ISSN:1533-9211
SEYBOLD REPORT
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EXTERNAL DEBT AND ECONOMIC GROWTH IN SUB-SAHARAN AFRICA: EXPLORING THE IMPACT OF EXTERNAL DEBT SHOCK AND THE INTERACTIVE EFFECT OF INSTITUTIONAL QUALITY

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ISSN:1533-9211
SEYBOLD REPORT
www.seybold-report.com

ISSN: 1533 - 9211

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KEYWORDS:

External Debts, Economic Growth, External Debt Shocks, Institutional Quality, ARDL model, Impulse Response Function

Received: 12 September 2023
Accepted: 27 September 2023
Published: 05 October 2023

TO CITE THIS ARTICLE:

DINKA'A, A. Y., IBE, G. I., KESUH , J. T., LUM, N. I., TEMBENG, A. V., & ONWUMERE, J. U. J. (2025). External Debt And Economic Growth In Sub-Saharan Africa: Exploring The Impact Of External Debt Shock And The Interactive Effect Of Institutional Quality. *Seybold Report Journal*, *18*(08), 30-53. DOI:10-5110-77-1023

Abstract

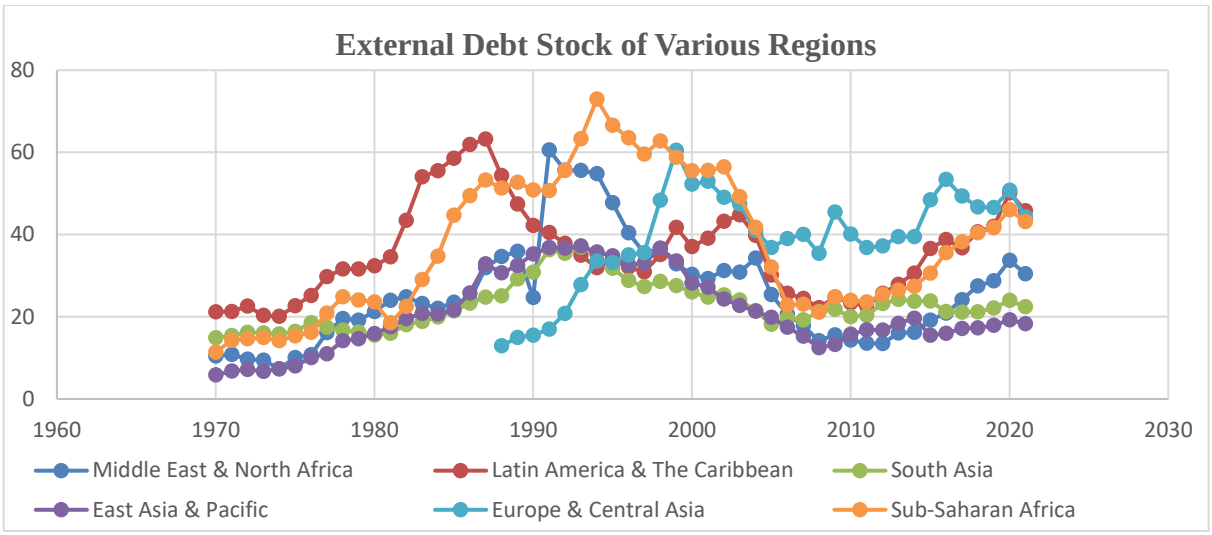
External debt remains a severe issue for many Sub-Saharan African (SSA) countries. This study investigates external debt's effect on the economic growth of SSA from 1991 to 2021. Panel data of 20 SSA countries obtained from the World Bank database was analysed using the panel Autoregressive Distributed Lag (ARDL) model and the Vector Error Correction (VEC) Impulse Response Function (IRF). The findings revealed that external debt negatively and significantly affects economic growth in the long run. It also reveals a significantly negative impact of external debt service payment. However, the moderating role of institutional quality is positively significant, with substantial institutional quality mitigating the negative effect of external debt on economic growth. External debt shock's effect in the short run is positive and negative but insignificant in the long run. The study recommends implementing prudent debt management strategies, prioritising productive investments, diversifying revenue sources, and building more vital institutions.

Contribution/Originality: This study stands unique by investigating the interactive effect of external debt stock and institutional quality on economic growth and the impact of external debt shock. This study sheds light on the nexus by blending the panel ARDL model and the VEC Impulse Response Function (IRF).

1. Introduction

External debt's effect on economic growth remains an issue of great concern to developing countries due to inadequate domestic resource mobilisation, low savings, low per capita income, large fiscal deficits, growing current account imbalances and high savings-investment gaps in these countries (Tarawalie & Jalloh, 2021). These countries are plagued with budget deficits resulting from decreasing revenues and increasing expenditures (Hameed *et al*., 2021). Governments can resolve budget deficit problems through tax increases, currency printing and borrowing internally or externally (Hameed *et al.*, 2021). If used productively, external debt will increase investment and accelerate economic growth. According to Chukwujekwu *et al*. (2018), debtor countries should be able to make prudent financial decisions with the borrowed funds, especially in funding development initiatives such as roads, power plants and other capital projects. External debt can only be considered productive if the rate of return exceeds the debt servicing cost. External debt will hinder economic growth when used for current consumption rather than capital investment (Odubuasi & Onuora, 2021).

