ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES
COLLEGE OF BUSINESS AND ECONOMICS
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THE EFFECT OF EXTERNAL DEBT ON ECONOMIC GROWTH AND ITS SUSTAINABILITY IN SUB-SAHARAN AFRICA

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A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Economics (Economic Policy Analysis)

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This is to certify that the thesis prepared by Ermiyas Tefera, entitled with: **The Effect of External Debt on Economic Growth and its Sustainability in Sub-Saharan Africa**, and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Economic Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

To date, the impact of external debt on economic growth is still ambiguous. On one hand, there exist copious and mixed evidential outcomes on the effect of external debt on economic growth. On the other hand, the contradiction prevailed between the linear and non-linear effect of external debt on economic growth. The objective of this study is twofold. First, to investigate the effect of external debt on economic growth in Sub-Saharan Africa (SSA). Second, to examine the sustainability of external debt in the region. A large panel data set of 41 SSA countries over the period of 2000-2017 is employed to estimate the effect of external debt on economic growth. The panel threshold model developed by Hansen (1999) is applied to analyze the effect of external debt on economic growth. The study adopts the bootstrap method developed by Hansen (1999) to test the statistical significance of the threshold effect. The empirical result revealed that there is a statistically significant non-linear relationship between external debt and economic growth in SSA, implying that a negative impact of external debt on economic growth at a higher level. The study finds strong evidence that there is a single threshold level of external debt-to-GDP ratio. The threshold level of external debt-to-GDP ratio for SSA works out to be 21.78 percent, beyond which the negative effect of external debt on economic growth is observed and the level of external debt is unsustainable. In addition, external debt sustainability is analyzed based panel unit root tests and panel cointegration test. According to these test results, external debt is unsustainable in SSA. In light of these findings, this study recommended that governments of SSA countries should utilize their external borrowed resource in productive and development purposes, and should adopt sound external debt management policy in terms of structure and composition of external debt.

Keywords & Phrases: External debt, debt sustainability, economic growth, panel threshold model SSA countries

JEL Classification: C33, F34, F43, H63, O4

Declaration

I hereby declare that this Msc. thesis entitled "**The Effect of External Debt on Economic growth and Its Sustainability in Sub-Saharan Africa**" was carried out by me for the masters of economics under the guidance and supervision of Dr. Atnafu G/Meskel, Addis Ababa University, college of Business and Economics, Department of Economics.

The interpretations put forth are based on my reading and understanding of the original texts and they are not published anywhere in the form of books, articles and reports. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text.

For the present thesis, which I am submitting to the University, no degree or diploma or distinction has been conferred on me before, either in this or in any other University.

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List of Acronyms

ADF	Augmented Dickey-Fuller
ADI	African Development Indicators
AfDB	African Development Bank
ARDL	Auto Regressive Distributed Lag model
BoP	Balance of Payments
CD	Cross-sectional Dependency
DEDH	Direct Effect of Debt Hypothesis
DOH	Debt Overhang Hypothesis
DSA	Debt Sustainability Analysis
DSAs	Debt Sustainability Assessments
DSF	Debt Sustainability Framework
EDiA	Economic Development in Africa
FE	Fixed Effects
GDI	Gross Domestic Income
GDP	Gross Domestic Product
GMM	System Generalized Methods of Moments
GNI	Gross National Income
GNP	Gross National Product
HIPC	Highly Indebted Poor Country
HT	Harris–Tsavalis
IBC	Inter-temporal Budget Constraint
IDA	International Development Association
IDS	International Debt Statistics
IFC	International Financial Corporation

IMF	International Monetary Fund
IPS	Im, Pesaran, and Shin's
LCH	Liquidity Constraint Hypothesis
LICs	Low-income countries
LM	Lagrange multiplier
MDGs	Millennium Development Goals
MDRI	Multilateral Debt Relief Initiative
NPG	Non- Ponzi Game condition
OECD	Organization for Economic Co-operation and Development
PPG	Public and publicly guaranteed external debt
PVC	Present value constraint
QAR	Quantile autoregression
SSA	Sub-Saharan Africa
UN	United Nation
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development programs
VIF	Variance inflated Factor
WB	World Bank
WDI	World Development Indicators
US	United State

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Following the debt relief under the Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief (MDR) Initiative over the past two decades, external debt in several African countries has rapidly increased in recent years. In 2011–2013, the annual average external debt stock of Africa amounted to US$443 billion (22 percent of gross national income (GNI)). Africa's external debt stock grew rapidly, by on average 10.2 percent per year in 2011–2013, compared with 7.8 percent per year in 2006–2009 (UN Conference on Trade and Development [UNCTAD], 2016). Because of this continuously raising level of external debt stock in Africa, government external debt payments have increased dramatically in the last few years. Between 2015 and 2017, it doubled, rising from 5.9 percent of government revenue in 2015, to 11.8 percent of government revenue in 2017 (Economic Development in Africa Report, 2017).

