the loans might become a burden and the country would find herself at the unsuitable side of the Debt Laffer curve, with growth and investment being crowded out (Soludo, 2003).

The economic implication of servicing heavy external debt and its burden to the domestic economy could be the reason some developing countries in Africa maintain low and sustainable external debt profile. For instance, a country like Botswana, despite depletion of her external reserve due to weak demand of diamond exports, still remains one of the lowest indebted countries in SSA (Khanie, Nettiimi & Nair, 2015). Botswana's total public debt fell from 26.3% of GDP in 2012/2013 to 22.3% of GDP in 2016/2017 (Honde, 2018). Also due to prudent debt policy, Botswana total external debt stock fell from \$2.3 billion in 2011 to \$1.5 billion 2019 (World Bank, 2021) as depicted in Figure 1 above. This reveals a significant difference in external debt stock between Nigeria and Botswana, and also suggests that Nigeria relies heavily on external borrowing relative to Botswana. Scholars in the region have raised concern on the implication of the continuous rise of Nigeria's external debt in the region (Okonjo-Iweala *et al.*, 2003). While others, such as Bakare (2011) and Shayanewako (2013) argued that the debt profile of a country won't impede growth, instead it depends on the country's impotence to adequately utilize the debts.

Recent studies opined that appropriate management of external debt could support growth, especially for developing countries in SSA endowed with abundant opportunities with an anticipated high return on investment (Ehikioya *et al.*, 2020; Shayanewako, 2013). Hence, channeling the external funds to critical sectors of the economy would assist heavily indebted countries (such as Nigeria) to diversify away from oil to manufacturing and service sector and reduce the nation's exposure to external shocks. However, it is in view of this that our paper investigates the potential impact of external debt on sectoral performance in Nigeria and Botswana. The choice of countries selected is based on their high as well as low external debt profile in SSA region and on the basis of resource dependent economies with high global risk exposure. In addition to this, other SSA countries (like Ethiopia, Egypt, Ghana, South Africa etc) that may have shared more similar characteristics have insufficient data for this study.

2. LITERATURE SURVEY

Literatures on domestic and external debt burden in relation to economic growth and sectoral performance are highlighted in this section.

2.1. Theoretical literature survey

Economic theories insinuate that if external loans are effectively and efficiently utilized by the debtor nation, it enhances value to the country's growth (Ahamad & Islam, 2020). However, a high external debt profile on the other hand can thwart economic growth – as explained by debt overhang theory.

Debt overhang effect: The debt overhang effect is a situation where creditors no longer expect to be paid their loans in full because of large debt stock. Krugman (1988) and Sachs (1989) developed literature about this theory. Their literatures analysed what occurs in a country that fails to service her debts in full without new borrowings. Krugman (1988: 255) opines that "a nation's debt overhang problem emanates when the expected present value of potential future resource transfer is less than its debts". It should be noted also that excessive borrowings is not the only cause of debt overhang (Muhammad, Nor & Sallahuddin, 2016), it could also spring up as a result of changes in the nation's economy where managing and discharging of stocks becomes difficult.

Crowding out effect: According to Muhammad, Nor and Sallahuddin (2016), crowding out effect occur due to high rate of real interest charges while the terms of trade of a heavy indebted economy depreciates as foreign credit markets may no longer be available. The philosophy behind this theory assumes that government debt consumes the greater chunk of the national savings allocated for investments as a result of a rise in demand with a constant supply level causing the cost of money to increase (Muhammad, Nor & Sallahuddin, 2016). As a result of excessive interest rate charges, crowding out effects sets in, thus making borrowings possible for only government and its agencies thereby crowding out individual entrepreneurs and firms in the competitive market. This has adverse consequence on the overall growth because of the economy's inability to raise enough capital for investment.

The classical economic theory: The proponents of the classical economic theory (Adam Smith, David Ricard, John Stuart Mills among others) opined that the major connection between increased external debt and unproductive government expenditure halts private savings and reduces investible resources. However, the Harod-Domar model of economic growth opines that the savings-investment (capital output) ratio is essential in stimulating growth.

Dual gap theory: The dual gap theory of Chenery and Strout's (1966) asserts that the prescribed growth level of an economy can only be obtained by developing countries if they can successfully close the domestic savings-investment gap with foreign resources. According to these economists, there will be massive need for external resources to flow to meet the investment needs that the domestic savings failed to meet. Following the argument of Chenery and Strout (1966), growth is a function of level of investment, and investment is inturn dependent on the domestic savings, but in a case where these savings are insufficient to match investment needs, the country has every reason to seek for external funds to close that gap. This theory is crucial to this study and will help in the examination of external debt effect on the living standards of Nigerians and Botswanans, as well as argue whether external borrowings have been effectively utilized in these economies or not.