There is great concern about whether external debt enhances or prohibits economic growth in Sub-Sahara Africa (SSA). This concern is because of the high default rate, slow economic growth and high poverty levels linked to large external debt stock in the region (Ndubuisi, 2019). SSA's external debt shock began when the countries gained independence as they mostly rely on external borrowing to stimulate Economic growth. When the global debt crisis began in the 1980s, SSA countries reached unsustainable levels of external debt with vast levels of accumulated debt and servicing costs began to have a significant impact on countries. The SSA nations have encountered various macroeconomic hurdles in the global arena. These encompass issues like inadequate exchange rate management, declining competitiveness in global trade, inefficient resource utilisation, political instability, and governance shortcomings (Zhang, Dawood & Asfour, 2020). The effect of the high debt burden on SSA countries became negative. Economic growth slowed due to rising interest rates, resistance to foreign investment, decreased domestic output, lower export revenues and the inability to import modern technological equipment (Zhang, Dawood & Asfour, 2020). Figure 1 shows the external debt stock of various regions in the world according to data from International Debt Statistics (IDS) of the World Bank (2022).



Source: Authors (2023)

Figure 1. External debt stocks (%of GNI) of various regions from 1970 to 2021. High-income countries are excluded except in South Asia.

Figure 1 shows that SSA has high external debt stocks (%GNI). According to IDS, World Bank (2022), the average of regional external debt stocks (% of GNI) from 1970 to 2021 stands at 27.78%, 35.86%, 22.76%, 21.01%, 39.03% and 37.32% for the Middle East & North Africa, Latin America & The Caribbean, South Asia, East Asia & Pacific, Europe & Central Asia and Sub-Saharan Africa respectively. SSA is the second region in terms of rate of indebtedness. The massive debt that SSA accrued hindered their economies' progress. Creditor nations granted debt relief to Heavily Indebted Poor Countries (HIPC) in 1996 and 1999 to eliminate the adverse effects of debt burden on economic growth, such as debt overhang. Most SSA countries suffered debt overhang as their total external debt exceeded their repayment capacity. Cancelling external debt was expected to boost economic growth, investment, and possibly the value of foreign exchange in indebted countries (Ekperiware & Oladeji, 2012). As cited by Hassan and Meyer (2020), the International Monetary Fund (IMF) and the World Bank launched the HIPC programme in 1996, which was the initial inclusive determination to reduce unjustifiable liability and support the sustainable departure from debt reliance among the developing countries in the world. As part of this endeavour, Western leaders consented to wipe off significant amounts of the external debt owed by many countries, including those of SSA. However, due to recent uncontrolled borrowing, the collapse of local currencies, and the price of commodities, collections of external debts have been rising in most SSA nations (World Bank, 2022).

Policymakers, scholars, the general public, and experts have paid close attention to the debt crises and

economic slumps in the early 1980s and the 1990s, with high levels of external debt and capital outflows from SSA (Benli, 2020). After the 2008 financial crisis, the rising foreign debt burden driven by hovering product costs, quantitative stretching, and lower interest rates in high-income nations has reignited discussions and worries about the sustainability of external debts. Most of SSA's foreign debt was acquired for political purposes, hiding under development goals. The accumulation of unsustainable levels of debt as a result of the misuse of resources has been a significant barrier to growth in SSA (Musibau *et al.*, 2018).

Previous research has focused on the direct relationship between external debt and economic growth (Ayadi & Ayadi, 2008; Pattillo et al., 2004). In some studies, SSA was combined with other regions of the world, therefore failing to present the actual situation of SSA (Senadza et al., 2017). Many other African studies did not focus on SSA (Nounamo *et al.*, 2021; Ehikioya *et al.*, 2020). However, few studies focused on SSA used different approaches and highly disagreed in opinion (Odubuasi & Onuora, 2021; Hassan & Meyer, 2021). Other studies, including Hassan and Meyer (2020) and Forson (2019), emphasised the non-linear effect of external debt on growth and conducted a threshold analysis. The effect of external debt shocks on economic growth has not been adequately exploited, as very few studies have focused on that (Dey & Tareque, 2019; Manasseh *et al.*, 2022).

Additionally, very few studies like that of Sandow *et al.* (2022) and Manasseh *et al.* (2022) have considered the role of institutional quality. However, as far as the interactive impact of external debt stock and institutional quality on economic progress is concerned, much is yet to be done. Manasseh *et al.* (2022) interacted with governance, external debt and debt volatility using the dynamic system generalised method of moments. This study addresses this gap by empirically investigating the effect of external debt on the economic growth of SSA countries while emphasising the impact of external debt shocks and institutional quality. Also, it examines the interactive effect of external debt and institutional quality. By blending the autoregressive distributed lag (ARDL) model and the vector error correction model (VECM) Impulse response function, this study comprehensively analyses these critical issues and gives valuable insights to scholars and policymakers.

