Debt Sustainability and Economic Growth: Evidence from Low Income Sub-Saharan African Countries[1]

Nitsuh Mengist[2]

Abstract

The purpose of this study is to examine the effect of external public debt on economic growth and to examine the debt sustainability of twenty-four SSA countries over the period 2000-2017 using panel data analysis in which a fixed effect model is estimated. The study found out that external public debt, external public debt service, and trade openness have a negative and significant effect on the economic growth of the selected SSA countries. However, investment and domestic debt have a positive and significant impact on the economic growth. Additionally, the inflation rate and population growth have no significant effect on economic growth. For the purpose of examining the debt sustainability of the chosen countries, various tests were undertaken. The study has concluded that the external debt is unsustainable. In light of the findings, selected SSA countries should adopt an optimal balance between external and domestic debt to ensure sustainable economic growth. They should also implement measures to promote export and expand domestic investment.

Keywords: Sub-Sahara Africa, Panel data regression, Fixed Effect Model, Debt Sustainability, Hausman test

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[2] Lecturer, Wolkite University
E-mail: nitsuhmengist@gmail.com

1. Introduction

Many African countries have problems in finance all of their development spending with the revenues they collect from domestic sources. As a result, they consider borrowing as a substantial source of financing to realize sustainable economic growth[3].Governments' debt financing can help in this regard by channeling resources to projects where the rates of returns are at least sufficient to service the debt incurred (Irwin, 2015). Governments borrow either from domestic or external sources or both. Domestic debt includes funds raised through financial assets such as Treasury bills, bonds, and money borrowed from other locally-owned financial institutions. While, external debt is generated from bilateral and multilateral sources.

In the 1980s, the world experienced a debt crisis in which, highly indebted Latin American and other developing regions were unable to repay their debt. The problem exploded in August 1982 as Mexico reported the failure to service its international debt, and a similar problem immediately expanded to the rest of the world (Harl, 1990). In the 1980s and 1990s, SSA debt burden increased to higher levels, and they have become unable to pay back their debt. Most of them have been granted relief and reduction schemes following the massive debt-forgiveness campaigns of the 1990s. The subsequent fall in debt levels reduced worries about debt-related problems in these countries (Kelbesa, 2014).

Following the 1980s debt crisis, debt relief has been one of the issues on the policy agenda of governments and international institutions. Donors and the international community have agreed to further debt cancellation to the Highly Indebted Poor Countries (HIPC). Accumulated debt has an effect on SSA countries' macroeconomic performance, political, and institutional aspects. High debts could threaten the effectiveness of structural reforms aimed at enhancing growth and poverty reduction (Moss and Chiang 2003). Therefore, SSA countries' situation towards debt servicing and debt accumulation raises the issue of debt sustainability[4].

[3] Sustainable economic growth is economic development that attempts to satisfy the needs of humans but in a manner that sustains natural resources and the environment for future generations. Sustainable economic growth is a sole and most important factor to change the living standard of peoples (Buscemi and Alem, 2012).

[4] Debt sustainability is the ability of a country to meet its debt obligations without requiring debt relief or accumulating arrears.

The fragile financial and economic environment poses serious challenges for developing country debt sustainability. While the bulk of global debt is still held in developed countries, emerging and developing countries debt rose from 40 per cent of global GDP in 2008 to 93.2 percent in 2017. For developing countries as a whole, total external debt stocks had reached $7.64 trillion in 2017, having grown at an average yearly rate of 8.5 percent between 2008 and 2017, or more than 80 per cent over the period. Over the same period, total external debt stocks increased from $155 billion to $293.4 billion in the least developed countries, representing an average annual growth rate of 7.4 percent. Emerging economies registered a slightly higher average growth rate at 9.5 per cent of their external debt stocks. As a result, high debt levels can be problematic as the countries may require debt restructuring and forgiveness which is disruptive and costly and the burden of a debt overhang may undermine urgent progress on policy reform (UNCTAD 2018).