David Ricardo's theory of public debt: David Ricardo propounded this theory in 1819 and affirmed that the ordinary and extraordinary government spending were channeled towards paying unproductive labourers. Ricardo's letter to McCulloch in 1816 hypothesized that public outlay is not an economical undertaking the state embarks upon. Ricardo's theory of public debt was on the basis that government debt rose as a result of their wastefulness of public funds relevant for growth (Precious, 2015). This theory opined that public expenditure financing be utilized on resources from the abundant possessions of the public (Precious, 2015). The reason behind this is that irrespective of where funds are realized (that is, through tax or loans) to sustain the economy, it won't matter to the economy. Therefore, where loans are required, it is not clear whether they are efficiently used. The poor utilization of such loans affects growth negatively; however, if adequately utilized, it will boost the economy (Okoye, Modebe & Evbuonwan, 2013).

2.2. Empirical literature survey

Economic growth is stimulated when savings and investment increases (Hunt, 2007). Therefore, when any sort of gap begins to creep in between domestic savings and investments as well as foreign exchange, the need for external financing arises (Olanrenwaju, Abubakar & John, 2015). The dual gap theory justifies the choice of external financing over domestic resources as a means of ensuring sustainable development. It is necessary to note that external borrowings do not necessarily metamorphose into debt burden. The guiding principle to follow when borrowing abroad is that the loans should be invested where it could yield higher marginal returns (Onakoya & Ogunade, 2017). But the debt becomes a burden if its marginal returns fall below the interest rate.

World Bank (2020) reported that Sub-Saharan African countries recorded increases in external debt overseas in the past, but more significantly and faster in 2019, with South Africa having the largest share of 188.1 billion US dollars, followed from a distance by Nigeria with around 54.8 billion US dollars. These mind-boggling figures has caused justifiable panic among policymakers across the regions and led them into more in-depth research and policy recommendations. This led Udeh, Ugwu and Onwuka (2016) to study Nigeria's economic growth and external debt by employing the Ordinary least Square (OLS) technique and Error Correction Model (ECM) between 1980 and 2013. Short run results reported external debt to be favourable to GDP but unfavourable in the long run. Servicing of external debt was also found to inversely impact GDP; this is due to the instabilities in the macroeconomic environment (interest rate, exchange rate and inflation) caused by excessive borrowings which give rise to debt overhang (when accumulated debt exceeds the threshold level of a country's payment capacity). Ada, Chigozie and Godwin (2016) also explored foreign loans and economic growth linkage in Nigeria and found a negative significant connection between them. ARDL was employed across 1970 – 2013 in this study. Ben et. al.

(2020) assessed the effects of intergenerational debt burden in Nigeria. They employed the ARDL model across 2006 and 2018, and their findings revealed that debts from multilateral and bilateral creditors had strong inverse effects on the economy due to unproductive use of such loans while debts from other creditors is favourable and strongly related with growth. Dal and Phillip (2020) studied internal and foreign debt in the Nigerian economy covering 1980 – 2016, and the Vector Error Correction Model (VECM) revealed that internal loans are strongly related with growth in the long run while foreign loans exhibited a statistically insignificant inverse relationship.

Growth-debt nexus was also studied in Zimbabwe by Wellington, Frank and Joseph (2015) using OLS model from 1980 – 2013 with the results suggesting an opposing bond between public debt and growth. Benli (2020) studied the linkage between external debt and growth in 35 emerging markets between 1987 and 2017. Using Cross-sectionally augmented ARDL and cross-sectional augmented distributed lag, the findings revealed a long run inverse link between the variables. Furthermore, Kasidi and Said (2013) assessed the role of foreign loans on Tanzania's economic growth between 1990 and 2010. According to their findings, while external debt was positively and strongly related to GDP growth rate, debt servicing had a significantly inverse relationship. Chilombo and Jiang (2020) employed an ARDL panel model for their analysis on growth and external debt linkage in 9 Southern African countries across 2000 and 2018 and found that short term and long term borrowings exerts a strong unfavourable relationship with growth, suggesting that these external funds obtained are not channeled into profit-yielding economic activities like investment, capital formation and technology. Ayadi and Ayadi(2008) compared the total stock of external debt of South Africa and Nigeria. By deploying the Ordinary Least Square (OLS) and Generalized Least Squares (GLS) among other tests, their result confirmed anopposing relationship between the variables for both countries and further explained that South Africa were better-off in terms of the application of such loans in growth promotion. Ayadi and Ayadi (2008) supported this result when they reported an unfriendly relationship between public debt (and its servicing requirements) and growth forthe two countries in their comparative study. Wellington, Frank and Joseph (2015) analysed the growth-debt link in Zimbabwe across 1980 and 2013 using OLS model and their results insinuated a negative relationship possibly due to poor investment projects. Fisayo and Opeoluwa(2020) utilized both panel fully modified least squares technique and panel dynamic least squares to investigate the long run connection between public and domestic investment in 13 West African countries between 1986 – 2018. They reported little significance of public debt on investments. Their study also suggests that investment-generation policies would require public borrowings but the fears were that the loans may not be effective due to high level of mismanagement of public funds.