2. Literature Review

2.1. Theoretical Review

Debt Overhang Hypothesis

Myers (1977) first introduced the debt overhang hypothesis, and it was made famous by the studies of Krugman (1988) and Sachs (989). According to these scholars, high debt levels lead to a high future tax burden for the private sector since governments finance their debt by taxing businesses and households. Debt overhang refers to a high external debt burden that hinders a country's economic growth (Krugman, 1988). Matandare and Tito (2018) asserted that the debt burden has a detrimental effect on capital formation, consumption, and liquidity. As an enormous segment of revenues is used to upset existing debt, which increases the debt burden, debt overhang can trap nations in a vicious downward spiral.

Ricardian Equivalence Theory

According to Ricardo (1951), taxation and borrowing contribute equally to funding public expenditures, and governments can raise money through debts and taxes. As Dawood et al. (2020) discussed, the impacts of financing government spending with current taxes and future taxes on the economy will be equal. Borrowing is equivalent to future tax because any government expenditure resulting in a deficit must be financed by an equal increase in taxes. Consumers would save the tax cut to pay for the upcoming tax rises, offsetting the effect of a tax cut financed by higher borrowing on raising aggregate demand.

The crowding-out Effects Theory (or Liquidity Constraint hypothesis)

The 'crowding out' theory, associated with Bacon and Eltis (1978), posits that as government spending expands, it can suppress or displace private spending. To finance increased expenditures, the government typically seeks additional revenue through higher taxes or borrowing funds through the issuance of Treasury securities. Elevated taxes can reduce individuals' and businesses' income and spending capacity, potentially dampening overall economic activity. Furthermore, the increased issuance of Treasury securities can push interest rates and borrowing costs higher, discouraging private borrowing and spending. This phenomenon is often attributed to government actions crowding out private-sector spending.

The crowding-out effect can have broader implications, such as diminishing a country's capacity to manage its debt effectively, leaving fewer resources available for domestic investments, as a significant portion of revenue goes toward servicing obligations (Patenio & Agustina, 2007). In essence, the 'crowding out' theory highlights how government actions to increase spending and revenue can have indirect consequences by influencing the behaviour of private individuals and firms, potentially affecting overall economic health and fiscal sustainability.

Solow Neo-Classical Growth Theory

This model proposed by Solow (1956) and Swan (1956) suggests that an economy's output (Y) is determined by technology (A), physical capital (K), and labour (L), represented by the production function as follows:

$$Y = f(A, K, L) \quad (1)$$

This model makes three significant predictions. First, increasing capital to labour leads to economic growth because more capital makes people more productive. Secondly, in economically disadvantaged countries with limited capital per capita, each capital investment generates a higher return than wealthier nations. This dynamic accelerates economic growth in less affluent nations. Third, economies eventually reach a "steady state" point where adding more capital will not generate economic growth anymore due to diminishing returns on investment. Given that external debt is borrowed to pay for expenditures in health, education, and development, it is seen as constructive and is anticipated to help drive economic growth through better access to capital, labour, and technology. This study is, therefore, anchored on this theory.

2.2. Empirical Review

The debate on external debt's impact on economic growth remains inconclusive. Various opinions in the context of SSA, African countries and out of Africa are presented below.

The effect of external debt on economic growth in SSA has been investigated by several researchers using different approaches to suggest different opinions about the relationship. Gachunga and Kuso (2018) examined the impact of external debt on economic growth in SSA from 1990 to 2016 in 38 selected SSA countries. The GMM estimation technique was used to reveal that external debt harms the economic growth of SSA countries. This view was supported by Asafo *et al.* (2019) and Manasseh *et al.* (2022), who suggested an adverse effect of external debt stock on the growth of SSA. In addition, Manasseh *et al.* (2022) also suggested the existence of a negative and significant impact of external

debt volatility on economic growth. Odubuasi and Onuora (2021) employed the OLS to reveal that net outstanding debt was deleterious to economic growth. Using the dynamic OLS estimation techniques, Shittu et al. (2018) also argued about a negative correlation between economic growth and external debt in SSA.

Some findings revealed that external debt has a non-linear effect on economic growth. The non-linear effect of external debt on economic growth in SSA countries was studied by Hassan and Meyer (2020). The study employed the Augmented Mean Group (AMG) and Common Correlated Effects Mean Group (CCEMG) estimators to reveal that external debt has a non-linear impact on economic growth in SSA countries. Hassan and Meyer (2021) revealed that public investment, private investment and total factor productivity are channels transmitting the non-linear effect of external debt on economic growth.

Some studies examined the External Debt and Economic growth nexus in Africa or other African regions without focusing on the SSA region. Sichula (2012) suggested an adverse effect of external debt on economic growth. Musibau *et al.* (2018) revealed a positive correlation between economic growth and external debt, provided debt is used productively. In their study, Nounamo *et al.* (2021) emphasised that the more democratic a country is, the more its external debt will positively affect growth. Other scholars, including Ehikioya *et al.* (2020), Epaphra and Mesiet (2021), and Tarawalie and Jalloh (2021), suggested the existence of an optimal threshold beyond which the effect of external debt becomes a barrier to economic growth. Anifowose (2016) employed the Error Correction Model (ECM) to reveal that the impact of external debt on economic growth is not the same in every country. External debt favours some nations' economic growth while hindering growth in other countries.

