

Sustainable Foreign Aid and Contracting External Debt: Growth Enhancing Effects and Policy Imperatives

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Abstract: This study investigates the trend of foreign aid and external debt in developing countries, with particular focus on Sub-Saharan African countries that rely heavily on foreign capital inflows. Over the last 3 decades, several policy measures have been taken in these countries, leading to relative stability in foreign aid and contraction in external debt. This study aims to determine how the stable trend of foreign aid and the contracting trend of external debt have impacted economic growth over the period 1994-2022. The study employs the generalised method of moments (GMM) and vector error correction model (VECM) to investigate the issues. The empirical results reveal that growth responded favourably to stable foreign aid and declining external debt. However, the response to external debt is more significant than the response to foreign aid. The results, therefore, justify the IMF/World Bank's advocacy that developing countries stand to gain more by attracting foreign aid and reducing their high levels of external debt. In view of this, it is imperative for Sub-Saharan African countries to foster growth by sustaining the level of foreign aid and ensuring that external debt declines further to the optimum level of 30 per cent as prescribed by the IMF/World Bank.

Keywords: Foreign aid, External debt, Economic growth, Developing countries

JEL classification: F36, F34, F43 and O55

1. Introduction

In Sub-Saharan Africa, the level of foreign aid has remained relatively stable in the past 4 decades (OECD, 2020). Foreign aid, as a percentage of GDP, stood at 2.3 % in 1981, rose to 6.0 % in 1993, and dropped to 3.2 % in 2019 (see Figure 1 in the Appendix). However, it never dropped below the initial level attained in 1981, which makes it relatively stable. The consistent inflow of aid to Sub-Saharan Africa comes largely from the official development aid programme (ODA), established in 1970 by OECD countries to assist developing countries (Cohen, 2013). The political and economic interests of donor countries in less developed regions of the world serve as boosters to the inflows (Rahman & Giessen, 2017). On the

other hand, external debt escalated in the 1980s, when its ratio to GDP sharply rose from 18.8 % in 1981 to a peak of 76.8 % in 1994 and declined to 22.8 % in 2008. Although it rose again to 37.7 % in 2019, the rise was less dramatic compared to the 1980s and early 1990s. Therefore, external debt has declined substantially since 1981. The initial high level of debt was driven by several factors, including a strong desire to achieve rapid economic growth, willingness of external creditors to lend long-term funds, and floating interest rates in global financial markets (Sagdic & Yildiz, 2020). The subsequent sharp decline can be attributed to the debt relief programme for developing countries, which was sponsored by the IMF and the World Bank in the 1990s. The main external creditors to Sub-Saharan Africa are China, the London Club, the Paris Club, and multilateral institutions.

Sub-Saharan Africa also witnessed considerable oscillations in economic growth over the period, which recorded a robust rate of 4.1% in 1980 but dropped astronomically to a negative rate of -2.2% in 1983 (see Figure 2 in the Appendix). This downturn was caused by the considerable decline in revenue from exports of primary commodities, arising from the slump in demand in the global market. Since Sub-Saharan African countries largely depend on earnings from primary commodity exports, the negative impact on growth was quite severe. The negative growth was reversed to a positive rate of 2.4 % in 1984 and subsequently rose to a peak of 6.2 % in 2008. This impressive growth later declined and converged with the world GDP growth of 2.3 % in 2019. During 1980–2000, the GDP growth of Sub-Saharan Africa remained well below world GDP growth. However, there was a significant break in 2001, when the growth rate soared above the global GDP growth rate, but later declined to a level comparable to the global GDP growth in 2019. In particular, the period 2001–2018 witnessed economic growth that was predominantly above 4 % in Sub-Saharan Africa, because of political and economic reforms. In general, the growth trend since 1980 has been characterised by instability caused by domestic and external factors.

The important role of foreign aid in facilitating economic growth in developing countries cannot be overemphasised. Sub-Saharan African countries rely substantially on foreign aid to grow their economies. However, the contemporary debate on foreign aid to Africa has generated some controversies. It is argued that dependence on aid prevents countries from taking advantage of other opportunities in the global economy (Kwemo, 2017; Park, 2019). The main problem with foreign aid is said to revolve around the conditions set by donor countries, which do not serve the best interest of African countries. Easterly (2009) and Deaton (2013)

alluded to this problem, asserting that foreign aid has hidden negative effects resulting from donors' political inclinations. Therefore, it is seen to be useful in developing countries at the early stage of development, whereas indigenous efforts are more important at later stages of development. Another subsisting argument posits that foreign aid is not a problem by itself, but a misappropriation that limits its ability to foster growth in African countries (Lyons, 2014; Phiri, 2017). Indeed, some countries have mismanaged resources from foreign aid because of political interests and other perverse considerations (Ojong & Bessong, 2017). Therefore, the potential benefits of aid can only be maximised when obstacles to efficient use are removed.

External debt is also important in facilitating economic growth; hence, Sub-Saharan African countries are mostly obsessed with borrowing. This obsession is largely responsible for the persistent high levels of external debt and loan defaults in the sub-region. In 1980s, the inability to meet debt obligations led to the freezing out of most African countries from global financial markets. The severity of this situation in the 1990s necessitated the intervention of the IMF/World Bank, using a debt relief programme aimed at reducing the excruciating burden of debt on the economy. The intervention succeeded in reducing the debt burden to a sustainable level, which enabled the countries to regain access to global financial markets in 2005. Since then, the countries have been more cautious in accumulating external debt, thus driving the level of debt towards the World Bank/IMF prescribed optimum debt ratio.