Growing public debt is not prevalent in Africa alone. Countries like Sri Lanka in the past also suffered the negative impact of high debt profiles. According to Maitra (2019), public debt depressed the income and stimulated the price level of the Sri Lankan economy when he explored theeffect of foreignaid and foreign debt for the post-reform period. In the long run and short run, foreign debt and aid was also found to have raised interest rates. Presbitero (2012) investigated the link between growth and public debt in some low-and middle-income countries between 1990 and 2007. This study reported anunfavourable impact of public debt on growth until it clocks 90% of GDP where the effect of the debt on growth appears insignificant. Fseifes and Warrad (2020) studied the effect of internal and foreigndebt on Jordan's economy. They employed the FMOLS method, and their results suggested that both forms of borrowings negatively associates with growth. Their study suggesteda reduction in public debt incurementand deficit budget in the long run through the implementation of strictpenalties and fiscal disciplines that will minimize the potential economic growth decline. In corroboration with most studies, Ahamad and Islam (2020) also reported a negative nexus between growth and public debt in Bangladesh by adopting ARDL Bound testing approach. They argued that these funds were not utilized in productive economic avenues. Yeasmin and Chowdhury (2014) supported this result when they examined the growth-debt link in Bangladesh. A comparative analysis of external debt and growth link by Pattillo, Poirson and Ricci (2011) involving 24 developing countries suggested a negative relationship. Their findings led to the recommendation that developing countries should



effectively use these external debts because of its ability to influence investment. This result is in corroboration with the work (Shabbir, 2012). She studied economic growth and debt linkage in 70 emerging markets between 1976 and 2011, and her results argue that external debt clamps down growth and also decreases the level of private fixed capital formation. IMF in their working paper sampled data of 55 low-income countries over the period of 1970 to 1999 and reported an inverse connection between growth and external debt, reporting that in highly indebted countries, growth increased as external debt shrank. Sen et al. (2007) studied the linkage between growth and debt in Korea, Indonesia, Brazil, Philippines, Argentina, Columbia, Thailand, China, India, Mexico and Venezuela. They confirmed a negative relationship in Asia and Latin American countries. By sampling European Union (EU) Member States over the period of 2000 to 2010, Misztal (2010) pointed out that a percentage rise in public debt stock brought about an average decline of GDP of about 0.3% while GDP growth of 1% reduced 0.4% of public debt. Manmohan and Jaejoon (2010) also confirmed an inverse link between economic growth and debt in a panel of 38 developed and developing economies between 1970 and 2007. However, the effect is reportedly more intense in developing nations and impotent in the industrialized nations.

Contrary to these negative findings, other literatures confirmed external borrowings in some countries influenced economic growth in a positive direction. Korkmaz (2015), in her analysis on debt-growth relationship in Turkey using Vector Autoregression (VAR) method between the period of 2003:01 – 2014:03, reported that external borrowing in that period influenced growth positively. VAR estimates were deployed by Bakar and Hassan (2008), and their findings confirmed a positive relationship connecting economic growth and total external debts. Empirically, Sulaiman and Azeez (2012) studied the link ensuing between external debt stock and growth in Nigeria with results revealing that external borrowing is a blessing to the Nigerian Economy. Similarly, Ezema, Nwekwo and Agbaji (2018) in their analysis on debt-growth linkage opined that debt and economic growth in Nigeria are positively related. Their findings also suggested that Nigeria's external debt is a key player for economic prosperity, but the accumulation of the debt service has increased the level of debt burden in the 1990s and the early part of 2016. Safdari and Mehrizi (2011) supported these findings when they explored the external debt effect on Iran's economic growth between 1974 and 2007. They found external debt and public investments to be growth-enhancing with Ordinary Least Squares (OLS) as their methodological approach. In Pakistani economy, Zaman and Arslan (2014) also assessed the effect of external debt on growth. The scope of their study was between 1972 and 2010. And the ordinary least square (OLS) method was utilized. Their findings suggest a positive link between the variables. Comparatively, the connection ensuing between the stock of public debt and economic growth in six ASEAN countries were examined across 1995 and 2015 by Pharm (2018) using the Generalised Method of Moments (GMM) estimation. The finding suggested a strong and positive relationship between variables. Saifuddin (2016) empirically examined the link connecting investment, public debt and economic growth in Bangladesh. His findings support the assertion of other authors (Abbas Christensen, 2011; Sasaki, 2009) that suggested a positive link between the variables. However, he added that this effect is through its positive influence on investment.