Others did time series analyses on external debt and economic growth nexus in specific African countries. Ndubuisi (2019) revealed that external debt negatively affects economic growth. However, Olusegun *et al.* (2020) argued that external debt affects economic growth positively. Other researchers opined that there is no direction of causality between external debt and economic growth (Jilenga *et al.*, 2016). Others opined that external debt's impact is insignificant and cannot be used to predict economic growth (Polycarp, 2020).

Away from Africa, several studies conducted time series analyses on the external debt and economic growth nexus. Uslu (2021) opined that external debt impacts economic growth positively. Contrarily, Benli (2020) argue that external debt negatively affects economic growth. Others did panel studies across several countries outside Africa, including Dawood *et al.* (2020), who argued that external debt positively affects economic growth, while Hameed *et al.* (2021) argued that external debt affects

economic growth negatively. Forson (2019) suggested that the impact of external debt on economic growth becomes harmful when it gets beyond a certain threshold.

3. Data, Model and Methodology

3.1. Data and variables

This study employs a quantitative research approach using the *ex-post facto* research design. Secondary data used was obtained from the World Bank (2022) database precisely from World Development Indicators (WDI), International Debt Statistics (IDS) and Worldwide Governance Indicators (WGI). Data from 20 selected SSA nations from 1991 to 2020 were collected. The countries include Mauritius, Sierra Leone, Burundi, Uganda, Mali, Ghana, Togo, Cameroon, Guinea, Kenya, Mozambique, Niger, Benin, Nigeria, Rwanda, Senegal, Botswana, Sudan, Tanzania, and Madagascar. The countries and base years were chosen based on data availability. The variables of interest are Economic growth, external debt stock, debt service payment, capital, employed labour force, government expenditure, inflation and institutional quality. The theoretical framework guided the inclusion of primary variables in the model, while a literature review guided the choice of control variables. The definition of variables is presented in Table 1.

Table 1. Definition of Variables

Variable	**Definition**	**Source**
Economic Growth (GDP)	GDP per capita growth (annual %)	WDI
External Debt Stock (EDS)	External debt stocks (% of GNI)	
Debt Service Payment (DSP)	Total debt service (% of exports of goods, services and primary income)	
Capital (GFC)	Gross fixed capital formation (% of GDP)	
Employed labour force (ELF)	Population growth (annual %)	
Government Expenditure (GEX)	General government final consumption expenditure (% of GDP)	
Inflation (INF)	Inflation, consumer prices (annual %)	
Institutional quality (IQ)	Average of six governance indicators, like - Control of Corruption: Percentile Rank - Government Effectiveness: Percentile Rank	WGI

	- Political Stability and Absence of Violence/Terrorism: Percentile Rank - Regulatory Quality: Percentile Rank - Rule of Law: Percentile Rank - Voice and Accountability: Percentile Rank	

Source: Authors (2023)

Inspired by Yen *et al.* (2023), the Institutional Quality (IQ) variable used was calculated from the average of the six governance indicators of WGI presented in Table 1.

Descriptive Statistics and Correlation analysis

Descriptive statistics and correlation analysis are necessary before estimation. Table 2 contains the descriptive statistics and correlation analysis. Descriptive statistics gives a detailed description of the data, while Correlation analysis shows the linear relationship between the variables.

Table 2. Descriptive statistics and Correlation Analysis

	GDP	**EDS**	**DSP**	**GFC**	**ELF**	**GEX**	**INF**	**IQ**
Descriptive Statistics								
Mean	1.441024	63.10238	12.92739	20.26601	2.563825	13.83868	11.10797	32.58275
Median	1.762300	48.87193	8.869227	19.18984	2.683636	13.38768	6.787156	29.23737
Maximum	60.09054	429.7383	134.8028	52.41832	16.62550	36.21686	150.3227	77.96074
Minimum	-41.58686	3.895006	0.493938	-2.424358	-16.88063	0.911235	-7.796642	4.246861
Std. Dev.	5.036224	54.32443	13.46863	7.448492	1.564204	5.579891	16.68884	18.44679
Skewness	1.129334	2.381696	3.435798	0.650279	-4.489167	0.904716	4.198516	0.774613
Kurtosis	43.29032	12.16064	22.62983	4.213166	88.88627	4.752417	26.62511	2.946783
Jarque-Bera	40710.28	2665.181	10813.73	79.08053	186426.5	158.6253	15716.40	44.05378
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Correlation Analysis								
GDP	1.000000							
EDS	-0.049672	1.000000						
DSP	-0.035440	0.548086	1.000000					
GFC	0.045827	-0.151428	-0.305138	1.000000				
ELF	-0.067894	-0.028465	-0.155056	0.009878	1.000000			

GEX	-0.176750	0.086020	0.016218	0.057965	-0.015380	1.000000		
INF	-0.101869	0.180151	0.019353	0.049642	-0.047665	-0.020729	1.000000	
IQ	0.132057	-0.117538	-0.035490	0.133413	-0.390330	0.260328	-0.201780	1.000000

Source: Authors (2023)

We observe that the mean GDP in SSA is 1.44%, which is relatively low. Both the minimum and maximum figures of -41.58% and 60.09% for GDP were recorded by Rwanda in 1994 and 1995, respectively. The standard deviation of 5.03% confirms that the region's GDP growth rate is low. Contrarily, EDS has a very high standard deviation of 54.32% and a maximum of 427.73%, confirmed with a very high mean value of 63.10%. Regarding percentile rank, IQ has a mean figure of 32.58%, a maximum of 77.96% and a standard deviation of 18.44 %. These values are pretty low, showing the low quality of institutions in SSA. The 77.96% maximum value for institutional quality was attributed to Mauritius in 2015. The skewness, kurtosis and Jarque-Bera show that the variables do not follow a normal distribution. The probability value of Jarque-Bera, which is all less than 5%, reveals that the variables are not normally distributed.