Similarly, International Financial Corporation (IFC) in 2018 noted that external debt in African countries has grown by 10 percent of GDP, on average, since 2014. Debt levels have risen even faster in several African nations more than 10 percent of GDP. This rapid debt accumulation occurred after the debt relief and debt clearance mechanisms such as the Heavily Indebted Poor Countries (HIPC) Initiative of the late 1990s and early 2000s. The external debt burden has increased further due to large currency depreciation against the U.S. dollar since 2014(see Figure 11). As many African countries accessed international capital markets over the last decade, their external debt also increased, with the composition of debt shifting toward higher-priced non-concessional financing (see Figure 16).

More specifically, external borrowing from non-traditional (particularly from China) lenders one in raising debt in the Sub-Saharan Africa (SSA) region considerably, ranging from 21.2 per cent of GDP in Burundi to 54.2 per cent of GDP in Ethiopia in 2016 (Africa Economic outlook, 2018). In this region accumulated external debt at a faster pace than low- and middle-income countries of other regions, the combined external debt stock rise by 15.5 per cent in the year 2017 to US$535 billion from the year 2016. Much of the external debt stock increase was driven by two of the region's largest economies, Nigeria and South Africa, where the external debt stock rise by 29 per

cent and 21 per cent respectively. Even for some countries in the region, the increase was much larger, between 2010 and 2017 external debt stocks rose more than 200 percent in Cameroon, Ethiopia, Rwanda, Uganda and Zambia and by more than 140 per cent in Ghana, Kenya and Liberia (International debt statistics, 2018).

In addition to this, in SSA countries the ratio of external debt-to-GNI increased to 34.2 per cent in 2017 compared to 32 per cent in 2016 on average. However, that was over 50 percent higher than in 2010. On the other hand, at the end of 2017 54 percent of countries in the region had an external debt-to-export ratio over 150 percent, as compared to 28 percent of countries in 2010 and the number of countries where the ratio surpassed 200 per cent more than doubled, from 6 countries to 14 countries, over the same period. And in the same year, one-third of the countries in the region had a debt service-to-export ratio above 10 per cent (Economic outlook of Africa, 2018).

In Sub-Saharan Africa, not only the government but also the private sectors were accumulated external debt (Economic Development in Africa Report, 2016). The size and rate of growth of external debt have an implication for external debt sustainability and its effect in the region. Countries in the region have been characterized by unsustainable external debt (Muhanji and Ojah, 2011). According to (IMF, 2018) debt sustainability analysis from the total Sub-Saharan African countries 6 in debt distress, 13 countries in high risk, 15 countries in moderate risk and 5 countries in low risk (see the list in the Appendix 11). The basic issue concerning the sustainability of external deficits has gained importance in developing countries as well as among political leaders, academic economists, and researchers in international institutions. Indeed, debt sustainability has become a highly important topic for governments because it requires the adoption of responsible policies in order to ensure macroeconomic stability (Llorca and Matthieu, 2017).

Many low-income countries (LICs) in general and SSA countries, in particular, require external financing to reach their development objectives, and increase investment in infrastructure is critical to achieving sustained economic growth (Akanbi, 2014). And the final objective of the economic policy is to achieve a high and stable economic growth level. In developing countries, external borrowing considered as an important resource for financing economic growth (Doğan and Bilgili, 2014).

External debt may not be a big problem if the borrowed funds invested in a sustainable project and growth is high enough to repay the debt as well as finance additional investment demand (Africa Economic Chart Book, 2018). In the case of SSA, however, this has not been the case, the world most low-income countries were found in the region. Over two decades, the general economic context of SSA is turning less favorable, with growth slowing down, especially in oil and mineral exporting countries. On the whole, overall growth is expected to continue, but at a slower pace (Zamfir, 2016). The SSA economic growth continued to deteriorate in 2016, due mainly to lower commodity prices, with commodity exporters most adversely affected (Africa economic outlook, 2017).

The decreasing economic performance and the accumulation of large external debt stock in SSA lead to a growing concern among the African and international community. The growing indebtedness of these countries is often mentioned as a major reason for their poor economic performance. Because of all aforementioned quantitative figures and facts, the effect of external debt on the economy in the region and the sustainability of external debt is questionable.

1.2 Statement of the problem

> *"There is no simple relationship between debt and growth [...] There are many factors that matter for a country's growth and debt performance. Moreover, there is no single threshold for debt ratios that can delineate the "bad" from the "good." (International Monetary Fund, 2012, p.109.* This is an indication for further research in the subject matter.

External debt sustainability and its effect on the economy are burning issue and, a popular topic of debate due to the worldwide debt crisis. Nowadays, almost all economically developed and developing countries are subject to the problem of external debt because of current account and fiscal deficits (Muhammad et al., 2014). External debt in Africa is on the rise and is predominantly related to reduced export revenue, a widening current account deficit and slower economic growth (UNCTAD, 2016). And determining the sustainability of a developing country's external debt is a challenge. This is because most developing countries in general and Sub-Saharan Africa (SSA) countries in particular face an undiversified export base, a large share of agriculture in GDP (which itself is characterized by low yields) with large share of labor force in the primary sector, and complex governance and instability problems (Seid et al., 2014).