External debt-servicing difficulties have historically afflicted SSA countries, as it is hampering the continent's economic growth as servicing external debt diverts scarce fiscal resources from crucial areas of spending for development and growth. AFRODAD's (2016) report shows, in 1999 it was estimated that "the Highly-Indebted Poor Countries (HIPCs) spent one third of their tax revenues in servicing their debts.

As a result, many researchers are interested in identifying the effect of external debt on growth and have reached different conclusions. Greene (1989), Elbadawi et al. (1996), UNECA (1998), Iyoha (1999), Mwaba (2001), Reinhart et al. (2012), and Panizza and Presbitero (2014) conclude that accumulated external debt works against growth. On the other hand, a study by Tunde (2012), Matiti (2013), Zeaud (2014), Spilioti and Vamvoukas, (2015), Cassimon et al. (2015), and Njangang (2018) revealed a positive relationship between external debt and growth. These inconsistency of results suggest an ensuing controversy in the literature and there is a need for further empirical investigation into the subject matter.

There are three features distinguishing this study from much of the substantial empirical literature on the field. Firstly, the existing studies did not distinguish between public and private external debt. But this is crucial given that the transmission channels are substantially different. Hence, this paper gives an analysis of the impact of external public debt (public and publicly guaranteed) on the economic growth of selected SSA countries.

Secondly, the study examines the debt sustainability situation of low-income SSA countries[5]. The existing empirical literature focuses on the debt crises of SSA countries where middle-income countries of the region are also included. But the concept of debt sustainability in low-income countries is different from that in middle-income countries. Low-income countries have weak policy records to relatively middle-income countries that have some access to private capital inflows. Thirdly, the study incorporates the issues of both the effect of external public debt on economic growth and external debt sustainability of low-income SSA together.

The general objective of the study is to test debt sustainability and to examine the relationships between external public debt and economic growth of low-income SSA countries. While, the specific objectives are; to investigate the effect of external public debt on the economic growth of low-income SSA countries; to analyze the trend of external public debt and economic growth and to examine the effects of other macroeconomic variables on economic growth.

Generally, the finding from this study contributes to the countries by identifying the relationship between external public debt and economic growth in accordance with the debt servicing capacity of the nations. This paper also contributes to other researchers to give insight for further studies as a source of a document. Moreover, it would be useful to explore the above-mentioned issues by updating data and come up with results that are expected to have insightful implications for policy.

2. Survey of the Literature

Foreign debt with the presence of good economic policies encourage the development process that will definitely improve investment climate and help to improve the governance quality by removing the constraints regarding the low tax revenues (Qayyum and Haider, 2012). External debt helps a capital deficient nation to develop its productive activities and infrastructures. Government investments are financed by an additional resource from external debt and this contributes to economic growth (Saifuddin, 2016).

[5] Low income SSA countries are Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Congo Democratic Republic, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Tanzania, Togo, Uganda, Zimbabwe.

External debt affects economic growth through capital-accumulation and total factor productivity growth channels. The capital-accumulation channel implies when external debt grows large, investors lower their expectations of returns in anticipation of higher taxes needed to repay debt, so that new domestic and foreign investment is discouraged, which, in turn, slows capital-stock accumulation (Pattillo, Poirson and Ricci, 2004). The other consideration is that high debt levels may also constrain growth by lowering total factor productivity growth. Governments may be less willing to undertake difficult and costly policy reforms if it is perceived that the future benefit in terms of higher output will accrue partly to foreign creditors. The poorer policy environment, in turn, is likely to affect the efficiency of investment and productivity (Ricci, 2004).

High levels of uncertainties and instabilities related to the debt overhang are likely to hinder incentives to improve technology or to use resources efficiently (Pattillo and Ricci, 2004). The adverse effect of external debt can be reduced or even reversed in the presence of sound macroeconomic policy. The policy measures include reducing the budget deficit, lowering inflation rate, and achieving trade openness (Presbitero 2005). The debt relief initiatives should focus on creating fertile ground for macroeconomic stability (Ramzan and Ahmad 2013).