A high correlation between independent variables in the model can cause a problem of multicollinearity. The correlation analysis shows that the variables are not highly correlated. The highest coefficient is 0.548086, being that of EDS and DSP, which is logical as debt service payment is expected to increase as the external debt stock increases.

3.2. Methodology

Model Specification

To estimate the long-run and short-run effects of external debt stock on economic growth and the moderating role of institutional quality, the empirical model developed for this study based on the neoclassical growth model proposed by Solow (1956) and Swan (1956) is stated in equation 2.

$$GDP_{it} = \beta_0 + \beta_1 EDS_{it} + \beta_2 DSP_{it} + \beta_3 GFC_{it} + \beta_4 ELF_{it} + \beta_5 GEX_{it} + \beta_6 INF_{it} + \beta_7 IQ_{it} + \beta_7 INTERACT_{it} + \mu_{it} \quad (2)$$

In this model, the interaction variable (INTERACT) computed as a product of EDS and IQ (EDS*IQ) has been included to capture the interactive outcome of EDS and IQ on economic growth.

Estimation techniques

This study employs both the Auto Regressive Distributed Lag (ARDL) model and the Vector Error Correction (VEC) Impulse Response Function (IRF).

Auto Regressive Distributed Lag (ARDL) model

According to Pesaran et al. (2001), Panel ARDL is a robust and versatile technique to estimate short-run and long-run relationships in panel data, making it a good choice for a wide range of research questions. Therefore, in this study, the panel ARDL model projected by Pesaran, Shin, and Smith (1999) is estimated to determine external debt's long-run and short-run effects on economic growth and the interactive impact of external debt and institutional quality on economic growth. The ARDL model accommodates variables that are not stationary as it handles both I(0) and I(1) variables. Succeeding Pesaran et al. (2001), the ARDL model for this study is adopted from Shahid *et al.* (2022) and stated as follows:

$$\begin{aligned}\Delta GDP_{it} = \beta_0 &+ \sum_{j=1}^{m} \beta_{1i,j}\, \Delta GDP_{i,t-j} + \sum_{j=1}^{n} \beta_{2i,j}\, \Delta EDS_{i,t-j} + \sum_{j=1}^{n} \beta_{3i}\, \Delta DSP_{i,t-j} + \sum_{j=1}^{n} \beta_{4i,j}\, \Delta GFC_{i,t-j} \\ &+ \sum_{j=1}^{n} \beta_{5i,j}\, \Delta ELF_{i,t-j} + \sum_{j=1}^{n} \beta_{6i,j}\, \Delta GEX_{i,t-j} + \sum_{j=1}^{n} \beta_{7i,j}\, \Delta INF_{i,t-j} + \sum_{j=1}^{n} \beta_{8i,j}\, \Delta IQ_{i,t-j} \\ &+ \sum_{j=1}^{n} \beta_{8i,j}\, \Delta INTERACT_{i,t-j} + \propto_{1,it} GDP_{i,t-1} + \propto_{2,it} EDS_{i,t-1} + \propto_{3,it} DSP_{i,t-1} \\ &+ \propto_{4,it} + \propto_{5,it} ELF_{i,t-1} + \propto_{6,it} GEX_{i,t-1} + \propto_{7,it} INF_{i,t-1} + \propto_{8,it} IQ_{i,t-1} \\ &+ \propto_{9,it} INTERACT_{i,t-1} \\ &+ e_{it} \qquad (3)\end{aligned}$$

Where β_0 is the constant, α_1 to α_9 are the long-run coefficients, β_1 to β_9 are the short-run coefficients, Δ is the difference operator, and *m* and *n* represent the optimal lags of the dependent and independent variables, respectively. The long-run parameters in Equation 3 above confirm that the variables are cointegrated; therefore, an error correction model is necessary. The cointegration test is based on the null hypothesis that there is no cointegration, meaning $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = 0$. Estimating the error correction equation provides insights into cointegration and the speed of alteration of short-run disequilibrium into equilibrium in the long run. The error correction model, as proposed by Pesaran et al. (2001), has been adopted in this study from Makun (2021) and stated in equation 4 as follows:

$$\Delta GDP_{it} = \delta \mathcal{E}_{i,t-1} + \sum_{j=1}^{m} \beta_{1i,j}\, \Delta GDP_{i,t-j} + \sum_{j=1}^{n} \beta_{2i,j}\, \Delta EDS_{i,t-j} + \sum_{j=1}^{n} \beta_{3i}\, \Delta DSP_{i,t-j} + \sum_{j=1}^{n} \beta_{4i,j}\, \Delta GFC_{i,t-j} + \sum_{j=1}^{n} \beta_{5i,j}\, \Delta ELF_{i,t-j} + \sum_{j=1}^{n} \beta_{6i,j}\, \Delta GEX_{i,t-j} + \sum_{j=1}^{n} \beta_{7i,j}\, \Delta INF_{i,t-j} + \sum_{j=1}^{n} \beta_{8i,j}\, \Delta IQ_{i,t-j} + \sum_{j=1}^{n} \beta_{8i,j}\, \Delta INTERACT_{i,t-j} + e_{it} \quad (4)$$

Where δ is the coefficient of the cointegration term, $\boldsymbol{\mathcal{E}}_{i,t-1}$ is the cointegration term, and e_{it} is the error correction term.