Since every economy is after long term development, they (especially the third world nations) are justifiably expected to borrow. However, these loans acquired are meant to cover government's budget deficit that would birth economic growth and development (Dal & Phillip, 2020). For instance, Egbetunde (2012) analysed the causal nexus arising from the interaction between debt stock and economic growth in Nigeria. His long run result proposed a favourable linkage between public borrowings and growth suggesting that if these loans are judiciously utilized, there would be growth and development eventually. Although the cleverness to ensure a relative positive connection ensuing between debt stock and economic growth rests on the shoulders of the government to maintain low budget deficit, low debt-to-GDP ratio, and channeling such debts mainly into capital ventures as suggested by some literatures. If this is not properly managed, the government will be threatened by a scenario where public debt will inhibit growth when the debt rises over time (Dal & Phillip, 2020). In lieu of this, Pegkas (2018) explored the break effects between Greek government's debt and its economic growth after the financial crisis. His study

opined that while the government's debt rose beyond the year 2000, its effect on economic growth dropped drastically and eventually turning the growth impact negative.

On the impact of sectoral performance on external debt and sectoral performance, Olu-Coris (2008) reported a negative relationship in Botswanan service sector. Ramakrishna (2012) on the other hand explored the linkage and his finding also supported a negative nexus. Warner (2012), Brown, Vincent, Emmanuel and Etin (2014) and Jain, Nair and Jain (2015) all investigated the impacts of external debt stock on the agricultural sector across several countries. They utilized several econometric models (like ARDL, OLS model and many more) and their findings reported a negative relationship. Udo (2014) explored the connection between external debt and the industrial sector in developing countries. His findings reported an inverse relationship between the variables. From previous studies, there is evidence of unresolved conclusions on public debt's impact on economic growth. Hence, it is against this background that our study embarks on a comparative analysis between Nigeria and Botswana to shed more light on their debt-growth nexus and its impact on sectoral performance.

3. PROBLEM STATEMENT

The problem of foreign loans in Africa has raised several of concerns in the past and recent years. Since the beginning of the 1980s, Nigeria has been bedeviled by devastating external debt burden that tends to sabotage every developmental stride (Edo, 2002). Flood (1993), World Bank (1993) and Edo (2002) describes this problem as severe and disturbing. In fact, it has been likened to as a debt trap, with escape almost inevitable (Cheru, 1989 cited in Edo, 2002). This is seen from the continuous increase in external debt-to-GDP ratio as shown in figure 1 above. A lot of efforts have been geared towards addressing the problem of heavy external debt burden in Nigeria and Africa in general. Part of the global efforts were proposals by Baker Plan (1985), Paris Club Plan (1987), Brady Plan (1989), Toronto Summit and the African Development Bank Plan. These attempts put forward in solving this problem has scarcely yielded any meaningful result. External debt burden still remains a challenge in Nigeria and Botswana though with less external debt to GDP ratio compared to Nigeria. As part of effort to address this problem, studies have opined that appropriate management and investment of external debt in critical sectors of the economy could support growth (Ehikioya et al., 2020; Shayanewako, 2013). As previously noted that diversion of funds to personal purse and to less productive ventures are evident in most heavily indebted African countries, including Nigeria (Mutiu, Abdulfatai & Rasheed, 2020).

Though Botswana is not yet burdened with debt. However, the recent trends point to the fact that this may not be the case forever as the indicators are pointing to some level of accumulation of external debt (Nair, Narayana & Modisaemang, 2015). As a matter of fact, many countries started like that and ended up in deep debts later. Before the financial and economic crisis of 2008, the country had surplus budgets for most of the years and accumulated huge foreign reserves, keeping its debt levels low and constant. Between 2008/09, her public debt rose from 6.7% of GDP and in 2009/10 to 16.1% of GDP (Nair et al., 2015). Even at that, debt sustainability does not seem to be of severe alarm, at least in the short run in Botswana (Nair et al., 2015). Nevertheless, it may surface as a matter of great concern in the future given the weak foundations of the economy such as heavy dependence on diamond which is on the verge of depletion in a decade or two, insufficient diversification of the economy, increasing dependence on imports for basic food in the context of a stagnant and decimated agricultural sector and the ill performing livestock sector which is another foreign exchange earner in the country.