The World Bank and the IMF have consistently advocated the need for developing countries to attract more foreign aid and reduce external debt to an optimum ratio of 30 % to lessen the debt burden on the economy (International Monetary Fund, 2018). Following this advocacy, Sub-Saharan African countries have been adopting measures, resulting in relatively stable foreign aid since 1994, while external debt has tended to converge towards the prescribed debt ratio (World Bank, 2020). However, it is not yet clear how this phenomenon affects economic growth in Sub-Saharan African countries. Because of this perceived void, investigation is carried out in this study to determine whether it is favourable or not. Previous research has not given adequate attention to this topical issue that has important policy implications. Thus, the study is expected to provide new evidence on the issue.

The investigation is carried out by employing the techniques of the generalised method of moments (GMM) and vector error correction model (VECM). The two methodologies are used to ensure consistency of estimation results. In terms of scope, the study covers 43 developing

economies of Sub-Saharan Africa and the period 1994–2022. It is structured into five sections: introduction, literature review, methodology, discussion of empirical results, and conclusion/recommendations.

2. Literature Review

2.1. Theoretical Review

Theoretically, the Harrod–Domar growth model (Harrod, 1939; Domar, 1946) and the two-gap growth model (Chenery & Strout, 1966) were employed by early economists to explain the growth process of developing countries. These models provide insight into the resource gap militating against economic growth and the need for foreign aid to fill the gap. The development economists of the 1970s, which Lewis (1979) represents, also argued that development aid is needed to improve infrastructure and facilitate economic growth in developing countries. Furthermore, modern economists have advocated for foreign aid, but argued that aid could only play a significant positive role in economic growth when properly channeled into productive ventures. This view is championed by Sachs (2005), who contended that large-scale aid can only improve the welfare of countries when properly targeted and well used. He described aid as a big push required to overcome specific economic problems in developing countries. In addition, modern economists have identified major channels through which foreign aid could impact economic growth. According to Barder (2011), aid impacts growth by boosting human development in developing countries. Second, aid impacts growth by boosting agriculture and providing food security.

With regard to external debt, classical economic theory suggests that reasonable levels of borrowing by developing countries are likely to enhance economic growth as long as borrowed funds are used for productive investment (Pattillo *et al.*, 2002). However, large levels of accumulated debt lead to lower growth when it is above the country's repayment capacity. This situation, referred to as debt overhang, is associated with high debt-service costs that discourage further domestic and foreign investments and subsequently stagnate growth (Saungweme & Odhiambo, 2019). The classical school of thought also argued that large external debt may impair economic growth by reducing budgetary discipline and private sector access to credit (Broner *et al.*, 2014). On the other hand, the Keynesian school of thought argued that public expenditures financed through debt have a multiplier effect on national output (Elmendorf & Mankiw, 1999). The postulation is based on the principle that external debt funding stimulates the economy more than its

crowding-out effect (Ncanywa & Masoga, 2018). This view suggests that government debt is important for boosting growth, provided that it is not used for consumption. In this way, the impact of debt on growth is optimised with moderate inflation (Driessen & Gravelle, 2019).

2.2. Empirical Review

Aid's role in economic growth is largely influenced by institutional quality, political system, and the perception of foreign aid donors (McGillivray *et al.*, 2006). In a study of six African countries, Mallik (2008) found a negative long-term effect of foreign aid on economic growth over a period of thirty-five years. However, this was not the case in Iran, where Refaei and Sameti (2015) adopted FMOLS and DOLS estimation techniques and discovered a significant positive relationship during the period 1980–2012. The study concluded that foreign aid is more productive than other components of capital flows. This view supports the argument by Doucouliagos and Paldam (2009) that foreign aid stimulates growth by bridging the domestic resource gap. In a panel data study of eighty-two developing countries, Mahembe and Odhiambo (2019) used the VECM model to estimate the relationship between foreign aid and economic growth over the 1981–2013 period. The relationship was found to be positive and convergent in the long run. The study of one hundred and four developing countries by Martinez (2015) was even more revealing. The impact of foreign aid on growth was found to be positive and highly significant in the short run, with over 50 % manifesting in less than one year. In a single country study based on Nigeria, Abdul *et al.* (2018) further confirmed the beneficial role of foreign aid on growth during 2003–2015. More precisely, aid was found to significantly enhance human capital development, which subsequently led to higher growth.

Appiah-Konadu *et al.* (2016) tested the hypothesis that foreign aid promotes growth in developing countries and discovered a long-term convergent relationship in Ghana. The test also revealed that the speed of adjustment towards convergence was moderate, which suggests that the effect of foreign aid on growth took considerable time to manifest. In another study, Aghoutane and Karim (2017) found the impact of foreign aid on Morocco's growth to be positive in the short run but negative in the long run. Similarly, M'Amanja and Morrissey (2005) investigated the relationship in Kenya, over the period 1964–2002, and revealed that it was negative in the long run. This finding was replicated in Uganda, where Edward and Karamuriro (2020) found that the inflow of foreign aid did not have a meaningful impact on growth in the period 1970–2017. Rather, domestic investment and exports were the key drivers of growth. In the

case of Ethiopia, a favourable policy environment in that country attracted large foreign aid that stimulated appreciable investment and growth in the 1990s (Gurmu, 2020).