SSA countries face a severe and growing external debt problems. External debt as a ratio to GDP or exports of goods and services for SSA countries has risen more than threefold since 1980 and exceeds the comparable ratios identified in the Baker initiative (Greene 1989). Investors have the willingness to lend a country's government depends on the country's suspected primary surplus, the level, and volatility of its rate of growth, and the amount of debt government expects to be able to propose in the future for the purpose of servicing the debt it seeks to raise today (Collard et al. 2015).

3. Materials and Method

The study used panel data for 24 SSA countries that are classified as low income which is based on a measure of national income per person, or GNI per capita. The data covers the period between 2000 and 2017 for all variables included in the study. The study employed data from the World Bank's World Development Indicator (WDI) database, Global Development Finance database (World Bank), and supplemented with data from the World Economic Outlook database (IMF). The study employed external public debt, external public debt

service, investment, population, inflation, trade openness, and domestic debt as explanatory variable.

Econometric tests of debt sustainability consist of investigating whether export, import, and other debt sustainability indicators are co-integrated. The theoretical framework of this study is based on the Husted (1992) framework. Husted (1992) provides a simple small-economy framework in which a representative household is able to borrow and lend freely in international financial markets at a given world rate of interest. The representative agent's budget constraint derived as follows:

$$\mathbf{Y_0 = C_0 + I_0 + NX_0} \quad \textbf{where: } \mathbf{NX_0 = X_0 - M_0} \qquad \textbf{(1)}$$

Husted (1992) considers the above equation as a small open economy that produces and exports a single composite of good.

The agent is able to borrow and lend in international markets using one-period financial instruments, faces a given world rate of interest, and is assumed to maximize lifetime utility subject to budget constraints. The current period budget constraint of this agent is given in equation (2).

$$\mathbf{C_0 = Y_0 + B_0 - I_0 - (1 + r_0)B_{-1}} \quad \textbf{where: } \mathbf{NX_0 = (1 + r_0)\, B_{-1} - B_0} \qquad \textbf{(2)}$$

Where C_O is current consumption; Y_O is output; I_o is an investment; r_o is the one-period world interest rate; B_0 is international borrowing; and $(1 + r_O)\, B_{-1}$is the initial debt of the representative agents, corresponding to the country's external debt.

Husted (1992) suggested that equation (2) holds true for every time period. Iterating equation (2) forward provides the economy's inter-temporal budget constraint.

$$\mathbf{B_0 = \sum_{t=1}^{\infty} \delta_t NX_t + \lim_{n\to\infty} \delta_n B_n} \qquad \textbf{(3)}$$

Where NXt is the trade balance in period t which equals $NXt = Xt - Mt = Yt - Ct - It$, Xt equals export and $Mt$is import, and δt is the discount factor or $\delta t = 1/(1 + r)t$.

A necessary and sufficient condition for external debt sustainability is that as $n\to\infty$, the discounted value of the external debt converges asymptotically

to zero. This transversal condition can be expressed as:

$$\lim_{n\to\infty} \delta_n B_n = 0 \qquad (4)$$

Equation (4) implies that a country cannot borrow (lend) indefinitely in global capital markets to finance its trade account deficit (surplus). If this transversal condition holds, then the amount that a country borrows (lends) in international financial markets equals the present value of the future trade surplus (deficits). Thus, a test for the sustainability of the external debt can check for the co-integration of Mt and Xt. If they are I (1) this co-integration regression takes the following form:

$$X_t = a + \delta M_t + U_t \qquad (5)$$

Formally, if M_t and X_t are I (1), the null hypothesis is that M_t and X_t are co-integrated and $\delta = 1$. If the null hypothesis is not rejected, then the external debt is said to be sustainable.