Hence, channeling the external debt to critical sectors of the economy would assist indebted countries (such as Nigeria and Botswana) to diversify away from resource-based economy to manufacturing and service sector and reduce these two countries' exposure to external shocks. This study therefore examines the impact external debt has in determining the performance of some sectors in Botswana and Nigeria.

4. RESEARCH METHODOLOGY OR METHODS

In various theoretical models under perfect capital mobility assumption, reasonable levels of current debt inflows are expected to have positive effect on growth (Pattillo et al., 2011). But why is there lower growth when there are accumulated large debt stock? This could be for any of the two reasons. First, political economy considerations may birth over-borrowing and low growth; which is often accompanied by capital flight, if the cost of high taxes to service the debt are not internalized (Tornell & Velasco, 1992). Second, debt overhang posits that if there is any likelihood that debt in the future will be larger than the country's repayment ability, then expected debt service will be an increasing function of the country's output level. This suggests that the returns on investing in the country face a high marginal tax by external creditors. This discourages new domestic and foreign investors.

There is no well-defined theoretical framework that sheds light on the linkage between external debt and sectoral performance. But some empirical works on external debt used the dual gap theory as a platform to investigate its impact on economic growth. The dual gap theory recognizes the role of savings and investment on economic growth. According to Keghter, Chimezie, Chidozie and Ogochukwu (2021), the theory asserts that there is a required level of investment and savings to enhance economic growth. This study also incorporates the dual gap theory and estimates the quantitative impact of external debt on sectoral performance with a model which control for the endogeneity of investment, debt and other explanatory variables in the long run.

Therefore, to enable us test the possibility of a long run association between the regressand and regressors, we deploy Pesaran and Shin's (1999) Autoregressive Distributed Lag (ARDL) model developed by Pesaran *et al.* (2001). The justification for the adoption of ARDL model is that it captures the long run dynamics without losing the short run dynamics. Secondly, even with a small sample size, the results of the estimated long run obtained in the short run are efficient and unbiased. The importance of this is that it avoids the problems associated with serial correlation and endogeneity. In addition, ARDL is an appropriate econometric tool regardless of where the variables in question are integrated, that is, at I(0) or I(1) but it should not be integrated at an order higher than one.

4.1. Model Specifications

This model investigates the connection between the sectoral performance and external debt in Nigeria and Botswana, this is stated as follows;

$$Y_t = \alpha_0 + \alpha_1 LED_t + \alpha_2 LDS_t + \alpha_3 LGCF_t + \alpha_4 FDI_t + Y_{t-1} + \mu_t \quad (1)$$

where;

Y = vector of dependent variables, that is services, agricultural and industrial sectors.

LED = Log of external debt

LDS = Log of external debt service

LGCF = Log of gross capital formation

FDI = Foreign Direct Investment

μ = White noise

L = Natural logarithm

The natural logarithm of all the variables are taken, with the exception of foreign direct investment. This is because it contains some negative values. And it is impossible to take the natural logarithm of numbers less than zero.

According to Pesaran *et al.* (2001), an unrestricted Error Correction Model (ECM) is coined through the bound test. The ECM integrates the shortrun changes with the longrun equilibrium without losing any longrun information (Oliver *et al.*, 2020). We can now specify equation (2) using ARDL-ECM framework thus;

$$\Delta Y_t = \alpha_0 + \eta_1 Y_{t-1} + \eta_2 LED_{t-1} + \eta_3 LDS_{t-1} + \eta_4 LGCF_{t-1} + \eta_5 FDI_{t-1} + \sum_{i=1}^p \kappa_i \Delta Y_{t-1} + \sum_{i=1}^p \lambda_i \Delta LED_{t-1} + \sum_{i=1}^p \phi_i \Delta LDS_{t-1} + \sum_{i=1}^p \delta_i \Delta LGCF_{t-1} + \sum_{i=1}^p \varpi_i \Delta FDI_{t-1} + \mu_t \dots \dots \dots (2)$$

where: Δ is the differenced operator; $\eta_1, \eta_2, \eta_3, \eta_4, \eta_5$ are the longrun estimates; $\kappa_i, \lambda_i, \phi_i, \delta_i$ and ϖ_i are short-run estimates; and μ_t is error term in period t.