The role of external debt in economic growth is even more contentious. The debt controversy was accentuated by the study of Reinhart and Rogoff (2010) based on 44 countries. The study found a threshold debt ratio of 90 % that determined economic growth in advanced countries. It was revealed that a ratio below the threshold increased economic growth slightly, whereas a ratio above the threshold reduced growth significantly. The same study found a threshold debt ratio of 60 % for emerging countries. It was discovered that growth fell by 2 % as the ratio approached the threshold and declined drastically by 50 % as the ratio rose above the threshold. It follows that a high debt burden tends to slow economic growth in both developed and emerging economies.

In a further study on the threshold issue, Law *et al.* (2021) used a dynamic panel technique to produce different evidence in seventy-one developing countries during 1984–2015. The threshold was found to be 51.65 %, which is much lower than the Reinhart–Rogoff threshold. It was also discovered that debt had a slight positive impact on growth at ratios below the threshold, but a significant negative impact above the threshold. In another study, Salameh (2020) examined the impact of foreign debt on economic growth in some oil-rich countries during 2002–2017 using a panel vector auto-regressive approach. The results showed that public debt had no meaningful impact on growth because of the inability of the government to manage debt resources. On the other hand, Ssempala *et al.* (2020) found a significant negative impact of external debt on economic growth in Uganda in the short run, whereas the impact was significantly positive in the long run. The study concluded that external debt in Uganda constrained the private sector and investment activities in the short run. In a comparative study of two highly indebted African countries, Nigeria and Morocco, conducted by Edo (2002), external debt was discovered to have severe adverse effects on investment and growth over the period 1980–1999. During this period, there was massive accumulation of debt in the two countries caused by uncontrolled fiscal expenditures and sharp increases in global interest rates. The economic stagnation occasioned by the high level of debt in these countries, and indeed, all highly indebted countries, necessitated the inauguration of a debt relief programme by the IMF/World Bank. The programme, referred to as the Highly Indebted Poor Countries initiative (HIPC), aimed at improving the severe impact of debt on economic growth.

In a study of forty-three African countries, over the period 2001–2018, Ehikioya *et al.* (2020) used the GMM model to examine the relationship

between external debt and economic growth. The results revealed the existence of a significant long-term relationship and discovered that beyond a certain level, debt had a deteriorating impact on growth. The findings, therefore, support the threshold hypothesis of debt. The study provided some insight into how the potential benefits of debt have been curtailed in most African countries due to misappropriation of resources. Bidzo (2018) further demonstrated that external over-borrowing negatively impacted economic growth in the Gabonese economy. The study employed the GMM model to produce results that revealed considerable deterioration in economic growth due to an increase in external debt. On the contrary, Wibowo (2017) used the VAR model in a study of eight Southeast Asian countries over the period 2006–2015. The study discovered that it took external debt considerable time to positively impact economic growth. A similar study was conducted by Asteriou *et al.* (2021) on a panel of selected Asian countries for the period 1980–2012. The study employed the ARDL model to produce results that showed that an increase in external debt negatively impacted growth in the short and long run. Several other studies have investigated the relationship between external debt and economic growth, with conflicting results. Some of these studies that found a positive relationship include Jayaraman and Lau (2009) and Bakar and Hassan (2008). Other studies that found negative relationships include Saad (2012) and Hameed *et al.* (2008).

Factors that affect economic growth in developing countries are not limited to foreign aid and external debt. The role of private investment (domestic and foreign) cannot be over emphasised. An investigation of the relationship between growth and private investment in eighty-four countries was carried out by Li and Liu (2005), within the period 1970–1999, which revealed that gross private investment promoted growth in the short and long run. These findings were replicated in a global study conducted by Iamsiroroj and Ulubasoglu (2015) over the period 1970–2009, which covered 140 countries. Foreign private investment was found to have a significant positive effect on growth in both developed and developing countries. The findings of some country studies also support the positive role of private investment in economic growth. Sarker and Khan (2020) employed the methodology of auto-regressive distributed lag (ARDL) to determine the nexus between growth and private investment in Bangladesh. The study discovered a unidirectional causality running from private investment to economic growth and a strong positive long-run relationship. In contrast, this strong positive relationship could not be established in a study of economic growth in Australia by Pandya and Sisombat (2017). Rather, multiple regression analysis revealed a weak

relationship, which was replicated in another study conducted on the economy of Turkey by Aga (2014), revealing an insignificant effect of private investment on growth.

Openness of the economy is considered an important factor in the economic growth of developing countries. Osei-Assibey and Dikgang (2020) alluded to this assertion in a study of the South African economy, which revealed robust sustainable long-run export-driven growth. In addition, the level of imports was found to have contributed appreciably to economic growth. Thus, the openness of the economy helped to facilitate economic growth in the country. Caleb *et al.* (2014) produced a similar result in Zimbabwe, where they used a co-integration approach to reveal a long-run positive relationship between economic growth and trade openness during 1975–2005. The findings were supported by Chai (2016), who investigated a panel of selected Sub-Saharan African countries during 1985–2014. However, in a country study of Gambia, covering the period 1965–2016, Ceesay (2017) used OLS and VECM methodologies to investigate trade openness and growth. The study produced results indicating that exports had a negative impact on growth, whereas imports had only a slight positive impact. Therefore, economic growth did not clearly benefit from trade openness.