The study uses panel data analysis with annual datasets from 2000 to 2017 and aims to show the impact of external public debt on the economic growth of low-income SSA countries. The theoretical foundation is the augmented Solow model and endogenous growth model with a modification that extends the basic production function framework to permit human capital as an additional input into the production function following Romer (1996) and debt burden following Cunningham (1993). As implied by the Solow's formulation, economic growth is a function of capital accumulation, labor force, and exogenous technological progress which makes physical capital and labor more productive. According to the endogenous growth model, human capital influences economic growth as:

$$Y = f(K, HK, LF, A) \qquad (6)$$

Where Y is a proxy for economic growth; K is capital stock; HK represents Human capital; LF denotes labor force and A is technology. Although the endogenous growth model explains variables which affect economic growth, the model does not consider the impact of debt burden on economic growth. But Cunningham (1993) revealed debt burden is a vital determinant of economic growth especially, for those who are developing and highly indebted economies. Then after including debt burden as a new variable, the growth model can be expressed as:

$$Y = f(K, HK, LF, DB, A) \quad (7)$$

Where: DB is debt burden. Based on economic theories this study modeled GDP growth as a function of external public debt (EPD), external public debt service (EPDS), investment (INV), population growth (POP), trade openness (TOP), Domestic debt (DOM), and inflation rate (INF). This relationship is expressed as:

$$GDP = \beta_0 + \beta_1 lnEPD_{it} + \beta_2 lnEPDS_{it} + \beta_3 lnINV_{it} + \beta_4 POP_{it} + \beta_5 lnTOP_{it} + \beta_6 lnDOM_{it} + \beta_7 lnINF_{it} + U_{it} \quad (8)$$

4. Empirical Results and Discussion

The first step in the econometric analysis is to carry out a unit root test on the variables of interest. The test examines whether the variables are stationary or not. Non-stationary data has often been regarded as a problem in the empirical analysis. The results from the test are presented in Table 1 below and all the variables except external public debt and external public debt services are stationary in level. External public debt and external public debt services are stationary at first difference. Hence, all the variables are integrated of order zero and one the basic conditions for the applications of other test are met and can move to the next step of the analysis.

Table 1: Unit Root test result

Var	Levin-Lin-Chu		Im-Pesaran-Shin	
	t-statistic	P-value	t-statistic	P-value
lnGDP	-6.1094	0.0000*	-5.1539	0.0000*
lnEPD	-1.5728	0.0579	-1.3276	0.0922
lnEPDS	0.4910	0.6883	-0.1473	0.4415
lnINV	-3.0759	0.0010*	-2.3998	0.0001*
POP	-8.2349	0.0000 *	-2.3212	0.0101*
lnINF	-5.9949	0.0000*	-3.2777	0.0000*
lnTOP	-5.6768	0.0000 *	-6.0009	0.0000*
lnDOM	-2.8025	0.0025*	2.4748	0.0005*
lnEPD	-4.7403	0.0000**	-8.5440	0.0000**
lnEPDS	-9.5041	0.0000**	-9.8945	0.0000**

Source: Authors computation from the WDI (2018). The null hypothesis is non-stationarity and the alternative hypothesis is stationarity* and ** indicates statistical significance at I (0) (level) and I (1) (first difference), respectively.

There are three types of tests applied on debt sustainability indicators (external public debt to GDP ratio and external public debt service to export ratio), export and import to check the status of countries regarding their external debt sustainability. Those are univariate unit root tests, panel unit root tests, and panel co-integration tests. The univariate unit-root test statistics for all series (ADF and PP) fail to reject the unit-root null at the level at the 5% significance level while; all series are stationary at first difference. As a result, the researcher turns to test panel unit root, and panel co-integration between the selected variables. The result of panel unit root test is presented in Table 2 below and declares that external debt is unsustainable and similar to the test result of the univariate unit root test; and leads to the third step of panel co-integration test.