The ARDL model is capable of automatically choosing its most suitable lag length. However, the appropriate calculation of the f-statistic depends on the suitable lag order selection of the series in the model. In conducting ARDL bounds testing, we must pre-test for long-run association by testing for cointegration via f-test where the null hypothesis of no cointegrating relationship among the variables in equation 2 (i.e. $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$) are compared against the alternative hypothesis of cointegrating relationship, that is, $H_1: H_0: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$. This is to decide whether or not the null hypothesis should be rejected. The decision relies on the two asymptotic critical values (upper and lower critical values). Therefore, if the f-stat > I1 (upper critical value), there is cointegrating relationship. For this reason, we do not accept H_0 of no long-run association but conclude that a long-run association exists among the variables.

Now that there is a cointegrating relationship, we proceed to estimate the long-run model and deploy the unrestricted Error Correction Model (ECM) to ascertain the short-run dynamics, thus;

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^p \kappa_i \Delta Y_{t-1} + \sum_{i=1}^p \lambda_i \Delta LED_{t-1} + \sum_{i=1}^p \phi_i \Delta LDS_{t-1} + \sum_{i=1}^p \delta_i \Delta LGCF_{t-1} + \sum_{i=1}^p \varpi_i \Delta FDI_{t-1} + \psi ECM_{t-1} + \mu_t \dots \dots \dots (3)$$

Where

- ECM = the error correction model emanating from the tested equilibrium relationship in the long-run
- Ψ = the coefficient signifying the adjustment speed.
- μ_t = error term or white noise

5. DATA ANALYSIS AND DISCUSSIONS

Table 1: Data

Variables	Source
ED=External debt stocks, total (DOD, current US\$)	World Development Indicators (WDI)
EDS=Debt service on external debt, total (TDS, current US\$)	World Development Indicators (WDI)
GCF=Gross capital formation (constant 2010 US\$)	World Development Indicators (WDI)
FDI=Foreign direct investment, net inflows (% of GDP)	World Development Indicators (WDI)
SER=Services, value added (constant 2010 US\$)	World Development Indicators (WDI)
AGR=Agriculture, forestry, and fishing, value added (constant 2010 US\$)	World Development Indicators (WDI)
IND=Industry (including construction), value added (constant 2010 US\$)	World Development Indicators (WDI)

Unit root analysis

To avoid the trap of erroneous inference from non-stationary regression, Phillips-Peron test is deployed to ascertain the stationarity of the variables. The results in Nigeria established that all the variables are stationary. While LDS and FDI are stationary at levels, LSER, LAGR, LIND, LED and LGCF are stationary at first difference. As observed in Botswana, five variables (LSER, LAGR, LIND, LDS and FDI) are stationary at levels, while two (LED and LGCF) are stationary at first difference. Thus, we can proceed with the Bound test.

Table 2: Phillips-Perron unit root test

Variables	Nigeria			Botswana		
	P-P t-stat	5% critical value	Order of integration	P-P test statistics	5% critical value	Order of integration
LSER	-2.944172	-2.943427	I(1)	-3.144146	-2.941145	I(0)
LAGR	-5.906347	-2.943427	I(1)	-5.529966	-2.941145	I(0)
LIND	-5.282434	-2.943427	I(1)	-5.529963	-2.941145	I(0)
LED	-4.051548	-2.943427	I(1)	-5.697638	-2.943427	I(1)
LDS	-3.744413	-2.941145	I(0)	-3.214377	-2.941145	I(0)
LGCF	-4.821283	-2.943427	I(1)	-10.05434	-2.943427	I(1)
FDI	-3.855860	-2.941145	I(0)	-4.042356	-2.941145	I(0)

Source: Authors' Computation.

Bound test cointegration result

The bound test result for Nigeria presented below shows a long-run association in the service sector at 1%, 5% and 10% levels of significance. This is illustrated with the f-stat being greater than all three upper bounds. In the agricultural sector, only at 10% significance levels, we have f-stat greater than test-statistic. This is an indication of another long-run relationship since f-stat is greater than at least one upper bound. The industrial sector shows the existence of long-run relationship at all levels (that is, 1%, 5% and 10%) of significance.