So far, a consensus has yet to emerge in empirical literature on the role of foreign aid and external debt in the economic growth of developing countries. However, contemporary debate led by the World Bank/IMF emphasises the need to strengthen the role by attracting more foreign aid and reducing external borrowing, which seems to place a heavy burden on the economy (International Monetary Fund, 2018). The World Bank database seems to reflect this expectation, showing that foreign aid has remained relatively stable since 1994, while external debt has tended to decline towards the benchmark debt ratio of 30 % (World Bank, 2022). The effect of this trend on economic growth in developing countries has yet to be investigated, which creates a void that requires a new investigation. More precisely, there is a need to conduct a study that would determine the impact of relatively stable foreign aid and converging external debt on economic growth, particularly in Sub-Saharan African countries. This study is most likely to make a useful contribution to the expanding literature on economic growth in developing countries.

3. Methodology

3.1. Generalised Method of Moments (GMM)

The theoretical arguments of Lewis (1979) and Sachs (2005) underscore the importance of foreign aid in the economic growth of developing

countries. Similarly, classical and Keynesian arguments support the importance of external debt in the economic growth of less developed countries (Elmendorf & Mankiw, 1999; Broner *et al.*, 2014). It follows that both factors are fundamental in explaining economic growth, necessitating the construction of a generalised method of moments (GMM) model that relates growth to these factors and other control variables, as shown in (1a and 1b). The model depicts the theoretical and empirical relationships between economic growth and all variables.

$$EG_{it} = f[FRA_{it}, EXD_{it}, CAS_{it}, OPN_{it}] \quad (1a)$$

$$EG_{it} = \alpha_0 + \sum_{j=1}^4 \alpha_j X_{it} + \mu_{it} \quad (1b)$$

The endogenous variable in the model is EG_{it} (economic growth), whereas the exogenous variables are FRA_{it} (foreign aid), EXD_{it} (external debt), CAS_{it} (capital stock), and OPN_{it} (openness of economy). Vector X_{it} contains all exogenous variables, and μ_{it} is the error term. The parameters α_j ($j = 1, 2, 3$, and 4) are coefficients of the corresponding exogenous variables. The endogenous variable is expected to have a positive relationship with each exogenous variable ($\alpha_j > 0$). The panel data version of the model was introduced by including more empirical properties, as proposed by Arellano and Bond (1991) and consolidated by Blundell and Bond (1998). The panel data GMM model, with all its properties, is presented below.

$$EG_{it} = \beta_0 + \sum_{j=1}^4 \beta_j X_{it-1} + \beta_5 EG_{it-1} + \pi_{it} + \nu_{it} \quad (2a)$$

$$EG_{it} = \lambda_0 + \sum_{j=1}^4 \lambda_j X_{it-1} + \sum_{k=5}^n \lambda_k EG_{it-k} + \omega_{it} \quad (2b)$$

The moment conditions are:

- (a) $\varepsilon(w_{it}) = \varepsilon[F(EG_{it}, X_{it-1}, \lambda)] = 0$; zero expected residual of exogenous variables.
- (b) $\varepsilon(N'w_{it}) = \varepsilon(N'w_{it}, \lambda) = 0$; zero expected residual of the instrumental variables.
- (c) The unknown parameter λ determines whether the expected residuals are significantly close to zero or not.
- (d) There is optimum parameter λ^* that ensures that the expected residuals become zero.

Equation (2a) is the panel data model relating the endogenous variable (EG_{it}) to its own lag and the lags of all exogenous variables, including the unobserved country effect (τ_{it}). The lagged explanatory variables are contained in vector X_{it-1} . Since the lagged dependent variable was included among the exogenous variables, higher lags of the same variable entered the model as instrumental variables to eliminate the problem of serial correlation. These instrumental variables are EG_{it-2} and EG_{it-3} . Similarly, the unobserved country effect was eliminated by subtracting the group mean for each variable in the model (Fischer, 2010). All these adjustments are reflected in equation (2b). The optimising conditions of the model were indicated as the moment conditions, which prescribed that the expected values of random error in exogenous and instrumental variables should be zero.

3.2. Vector Error Correction Model (VECM)

An alternative methodology was used to estimate the relationship between economic growth and the explanatory variables. This methodology was based on the VECM, which originated from the conventional vector autoregressive model (VAR). The transformation of VAR to VECM is shown in (3a and 3b), following Engle and Granger (1987).

$$Z_{it} = \partial_0 + \sum_{j=1}^5 \partial_j Z_{it-j} + e_{it} \quad (3a)$$

$$Z_{it} = \eta_0 + \sum_{j=1}^5 \eta_j Z_{it-j} + EC_{it-1} + \varepsilon_{it} \quad (3b)$$

Where;

Z_{it} = vector of all variables

Z_{it-1} = matrix of lagged variables

∂_j = impact coefficients of lagged variables ($j = 1, 2, \dots, 5$)

EC_{it-1} = error correction term

Equation (3a) is the conventional VAR model that transforms to the VECM in (3b) by introducing the error correction term (EC_{t-1}). In VECM, all variables were endogenous; hence, the endogeneity problem was eliminated. Variables may be entered for estimation in levels or first differences, depending on their stationary status. The expectation of the model was that economic growth should have a positive relationship with the other variables ($j > 0$).