Table 2: Panel Unit Root test result of debt sustainability indicators

Specification		Levin-Lin-Chu		Im-Pesaran-Shin	
		t-statistic	P-value	t-statistic	P-value
lnEPD	1st difference	-4.7403	0.0000	-8.5440	0.0000
lnEPDS	1st difference	-9.5041	0.0000	-9.8945	0.0000
lnEXP	1st difference	-5.6579	0.0000	-8.5516	0.0000
lnIMP	1st difference	-10.5485	0.0000	-6.1226	0.0000

Source: Authors computation from WDI (2018). All the variables are stationary at first difference.

The third step in analyzing public debt sustainability is a panel co-integration test. The test is employed to investigate whether the debt sustainability indicators, export, and import are cointegrated; cointegration implies that the *I* (1) series are in a long-run equilibrium; they move together, although the group of them can wander arbitrarily. Cointegration between these variables is a necessary condition for debt sustainability. The Kao (1999) panel co-integration test result is presented in Table 3 below and the test accepts the null hypothesis of no cointegration between variables.

Table 3: Kao Residual cointegration test result

	Statistic	Prob.
DF	-1.359955	0.0869
Residual variance	0.107172	
HAC variance	0.120998	

Source: Authors computation from WDI (2018)

From the Table 4 below we have seen that out of seven explanatory variables five of them significantly affect economic growth of low-income SSA countries from 2000 to 2017. Both external public debt to GDP ratio and external public debt service to export ratio have a negative and significant effect i.e. similar to the expected sign. Thus, on average, 1 percent increases in external public debt to GDP ratio and external public debt service to export ratio of the countries results in 34.9 and 17.4 percent reduction in economic growth, respectively. This result is consistent with the classical and monetarist theory of public debt.

Similarly, the coefficient of population growth is negative but insignificant. Unlike the expected sign, trade openness has a negative and significant effect on economic growth, similar with Rodriguez and Rodrik (1999), Vlastou (2010), and Jawaid (2014) findings that trade restrictions in the form of tariffs, as well as trade-related taxes, are positively associated with economic growth. Relying on a large sample of both developing and developed countries the relationship between trade openness and growth is negative even if it depends on the level of development and size of the economy.

However, gross investment (similar with the findings of Firebaugh (1992), Borensztein et al. (1998) and Asiedu (2002)) and domestic debt have a positive and significant effect on economic growth. The funds generated through domestic borrowing have been used partially to finance those expenditures of governments that contribute to the growth of GDP and long-term development purposes.

Table 4: Fixed Effect model estimation test result

lnGDP	Coefficient	Robust Std. Err	t-value	P-value
lnPED	-.3492947	.0544624	-6.41	0.000***
lnPEDS	-.1743913	.0552937	-3.15	0.004***
lnINV	.2596801	.0978064	2.66	0.014**
POP	-.1534773	.0757545	-2.03	0.055*
lnINF	.0015258	.0205354	0.07	0.941
lnTOP	-.4740249	.1282074	-3.70	0.001***
lnDOM	.2080128	.0609789	3.41	0.002***
CONS	16.10268	2.009333	8.01	0.000

Source: Authors computation using WDI data (2018). ***, ** and * represents significant variables at 1%, 5% and 10% significant level, respectively.

Government with large recurrent budget deficit may be forced to tap into domestic savings including through the issuance of domestic debt, to close their budget gap. In addition to this, domestic debt can also be used to achieve monetary policy target. This is particularly the case in countries with a large balance of payment surpluses, created by large aid inflow and this increases liquidity which could undermine macroeconomic stability and central banks often are decide to intervene by selling government or central bank bills to stem inflationary pressure from excess liquidity (Christensen 2004). Finally, the inflation rate has a positive but insignificant effect in this study.

5. Conclusions and Policy Implications

The econometrics test result indicates that a significant and negative effect of external public debt to GDP and external public debt service to the export ratio on economic growth. A higher debt burden leads to a significant portion of government revenue being devoted to debt servicing instead of being channeled to productive investment. This is a constraint condition to improve economic growth. As a result of which, GDP growth declines. A significant increase in external public debt also discourages investments by increasing uncertainty concerning government policies. An increasing external public debt stock often creates expectations that the government is likely to increase tax to meet its debt obligations. Due to this, the private sector investors are likely to postpone their investment, which in turn reduces economic growth.