Table 3: ARDL bounds co-integration test result for Nigeria

Sectors	Service			Agricultural			Industrial		
	I0	I1	f-stat	I0	I1	f-stat	I0	I1	f-stat
Significance									
1%	4.4	5.72	13.21544	4.4	5.72	4.658456	3.74	5.06	3.645590
5%	3.47	4.57	13.21544	3.47	4.57	4.658456	2.86	4.01	3.645590
10%	3.03	4.06	13.21544	3.03	4.06	4.658456	2.45	3.52	3.645590

Source: Authors' Computation

In Botswana as seen in table 4 below, the service and industrial sectors show a long-run relationship at 1%, 5% and 10% significant levels. This is also evident in the agricultural but only at 10% level of significance with f-stat having a greater value than the lower and upper bounds. The long-run association as seen in both countries sets the stage to proceed with the ARDL model.

Table 4: ARDL bounds co-integration test result for Botswana

Sectors	Service			Agricultural			Industrial		
	I0	I1	f-stat	I0	I1	f-stat	I0	I1	f-stat
Significance									
1%	3.07	4.44	24.74174	3.74	5.06	3.850631	4.4	5.72	7.358761
5%	2.26	3.48	24.74174	2.86	4.01	3.850631	3.47	4.57	7.358761
10%	1.9	3.01	24.74174	2.45	3.52	3.850631	3.03	4.06	7.358761

Source: Authors' Computation

Short-run (error correction) result

Table 5 reports the short-run results of both countries in all three sectors of the economies. From the results of the model, the error correction parameter for both countries is negative and it is statistically significant at 5% level in all the sectors considered. This validates the established assertion of long-run connection between the regressand and the regressors. The error correction term with coefficient -1.184466 for Nigeria and -0.077274 for Botswana in the agricultural sector shows a long-run association between the variables. These deviations of the short-run dynamics to its long-run equilibrium are corrected by the error correction model. This is to say that there is disequilibrium in growth which is adjusted in the short-run. The adjustment is considered to be in the right direction to restore equilibrium in the sectorial growth in the long-run. The magnitude of this correction in Nigeria and Botswana is 1.184466 and 0.077274 respectively. This is to say that the respective speed of adjustment of about 118% for Nigeria is relatively high and 7.7% for Botswana is relatively low.

Similarly, the error correction model for the service sector is negative and significant in the two countries. However, this sector records a very low speed of adjustments of 19% for Nigeria and 8.2% for Botswana. The industrial sector reflects a similar result with the service sector as both countries exhibit a low speed of adjustment with Nigeria at 43% and Botswana at 39%.

Table 5: ARDL Cointegrating and Long Run Form

Variables	Service sector		Agricultural sector		Industrial sector	
	Nigeria (1, 0, 0, 0, 0)	Botswana (1, 0, 0, 0, 0)	Nigeria (4, 4, 4, 3, 4)	Botswana (1, 0, 0, 0, 0)	Nigeria (2, 5, 2, 5, 0)	Botswana (1, 0, 0, 0, 0)
Short-run coefficients						
D(LED)	-0.049787**	-0.030118	-0.033140	-0.053153*	0.025626	-0.096452**
D(LDS)	-0.008818	-0.045285**	-0.023063	0.044356	0.032012*	0.054853**
D(LGCF)	-0.022461	0.019949	0.212247	0.102095**	0.094216*	0.074595
D(FDI)	0.008620	0.005538*	0.013662	0.006251	-0.015114*	0.007237
ECM(-1)	-0.199565**	-0.082128*	-1.184466**	-0.077274**	-0.434194**	-0.392970**
Long-run coefficients						
LED	-0.249477**	0.366722	-0.218071**	-0.185591*	-0.143687*	-0.245444**
LDS	-0.044185	0.551395	0.044867	0.154877	-0.080528	0.139585**
LGCF	-0.112551	0.242900	-0.213973	0.356480	-0.418302	0.189825**
FDI	0.043195	0.067434	0.077533**	0.021828	-0.034809	0.018416

** and * indicates significance at 5% and 10% level respectively

Source: Authors' computation

Long-run impact

Our findings in the service sector for both countries are mixed. While external debt has a negative impact in Nigeria and the finding corroborate with Olu-Coris (2008), the external debt impact is though negative but statistically insignificant in Botswana and the finding is in tandem with Ramakrishna (2012) where found external debt to positively affect the service sector of the Ethiopian economy. This implies that 1% increase in external debt reduces the service sector performance by 24%, while the effect of a percentage rise in external debt in Botswana is muted. This suggest that in countries with poor institutions such as Sub-Saharan African countries, high external debt stock is detrimental to service sector than low external debt stock. The agricultural sector on the other hand for both countries shows similar outcomes. External debt inversely relates with agricultural productivity in Nigeria and Botswana, though the adverse effect is more pronounced in Nigeria than Botswana. This result corroborates with Warner (2012), Brown, Vincent, Emmanuel and Etin (2014) and Jain, Nair and Jain (2015) who all suggested that total debt stock has detrimental impacts on the agricultural sector of less developed countries. The findings shows that the magnitude of the negative impact which is 21% at 5% level of significant in Nigeria is greater than Botswan which is 18% at 10% level of significant. This findings complement our earlier assertion that high debt