3.3. Estimation Techniques and Data Sources

The estimation was performed in three stages. The first stage involved investigating the stationary and convergence status of all variables in the model to ensure that they possessed desirable empirical properties that would enable the GMM and VECM models to produce unbiased results. According to Engle and Yoo (1987), if non-stationary variables were used in estimation, the parameter estimated might be biased and inconsistent. The standard approach used to investigate the stationary status of variables is the unit root test. In panel model estimation, the unit root tests commonly employed are the LLC, IPS, and HD tests proposed by Levin *et al.* (2002), Im *et al.* (2003), and Hadri (2000). In addition, the co-integration test was conducted to determine the long-run convergence status of variables, which was important for forecasting and policy making. The co-integration test employed in this study was proposed by Pedroni (1999; 2004). The test is based on the three vital indicators of variance ratio, Rho statistic, and PP statistic. Unlike the regular co-integration test proposed by Johansen (1988), the Pedroni statistics provides more precise estimates of the convergence status among two or more variables in a panel data model.

The second stage involved using the techniques of the generalised method of moments (GMM) and vector error correction model (VECM) to estimate the impacts of variables in the model. The GMM technique is useful for determining the dynamic relationships among variables. The VECM technique is used to further estimate the impacts to check for consistency of estimates. Both techniques have been employed to produce consistent estimates as in previous studies, such as Andrei *et al.* (2017), Gries and Redlin (2012), Taghizadeh-Hesary *et al.* (2019).

The third stage focused on the relevance of empirical results to policy making. The results can only be considered useful for policy making when there is structural stability and the model possesses strong forecasting capacity. In view of this, the maximum likelihood estimator was employed to test for structural stability, which involved splitting the entire study period into two sub-periods by choosing a suitable break point (Yu *et al.*, 2008). The period 2007 was, therefore, used as the break point because it was characterised by a global financial crisis that led to an economic downturn in all developing countries. On the other hand, the forecasting capacity was tested by splitting the study period into two sub-periods and fitting data to each sub-period. The forecast errors in the two sub-periods were evaluated to determine the forecasting power of the model. For a model to have forecasting capacity, the forecast errors in the two sub-periods should be similar and insignificant. This procedure has been adopted in several studies, such as Otavio *et al.* (2011), Jiang and Liu (2011), and Kuo (2016).

The estimations in the three stages covered the period 1994–2022 and employed annual time series data. The data for economic growth and capital stock were sourced from the World Bank Open Database, while data on openness of the economy came from World Development Indicators. Data on external debt and foreign aid were sourced from the IMF World Debt Table and OECD Statistics, respectively. The OECD is the most reliable source of data for foreign aid because most foreign development aid is channeled through the OECD. Measurements of the variables are indicated as follows: economic growth (GDP growth rate), foreign aid (development aid as percentage of GDP), external debt (external debt as percentage of GDP), capital stock (gross fixed capital formation as percentage of GDP), and openness of the economy (export plus import as percentage of GDP).

4. Discussion of the Empirical Results

4.1. Panel Unit Root and Co-integration Test Results

A preliminary investigation was conducted to determine whether or not, the variables in the model possessed desirable empirical properties that made them suitable for GMM and VECM estimations. The models take variables that are $I(0)$ or $I(1)$, i.e., integrated in levels or first differences. Estimations may breakdown when the variables are not suitable. The unit root test results for all variables are reported in Table 1. The estimates LLC

Table 1: Panel Unit Root Estimates

<i>Sample size: 43 countries</i>						
<i>Estimation period: 1994–2022</i>						
Variable	Unit Root test					
	Level			First difference (Δ)		
	LLC	IPS	HD	LLC	IPS	HD
EG	3.99*	4.06*	1.18*	-	-	-
FRA	0.59	1.01	3.31	4.83*	5.01*	0.78*
EXD	0.99	1.12	2.99	3.99*	4.08*	1.25*
CAS	4.25*	5.02*	1.37*	-	-	-
OPN	0.88	1.20	4.03	3.87*	5.09*	0.88*
Pedroni Co-integration test						
Variance ratio		Rho statistic		PP statistic		
Critical range: ($0 \leq r \leq 5$)		Critical range: ($0 \leq \sigma \leq 1$)		Critical range: ($1.5 \leq p \leq 5$)		
3.06*		0.68*		2.79*		

*Variable is stationary

Variables: EG = Economic growth, FRA = foreign aid, EXD = external debt, CAS = capital stock, OPN = openness of economy.

Note: LLC = Levin–Lin–Chu test, IPS = Im–Pesaran–Shin test, HD = Hadri test. In LLC and IPS, larger statistics indicate more stationary variables. In HD, smaller statistics indicate more stationary variables.

Source: Authors' estimation using Eviews.

(3.99), IPS (4.06) and HD (1.18), show that economic growth is I (0). Similarly, the estimates LLC (4.25), IPS (5.02) and HD (1.37) show that capital stock is I (0). Therefore, only two of the five variables are stationary in levels. However, the remaining three variables are I (0), which indicates that they are stationary in the first differences. Therefore, the null hypothesis of the non-stationary variable was rejected; hence, all the variables were considered stationary and suitable for estimation. Therefore, two variables (EG and CAS) would enter estimation in levels, while three variables (FRA, EXD, OPN) would enter in first differences.

The same table shows the co-integration test results, where the Pedroni variance ratio of 3.06 falls within the critical range. Similarly, the Rho statistic of 0.68 and the PP statistic of 2.79 fall within the critical range. These are indications that all variables tend to move towards equilibrium and are most likely to converge in the long run. Therefore, the null hypothesis of 'no convergence' was rejected; hence, the variables were qualified to be used in the estimation.