The Impulse Response Function (IRF)

The IRF is estimated to analyse the impact of standard deviation shocks to external debt stock and debt service payment on economic growth. This analysis estimates the Vector error correction model (VECM) and the IRF. The VECM is also useful when analysing external debt dynamics over time, as it captures both short-run and long-run relationships between endogenous and exogenous variables. It should be noted that VECM can only be estimated when the variables are cointegrated. Adopting Rehal (2022), Marques *et al.* (2014) and Razek and McQuinn (2021), the VECM is stated as follows:

$$\Delta Y_t = CD_t + \Pi Y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i\, \Delta Y_{t-i} + \mathcal{E}_t \quad (5)$$

Where Y_t denotes the Vector of endogenous variables, Y_{t-i} represents the lagged difference for short-run effects, $\boldsymbol{\Gamma}_I$ stands for the coefficient of endogenous variables, D_t is the Vector of exogenous variables, C denotes the coefficient of exogenous variables, $\boldsymbol{\Pi}$ is The long-term cointegrating relationship and $\boldsymbol{\mathcal{E}}_t$ = Residuals.

4. Results and Discussion.

Panel Unit Root Test

The ARDL model requires all the variables to be stationary at level [I(0)], first difference [I(1)] or a mix of both I(0) and I(1) variables. Table 3 shows the unit root test results for stationarity, consisting of five different tests: Levin, Lin & Chu (LLC), Breitung, Im, Pesaran & Shin (IPS), Augmented Dickey-Fuller (ADF) and Phillip Peron (PP) tests. LLC and Breitung assume a standard unit root

process, while IPS, ADF and PP assume an individual unit root process. The test used automatic lag selection based on the Schwarz information criteria (SIC), as seen in Table 4. Individual intercept and trend were used at the level and first difference.

Table 3. Unit Root Test Results

Common Unit Root Process			**Individual Unit Root Process**		
Variables	**LLC**	**Breitung t-**	**IPS**	**ADF-Fisher**	**PP-Fisher**
LEVEL					
GDP	-4.08835***	0.41703	-7.04044***	132.229***	317.392***
EDS	2.29396	0.07646	2.78259	21.8915	28.5305
DSP	-1.47882*	2.64670	0.87000	38.7504	104.019***
GFC	-1.31450*	-0.56161	-1.45204*	55.4991*	50.4744
ELF	-4.99209***	-2.77247***	-6.61814***	135.245***	84.3253***
GEX	-1.17957	0.95073	-1.35064*	52.3999*	64.1759***
INF	-7.28661***	-3.46896***	-7.65524***	143.952***	175.220***
IQ	-2.67502***	-1.06712	-0.75003	46.5185	83.1328***
FIRST DIFFERENCE					
GDP	-9.58333***	-2.70918***	-18.6179***	327.203***	2827.88***
EDS	-11.5404***	-5.55945***	-10.6364***	204.261***	532.595***
DSP	-9.29408***	-7.15496***	-13.8398***	236.121***	1232.45***
GFC	-9.48265***	-9.68525***	-12.2608***	209.059***	780.652***
ELF	-11.5176***	-8.05279***	-16.9184***	461.529***	624.198***
GEX	-6.47346***	-5.30135***	-11.6192***	197.647***	874.286***
INF	-12.8585***	-9.35735***	-16.8706***	291.087***	1929.80***
IQ	-6.22370***	-6.25883***	-7.06853***	121.625***	274.129***

Source: Authors (2023)
Note: ***, ** and * stands for 1%, 5% and 10% level of significance respectively
Null: Unit root

The absence of unit roots means the variables are stationary. The unit root test results show that all the variables are stationary at I(0) or I(1). GDP, ELF and INF are all stationary at level (I(0)), while EDS, DSP, GFCF, GEX and IQ are stationary at the first difference (I(1)), meeting the requirements to estimate the ARDL model.

Optimal lag selection

Selecting the optimal lag order is essential in constructing a reliable ARDL model. The lag order collection is obtainable in Table 4, including several statistical information criteria.

Table 4. Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5931.525	NA	2.30e+12	54.00477	54.14360	54.06083
1	-3908.510	3862.119	49501.54	36.35009	37.73839*	36.91072*
2	-3839.611	125.8959	55442.01	36.46010	39.09788	37.52531
3	-3727.837	195.0973	42274.25*	36.18034	40.06758	37.75011
4	-3670.760	94.95571	53420.98	36.39782	41.53453	38.47216
5	-3598.818	113.7984	59611.56	36.48017	42.86636	39.05908
6	-3515.274	125.3166	60692.27	36.45703	44.09270	39.54052
7	-3400.677	162.5186	47401.97	36.15161	45.03675	39.73966
8	-3302.931	130.6253*	44064.42	35.99937*	46.13397	40.09199

Source: Authors (2023)

* indicates lag order selected by the criterion

The most commonly used information criteria for optimal lag selection include the Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). The optimal lag selected for this study is lag 1 (one) based on the Schwarz information criterion.