profile in a countries with poor institution such as SSA, loans are not optimally utilized. Focusing on industrial sector, external debt still accounts for the negative growth of the industrial sector from our results. More disturbing is that the effects are strong enough to significantly distort the growth of the sector. The result indicate that 1% increase in external debt decreases industrial sector performance by 14% in Nigeria and 24% in Botswana at 10% and 5% level of significant, respectively. The finding is consistent with previous study like Udo (2014). The level of foreign involvements in the industrial sector in developing economies is usually substantial and as such, high debt profile in the developing countries may have less impact on the industrial sector.

Debt service in this study has a negative relationship with the service sector in the Nigerian economy. However, the impact is weak. In Botswana on the other hand, the relationship is positive but insignificant. The story is not the same for Nigeria in the agricultural sector as the result is positive but not strong enough to significantly affect the sector. Adetula (2009) gave a similar result after carefully investigating West African labour migrants and national security in Nigeria. The relationship is also insignificant and positive in Botswana. The result in the industrial sector is negative but inconsequential in Nigeria. On the contrary, it is positive and significant for Botswana. Gross capital formation is reported to exhibit an insignificant inverse relationship for Nigeria, in all three sectors of the economy. In Botswana on the other hand, the relationship is positive in all the sectors. But only significant in the industrial sector. Jain et al. (2015) asserted that India's agricultural sector and FDI are positively related. This is applicable to both Nigeria and Botswana in our analysis, as FDI reports a positive relationship with the agricultural sector. FDI has a weak positive relationship in the Botswanan agricultural sector, whereas exerting a strong and positive link in Nigeria. In the service sector, the impact on both countries appear positive, minimal. And its impact in the industrial sector is weak in both countries but negative in Nigeria and positive in Botswana.

6. RESEARCH IMPLICATIONS

The paper investigated the effect of external debt on two economies, the first (Nigeria) with a high debt profile and the second (Botswana) with a relatively low public debt profile. The study dissected the roles of external debt stock on three sectors (service, agricultural and industrial) of the economy where researchers have given less attention to. The core variables in the model are outcomes of the services (LSER), agricultural (LAGR), industrial (LIND) sectors and external debt % GNI (LED). Log of Gross capital formation (LGCF), Foreign Direct Investment (LFDI) and debt service (LDS) are the control variables. The study deployed the ARDL technique to account for the short-run changes and long-run dynamics in the model. The rationale behind the choice of this model was deemed compulsory because of its suitability in analyzing the variables with their different levels of stationarity.

The long run result reveal that the stock of external debt strongly affects the output of the three sectors in Nigeria negatively. This is not entirely the same for Botswana, since it's only the service sector that shows a weak positive relationship. The control variables in the analysis significantly affects the performance of some of these sectors. Debt service and gross capital formation significantly impacts the industrial sector of Botswana positively, while foreign direct investment positively influences the Nigerian Agricultural sector. It is imperative to note that even though Nigeria has a much higher debt profile than Botswana, the impacts of these debts to the various sectors of the economy are mostly negative and significant. Which suggests that volume of external debt does not ensure growth, rather as pointed by Daud (2020), the impact of the stock of external debt on growth is dependent on the quality of the country's institutions. This is to say that proper management of these public loans is key to the development of these sectors.

This study's main objective is to investigate the sectoral performance of two economies with different rates of external debt stock. It is because of the above results that we recommend that expenditure of external loans for the productivity of all three sectors need monitoring to guarantee appropriate channeling into productive use for the benefit of the economies. Secondly, more empirical studies on the same subject on different sectors should be



encouraged so as to identify where these economies could take advantage. Finally, other methods of financing these sectors be explored to make a successful investment decision.

7. CONTRIBUTIONS TO SCIENTIFIC COMMUNITY AND FUTURE RESEARCH

This research has added to the stock of knowledge on external debt and growth nexus. It specifically compares the sectoral performance with borrowed funds between a highly indebted country (Nigeria) and an economy with low debt stock (Botswana). This will also help researchers and policy makers to propose policies that will improve the performances of the sectors that can boost economic growth.

8. CONCLUSION

In conclusion, external borrowing may be an option to finance the sectoral performance of the economy. This would be possible if these loans are appropriately channeled for development. However, loan acquisition should not be the only source of revenue for sectoral development.

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