4.2. Generalised Method of Moments (GMM) Estimation Results

Because the variables satisfied the desired empirical property, the GMM model of economic growth was estimated using annual time series data covering the period of study 1994-2022. The estimation results are reported in Table 2, together with the reliability diagnostics. One unit increase in foreign aid (ΔFRA_{-1}) is indicated to have an impact of 0.52 on growth, which is significant at the 5% level. This shows that foreign aid significantly encouraged economic growth, probably because of its sustainable level over the years. The results also show that external debt (ΔEXD_{-1}), which experienced a considerable decline during the period, had an impact of 0.63 on economic growth. This impact is significant at 5 % and superior to the impact of foreign aid. It follows that the contracting trend of external debt towards the optimum level impacted economic growth in Sub-Saharan African countries more positively. The control variables also influenced growth, with capital stock (ΔCAS_{-1}) having a significant impact of 0.50 and openness of economy (ΔOPN_{-1}) having an insignificant impact of 0.22. The impacts of lag economic growth (ΔEG_{-1} , ΔEG_{-2} and ΔEG_{-3}) are also insignificant, suggesting a low response of growth to its lag. The period 1994-2022, therefore, witnessed growth-enhancing effects of stable foreign aid and declining external debt that conformed to the advocacy and expectations of the IMF/World Bank.

The diagnostics showed that the p-values of Sargan statistics fell within the critical range; hence, the null hypothesis of no correlation between instrumental variables and estimation residuals could be accepted.

Similarly, the p-values of A– B statistics fell within the critical range, indicating acceptance of the null hypothesis of no serial correlation in estimation residuals. The estimates from the GMM model are, therefore, unbiased and reliable.

Table 2: GMM Estimation Results

<i>Dependent variable: EG</i>					
<i>Sample: 43 countries</i>					
<i>Period: 1994 – 2022</i>					
<i>Explanatory variable</i>	<i>Elasticity coefficient</i>	<i>t-value</i>	<i>Test</i>	<i>Statistic</i>	<i>P-value</i>
Intercept	2.18*	4.02	Sargan chi-square	7.86	0.40
ΔFRA_{-1}	0.52*	2.23	($0.05 < p \leq 1$)		
ΔEXD_{-1}	0.63*	3.56	A– B 1 st order correlation	2.77	0.06
CAS_{-1}	0.50*	2.05	($0 < p < 0.1$)		
ΔOPN_{-1}	0.22	1.14	A-B 2 nd order correlation	1.09	0.31
EG_{-1}	0.06	1.38	($0.25 < p \leq 1$)		
EG_{-2}	0.05	1.34			
EG_{-3}	0.03	1.18			

Note: *Significant at 5 %, **Significant at 1 %. A– B stands for Arellano– Bond test.

Variables: EG = Economic growth (in level), ΔFRA = foreign aid (in first difference), ΔEXD = external debt (in first difference), CAS = capital stock (in level), ΔOPN = openness of economy (in first difference).

Source: Authors' estimation from Eviews Computer software.

4.3. Vector Error Correction Model (VECM) Estimation Results

The results in Table 3 show that foreign aid (ΔFRA_{-1}) had an impact of 0.55 on growth, which is significant at the 5% level. External debt (ΔEXD_{-1}), on the other hand, had a considerably greater impact of 0.68, which is also significant at 5%. This suggests that both variables have a favourable effect on economic growth, but the impact of declining external debt supersedes that of stable foreign aid. In the case of control variables, capital stock had a significant impact of 0.59, while openness of economy (ΔOPN_{-1}) remains passive with an insignificant impact of 0.29. The effect of lagged economic growth (EG_{-1}) is 0.31, which is insignificant, suggesting that growth did not significantly respond to its own lag. These VECM estimates are consistent with the GMM estimates. Furthermore, the VECM results reveal a slow adjustment of economic growth over time, as indicated by the insignificant value of -0.36 for the error correction (EC_{-1}). This suggests a sluggish adjustment speed of economic growth towards a steady state of equilibrium.

Table 3: VECM estimation results

<i>Dependent variable: EG</i>			
<i>Explanatory variable</i>	<i>Estimate</i>	<i>t-statistic</i>	<i>Diagnostics</i>
Intercept	3.01**	11.02	R ² (adjusted) = 0.91
ΔFRA_{-1}	0.55*	2.34	F-statistic = 31.42**
ΔEXD_{-1}	0.68*	3.72	Sargan statistic 3.54 (> 1.65)
CAS_{-1}	0.59*	2.65	Arch statistic = 0.28
ΔOPN_{-1}	0.29	1.17	Durbin's h = -1.97
EG_{-1}	0.31	1.32	
EC_{-1}	-0.36	-1.42	

Note: * significant at 5%, **significant at 1%.

Variables: EG = Economic growth (in level), ΔFRA = foreign aid (in first difference), ΔEXD = external debt (in first difference), CAS = capital stock (in level), ΔOPN = openness of economy (in first difference), EC_{-1} = error correction term.

Source: Authors' estimation from Eviews Computer software.

The various diagnostic statistics confirmed that the estimation results were reliable. The adjusted R² of 0.91 indicated that the explanatory variables accounted for over 90 % of the systemic variation in economic growth. The F-statistic 31.42 showed that the explanatory power of the model was significant at 1 %. The Sargan statistic of 3.54 was significantly higher than the minimum threshold, which implied that economic growth was a true reflection of changes in the past values of itself and other variables. The Arch statistic of 0.28 was low, indicating that changes in economic growth did not significantly deviate from changes in explanatory variables. Durbin's h-statistic -1.97 showed that autocorrelation and spuriousness were considerably minimised.