Cointegration test

This study employs the Fisher (Combined Johansen) and Kao (Engle-Granger-based) panel cointegration tests proposed by Johansen (1991) and Kao (1999), respectively, to test for cointegration among the variables. Table 5 presents the cointegration test results.

Table 5. Cointegration test result

Johansen Cointegration test		
Hypothesised	Fisher Stat.*	Fisher Stat.*
No. of CE(s)	(from trace test)	(from max-eigen test)
None	1885.***	719.0***
At most 1	825.5***	525.0***
At most 2	510.4***	298.3***
At most 3	261.8***	152.0***

At most 4	142.2***	74.56***
At most 5	92.14***	59.20**
At most 6	64.18***	51.32
At most 7	69.50***	69.50***
Kao Cointegration test		
		t-Statistic
ADF		-7.743909

Source: Authors (2023)
Null: No cointegration.
Note: Note: ***, ** and * refers to significance at 1%, 5% and 10% respectively

From the probability values, which are less than a 5% significance level for both tests, we cannot accept the null hypothesis of no cointegration; therefore, the variables are cointegrated. This cointegration means we can estimate the ARDL and the IRF from VECM.

ARDL Model Estimation

The ARDL model was used to establish the effect of External Debt on Economic growth and investigate the moderating role of Institutional quality in SSA from 1991 to 2021. The results in Table 6 estimate the relationship between the dependent and independent variables in both the long and short run. It also estimates the cointegrating equation, which shows the speed of alteration of short-run disequilibrium to equilibrium in the long run.

Table 6. Panel ARDL Estimation Results

Dependent Variable: RGDPGR		
Variables	**Coefficient**	**Std. Error**
Long Run Equation		
EDS	-0.015681***	0.003322
DSP	-0.017953**	0.008616
ELF	0.389879*	0.206005
GFC	0.146993***	0.021100
IQ	0.171801***	0.036020
INTERACT	1.940888***	0.672657
INF	0.130619***	0.024728
GEX	-0.025565*	0.038378

Short Run Equation		
COINTEQ01	-0.900130***	0.085319
D(EDS)	-0.018596	0.098894
D(DSP)	-0.197053	0.149085
D(ELF)	-0.401092	4.292258
D(GFC)	0.088069	0.115737
D(IQ)	0.067237	0.225129
D(INTERACT)	-1.943602	8.218693
D(INF)	-0.165422**	0.075810
D(GEX)	-0.789026***	0.269911
C	-11.87913***	1.261398

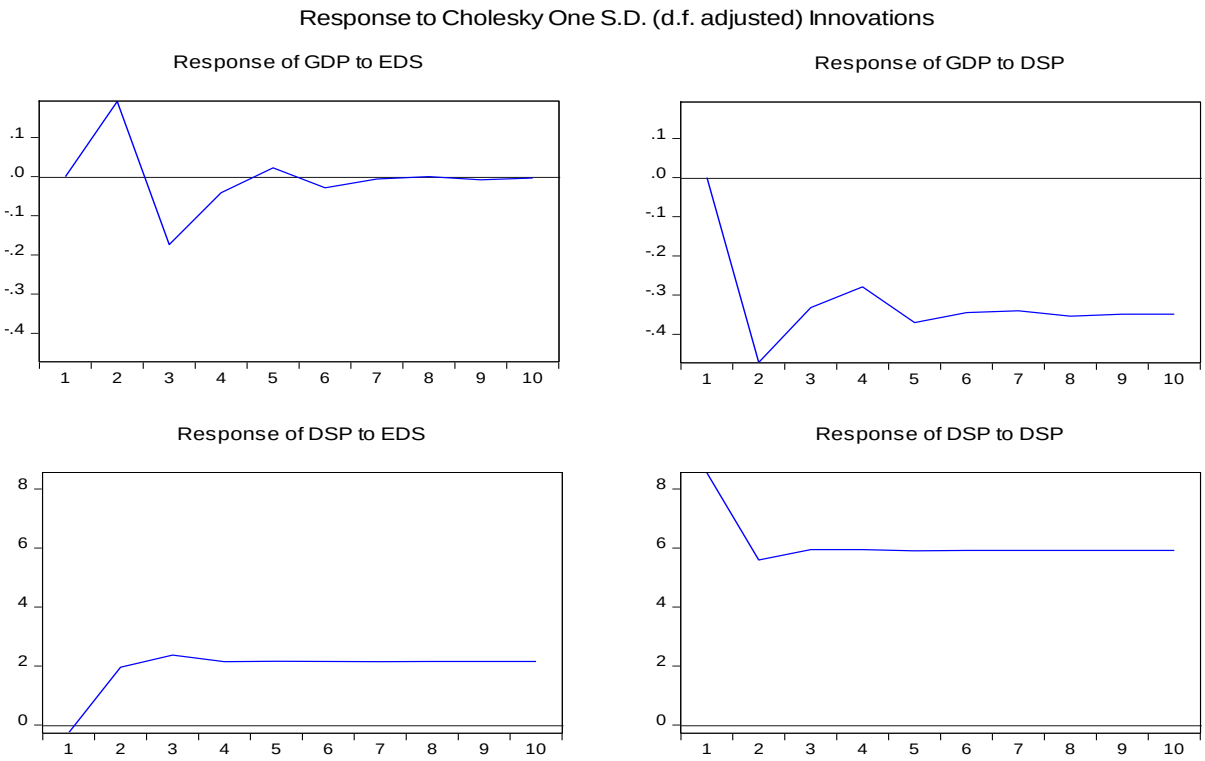
Source: Authors (2023)
Note: ***, ** and * refers to significance at 1%, 5% and 10% respectively