The coefficients of population growth and inflation rates are not statistically significant in the selected countries. Similarly, gross investment has a positive and significant effect on the economic growth of low-income SSA countries from 2000 to 2017. An increase in investment involves increased spending of the countries savings' on capital goods that are necessary for production and is likely to increase labor productivity. The resulting increase in aggregate output leads to an improvement in GDP growth and standards of living.

Furthermore, domestic debt has a positive and significant effect on economic growth. Domestic debt is better for low-income countries of SSA for two reasons. First, the payment is made by domestic currencies and this reduces the problem of foreign currencies shortage. Second, the domestic debt interest rate is low compared with external debt. Unlike the expected positive coefficient, trade openness has a negative and significant effect. Trade liberalization reduces

the productivity of the infant industry. For a newly created industry to survive, the government needs to protect it from foreign competition until its production process becomes more efficient and cost-effective.

In this study, the researcher has applied econometric techniques useful to assess the sustainability of external debt. Various univariates and panel unit root test have been applied to 24 Sub Saharan low-income countries with 18 years of data. Three different techniques were applied. The first was the univariate unit root tests (ADF and PP) to know the external debt sustainability of individual countries and the result depicted nonstationary series of external public debt stock to GDP, external public debt service to exports ratios, export, and import. Thus, all the countries are facing the unsustainable level of external public debts. Panel unit root tests (LL and IPS) was the second type of test and applied on low-income SSA countries as a whole to assess their external debt status. The test found that the external debt of the selected countries' economies as a whole was unsustainable.

The third type of tests includes time series and panel cointegration based approaches and found out that there was no long-run relationship observed between external public debt, external public debt service, export and import for each of the selected countries (unsustainable external public debt) and panel cointegration approach declared external debt was unsustainable as a whole. Based on the results, it can be said that the increased external debt is leading the low-income SSA countries' economies toward the low level of growth and retarding development in the economies.

Based on the empirical results the following measures are recommended. First, there is a need to implement an appropriate policy measure in order to adopt a balance between external and domestic debt so as to maintain steady economic growth. Countries with a narrow export base needs export diversification in order to widen the revenue base and reduce external borrowing for the countries to move out of debt distress.

Second, to avoid unsustainable levels of external debt, all low-income SSA countries should reallocate their resources in the development heads. They can utilize their externally borrowed resources in production and development purposes so that the profits and better repayment capacity can make the debt sustainable. The countries may create the economic environment attracting foreign direct investment which supplements not only the countries capital stock by filling the saving-investment gap but also removes fiscal and current account

deficits. The countries should export more and try hard to stable general price level, adopt measures to increase the domestic saving and investment rates, borrow from the sources having the less volatile and low-interest rate.

Finally, appropriate debt management mechanisms should be adopted and implemented to keep debt levels within sustainable limits. To be more specific, the Government should invest the borrowed money on productive investments, reduces unnecessary expenditures, and try to reduce corruption.

List of Acronyms

AFRODAD	African Forum and Network on Debt and Development
ARDL	Autoregressive Distributed Lag model
DSA	Debt Sustainability Analysis
DSF	Debt Sustainability Framework
FDI	Foreign Direct Investment
FE	Fixed Effect
GNI	Gross National Income
HIPC	Highly Indebted Poor Countries
IBC	Intertemporal Budget Condition
IMF	International Monetary Fund
MDRI	Multilateral Debt Relief Initiatives
MSD	Maximum Sustainable Debt
PD	Probability of Default
PNG	Private Non-Guaranteed debt
PPG	Public and Publicly Guaranteed debt
PV	Present Value
RE	Random Effect
SSA	Sub-Saharan Africa
UNCTD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
VIF	Variable Inflation Factor
WB	World Bank
WDI	World Development Indicator

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