4.4. Structural Stability Test Results

Structural stability in a model is important for forecasting and policy making. Because of this consideration, a stability test was performed to determine whether a break occurred in the period of study that might render estimation results unsuitable for policy making. The maximum likelihood estimator is commonly employed in the test for structural stability, which involves splitting the entire study period into two sub-periods by choosing a suitable break-point within the study period based on phenomenal occurrence (Yu *et al.*, 2008). The estimator is used to produce the likelihood and reliability estimates. The likelihood estimates in this study were obtained using the period 2007 as the break-point, which represented the period of the global financial crisis. Table 4 shows the likelihood coefficients and their t-asymptotic t-statistics. The coefficients of the joint period and sub-periods are reported to be significant at 5%.

Again, the sub-period coefficients of each variable are not significantly different. Therefore, the estimates indicate acceptance of the null hypothesis of ‘no structural break’, which makes the estimation results suitable for policy formulation.

Table 4: Maximum likelihood estimates

<i>Endogenous variable: EG</i>						
<i>Exogenous Variable</i>	<i>Joint period (1994-2022)</i>		<i>Sub-period 1 (1994-2007)</i>		<i>Sub-period 2 (2008-2022)</i>	
	<i>Coefficient</i>	<i>Asymptotic t-statistic</i>	<i>Coefficient</i>	<i>Asymptotic t-statistic</i>	<i>Coefficient</i>	<i>Asymptotic t-statistic</i>
Intercept	0.29	1.08	0.31	1.29	0.32	1.25
FRA ₋₁	0.30	1.11	0.26	1.25	0.28	1.18
EXD ₋₁	0.27	1.06	0.29	1.30	0.26	1.15
CAS ₋₁	0.34	1.14	0.28	1.27	0.31	1.24
OPN ₋₁	0.25	1.02	0.32	1.33	0.33	1.27
EG ₋₁	0.22	0.97	0.25	1.19	0.29	1.22

(*) Significant at the 5% level

Furthermore, reliability estimates were obtained by choosing alternative periods around the break point, as shown in Table 5. The table reports values of structural break parameters, normalised bias statistics, standard deviation, and root mean square error for each alternative. The values are generally insignificant, indicating that the likelihood coefficients are stable and reliable.

Table 5: Maximum likelihood reliability estimates

<i>Alternative break point</i>	<i>Structural break parameter estimation</i>		<i>Normalised bias statistic</i>	<i>Standard deviation (SD)</i>	<i>Root mean square error (RMSE)</i>
	<i>Rho 1</i>	<i>Rho 2</i>			
2004	0.06	0.07	0.38	0.15	0.25
2005	0.07	0.11	0.4	0.14	0.23
2006	0.05	0.09	0.39	0.16	0.22
2007	0.04	0.08	0.36	0.17	0.25
2008	0.05	0.1	0.41	0.19	0.24
2009	0.06	0.12	0.37	0.18	0.21
2010	0.08	0.09	0.35	0.16	0.25

Note: Alternative break points are distributed evenly around the year, 2007

The structural stability of the model suggested that it could be used to forecast growth; hence, it was also important to evaluate the forecasting capacity of the model using the standard measures of mean absolute error (MAE), mean absolute prediction error (MAPE), root mean square error (RMSE), and Theil's coefficient of inequality (Theil-T). In Table 6, the four

measures are used to evaluate deviations of forecast values from actual values of economic growth. The measures can take values within the range of zero to infinity (0 to ∞), where low values close to zero indicate minimal forecast error and strong forecasting capacity. All the values reported in the table are negligible and less than unity, which suggests that errors are significantly low; hence, the model can be considered to possess a relatively strong forecasting capacity. Therefore, it is suitable for the forecast of economic growth.

Table 6: Periodic Estimates of Forecast Error

Selected forecast model: VECM		
Dependent variable: Economic growth		
Sub-period 1: 1994 - 2007		
Sub-period 2: 2008 -2022		
<i>Forecast error indicator</i>	<i>Sub-period 1</i>	<i>Sub-period 2</i>
MAE	0.1226	0.1402
MAPE	0.7994	0.9015
RMSE	0.1303	0.15023
Theil-T	0.0079	0.0087

Note: MAE = Mean Absolute Error, MAPE = Mean Absolute Prediction Error, RMSE = Root Mean Square Error, Theil-T = Theil's coefficient of inequality

Source: Author's evaluation estimation

5. Policy Imperatives

The estimation results revealed that relatively stable foreign aid and converging external debt significantly impacted economic growth. Furthermore, the results revealed that capital stock played a significant positive role in facilitating economic growth, while openness of the economy played a passive role. The above findings are quite revealing and thus have some policy imperatives as follows.

- (a) The relatively stable level of foreign aid had a significant positive effect on economic growth. The implication is that foreign aid is a strong driver of economic growth. Therefore, it is important to ensure that the level is sustained. This could be achieved through efficient utilisation of the proceeds from development aid, which would encourage foreign donors to grant more aid.
- (b) The contracting trend of external debt exerted a more significant positive impact on economic growth in Sub-Saharan African countries. The implication of this finding is that an unsustainable high level of external debt is detrimental to economic growth; hence, lower external debt tends to enhance growth. It is, therefore, imperative for the countries to ensure that the level of external

debt is lowered until it reaches the World Bank/IMF optimum debt ratio of 30 % for developing countries.