In the long run, EDS and DSP negatively and significantly affect GDP. Based on the findings, a unit increase in EDS will lead to a fall in GDP by 1.5%. Similarly, GDP will reduce by 1.8% if DSP increases by one unit. Meanwhile, GFC, IQ, and INF positively and significantly affect GDP. The table shows that a unit increase in GFC, IQ, and INF will result in a 14.7%, 17.2%, and 13.1% increase in GDP, respectively. EDS and IQ's joint effect (INTERACT) leads to a higher (194.1%) positive and significant effect on GDP.

In the short run, EDS and DSP negatively affect GDP but are insignificant. IQ and INTERACT do not significantly affect GDP in the short run. INFL and GEX significantly and negatively affect GDP in the short run. The cointegrating equation (COINTEQ01) is significant, with a coefficient of -0.900130. Therefore, the speed of alteration of any short-run disequilibrium to equilibrium in the long run is 90%.

Impulse Response Function

The IRF examines the impact of shocks to EDS and DSP on GDP. We first estimated the VECM and then proceeded to the IRF. The Cholesky (of adjusted) was used, with the impulse variables being EDS and DSP, while GDP and DSP were the response variables. Figure 2 shows the responses of GDP to shocks in EDS, GDP to DSP, DSP to EDS and DSP to DSP.



Source: Authors (2023)

Figure 2: Response to Cholesky One s.d innovation

According to Figure 2, one standard deviation (SD) shock to EDS leads to a rapid increase in the GDP that year, immediately followed by a drastic fall the next year, resulting in a negative. In the third year, the situation improves for two years till it stabilises around the equilibrium in the sixth year, with the effects remaining slightly negative. Therefore, shocks to EDS affect GDP in the short run, with its effect first being positive, immediately followed by an adverse effect and adjusting to equilibrium in the long run with the effect remaining slightly negative. Also, ONE SD shock to EDS increases DSP that year and remains at that level. A positive impulse to EDS leads to a permanent increase in DSP. Similarly, one SD shock in DSP will result in a sharp decline in GDP that year and remain permanently in that state.

5. Summary and Conclusion

Ever since the debt crisis in the early 1980s, the question of whether external debt affects the economic growth of a country positively or negatively has been under scrutiny by scholars. This study employs the panel ARDL / PMG model of Pesaran, Shin, and Smith (1999) to investigate the effect of external debt on economic growth while unravelling the moderating role of institutional quality. The IRF is

utilised to examine the impact of external debt shocks on economic growth. Unit root tests ascertained that the variables are I(0) or I(1). The Johansen (1991) and Kao (1999) cointegration tests confirmed that the variables have a long-run relationship. Finally, the ARDL model was estimated to establish the long-run and short-run relationship among the variables. The results revealed that external debt stock (EDS) and debt service payment (DSP) affect the economic growth (GDP) of SSA countries negatively, while institutional quality (IQ) affects the economic growth (GDP) positively. Also, capital (GFCF) positively and significantly affects economic growth. Additionally, the interactive effect (INTERACT) of external debt stock (EDS) and institutional quality (IQ) results in a more positive and significant effect on economic growth (GDP). The IRF revealed that the effect of external debt shock on economic growth is first positive and later negative in the short run, while in the long run, the effect of external debt shock on economic growth is negative but insignificant.

Conclusively, we recommend implementing prudent debt management strategies and policies to mitigate the adverse long-term effects of external debt accumulation on Economic growth. Short-term measures should also be implemented to hedge the adverse impacts of external debt shocks while prioritising productive investments and diversifying revenue sources as a long-term plan. We also encourage the state authorities to channel more effort towards building more robust and quality institutions in SSA countries to maximise the positive impact of external debt on economic growth. Ultimately, the role of international cooperation and debt relief initiatives to alleviate the excessive debt burden on the region's heavily indebted countries cannot be left out. Therefore, a combination of both strategic policies and international cooperation must be employed by SSA nations to negotiate the challenges of external debt to achieve sustainable and equitable economic growth.

COMPETING INTERESTS

The authors have no competing interests to declare.

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HOW TO CITE THIS ARTICLE:

DINKA'A, A. Y., IBE, G. I., KESUH , J. T., LUM, N. I., TEMBENG, A. V., & ONWUMERE, J. U. J. (2025). External Debt And Economic Growth In Sub-Saharan Africa: Exploring The Impact Of External Debt Shock And The Interactive Effect Of Institutional Quality. *Seybold Report Journal*, *18*(08), 30-53. DOI:10-5110-77-1023

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