- (c) Capital stock was used as a control variable and was found to have a significant positive effect on growth. Similarly, openness of economy was used as a control variable and discovered to have an insignificant impact on growth. These findings imply that other factors also need to be controlled to ensure rapid economic growth. In this regard, more policy measures can be employed to raise the level of capital stock and openness of the economy. In particular, the low impact of openness can be enhanced by improving the balance of trade through export diversification.

6. Conclusion

The role of foreign aid and external debt in the economic growth of developing countries cannot be over emphasised. During the period covered in this study, foreign aid was relatively stable, while external debt tended to contract towards the prescribed optimum debt ratio of 30 %. However, adequate investigation has yet to be conducted on how this scenario impacted economic growth in Sub-Saharan African countries. Because of this perceived void, this study attempted to determine whether or not, the trends of external debt and foreign aid had a favourable effect on growth in these countries. The study employed the techniques of the generalised method of moments (GMM) and vector error correction model (VECM) to investigate the issues within the period 1994–2022. The results revealed that growth was impacted more favourably by the contraction in external debt than by stable foreign aid. The impact of the two variables justifies the advocacy and expectations of the IMF/World Bank, which centre on the potential benefits derivable from attracting more foreign aid and reducing high levels of external debt in Sub-Saharan Africa.

To enhance the policy relevance of the study, a structural stability test was performed to determine whether a significant break occurred in the period of study that may render the estimation results unsuitable for policy making. The structural break parameters were insignificant, indicating the absence of structural break, which makes the model suitable for policy making. In view of the policy relevance of the estimated results, the Sub-Saharan African countries need to take further measures that promote foreign aid and reduce external debt to the prescribed ratio of 30 % to foster growth. The findings of this study are most likely to motivate further research on foreign aid, external debt, and economic growth in Sub-Saharan Africa (SSA) and other developing regions such as the Middle East and North Africa (MENA) and Southeast Asia (SEA).

Ethical Compliance

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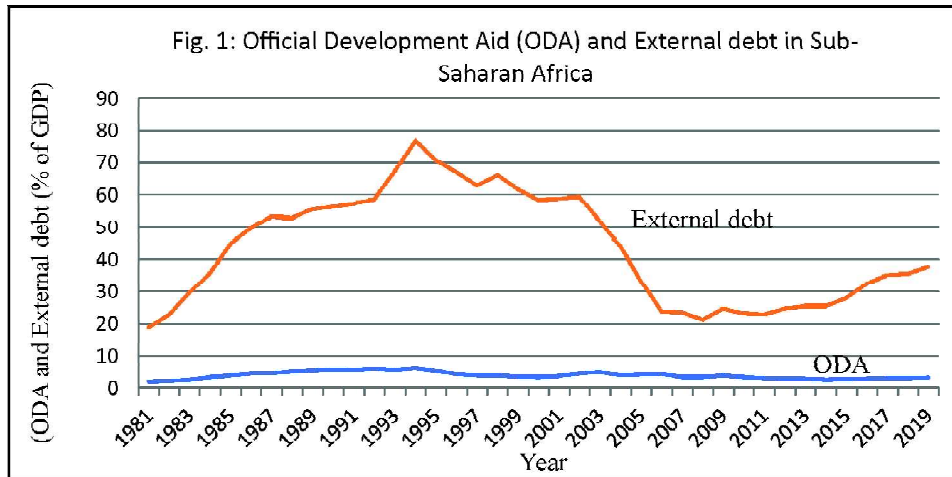
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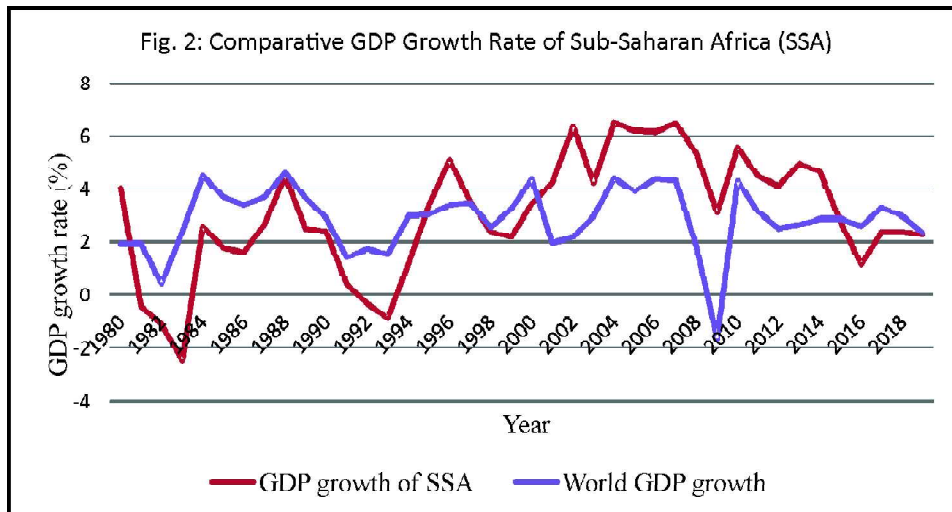
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Appendix



Source: Author's chart based on World Bank Open Database, 2020



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