SSA countries as a group showed a considerable reduction in external and public indebtedness in the early 2000's as the result of HIPC, however, more recently, most SSA countries have with a rapid increase in external debt accumulation (Battaile et al., 2015). These countries indebtedness are a rising concern, with the interest cost on SSA countries debt rising sharply in recent years (Africa Economic chart book, 2018). According to the Global Rating Report, noted that the interest cost on SSA countries debt have returned to levels last seen before the debt forgiveness program of the early 2000s. As a result, the IMF has reduced its debt sustainability assessment in the area.

Nowadays, the effect of external debt on economic growth and sustainability of external debt a hot research topic. Numerous empirical works have been carried out on the effect of external debt on economic growth in developed and developing countries using different econometric models and statistical tools. However, these studies were indicated contradictory result in their conclusions on the effect of external debt on economic growth. For instance, a study by Senadza

(2017), Babu et al. (2014) and Dereje (2013) concluded that the effect of external debt on economic growth is negative. Another study conducted by Okoye et al (2017), Usman et al (2014), Spilioti (2015), and Jayaraman and Lau (2009) noted that external debt and economic growth were positively correlated. Moreover, research studies on the functional form of debt-growth nexus were inconclusive; some of them were confirmed that there is a linear relationship while the other also supported that non-linear relationship. Studies by Reinhart and Rogoff (2010), Egert (2012), Mencinger et al.(2014), Swastika et al. (2013), Megersa (2015), Kaur and Mukherjee (2014), Dogan and Bilgil (2014), Clements et al. (2003), and Doğan et al. (2014) concluded that there is a non-linear relationship between external debt and economic growth. But other studies by Folrunso and Felix (2008), Herdon et al. (2013) and Senadza et al (2017) noted that does not exist a non-linear impact of external debt on economic growth. Therefore, the above all result contradictions show that there is a room for further research in the subject matter.

In addition, the effect of external debt on the economic growth is different across a time horizon in a given area. A study by Swastika et al. (2013) found that the impact of external debt on economic growth has time-varying nature embedded in it. Another study by Herndon and Pollin (2013) point out that the relationship between public debt and economic growth varies significantly in different time periods and countries. Egert (2012) also noted that the debt threshold level can be lower and the nonlinearity can change across different samples and specifications. Another study by Gomez and Sosvilla (2015) explained that the debt-growth nexus differ among several countries and across time horizon. So, this study used the recent data to analyze the effect of external debt on economic growth and its sustainability in the region. A recent study conducted by Chudik et al. (2018) concluded that the debt-growth relationship is complex, varying across countries, affected by global factors and there is no simple universal threshold.

External debt sustainability assessments are part of a process, which is itself in development. Empirical literature's concerning external debt sustainability was conducted by using different econometric methods and models in a different area. However, the sample countries, the sample periods and the econometric methods will make the results different. In addition, the vast majority of the literature were conducted in specific to the country even the IMF and WB external debt sustainability analysis (see, Takeuchi (2008), Kaur and Mukherjee (2012). And, most of the study

were studied on the external debt sustainability using panel data basically from Asian and advanced countries (see, Llorca (2017), Sheikh et al. (2014), Blanchard and Das (2017) and Lin (2014). However, studies using panel data in Sub-Saharan African countries were limited and has received relatively little attention.

The motivations of this study come from the following reasons. Firstly, the existence of ongoing debate with regard to the impact of external debt on economic growth and their functional relationship forms. Secondly, external debt sustainability analysis and its effect on the economy has been continuous and to be a current subject matter. Thirdly, the timing of the study is significant given the extensive use of external debt to finance annual budget in Sub-Saharan Africa countries.

Generally, to the best of my knowledge, none of the researchers has been conducted a study on the effect of external debt on economic growth using a panel threshold model in 41 SSA countries. In addition, none of the empirical literatures conducted a study jointly on the effect of external debt on economic growth and its sustainability in the region. Therefore, this study particularly aimed at addressing these research gaps by panel threshold model in 41 SSA countries.

1.3 Research questions

1. What is the recent external debt trend looks like in SSA countries?
2. Does the rapid rise in external debt stock affect economic growth in Sub-Saharan Africa?
3. Is the nexus between external debt and economic growth in the region nonlinear?
4. Is external debt sustainable in the Sub-Saharan Africa countries?

In an attempt to answer, the aforementioned research questions both general and specific objectives of the study are framed in a subsequent way:

1.4 Objectives of the study

1.4.1 Major objective of the study

This study investigated the relationship between external debt and economic growth in Sub-Saharan Africa. The study also seeks to analyze external debt sustainability in the region.

1.4.2 Specific objectives

i. Explain the trend of external debt and economic growth in SSA.
ii. Analyze the effect of external debt on economic growth in SSA.
iii. Examine whether the nexus between external debt and economic growth is nonlinear in SSA
iv. Determine the sustainability of external debt in Sub-Saharan Africa.

1.5 Significance of the study

Indebtedness has been a serious economic problem in developing countries in general and in Sub-Saharan Africa countries in particular. And as a result of this, the burden of external debt has been a matter of great concern to the government of all nations in Sub-Saharan Africa countries. Previous studies were attempted to explain the effect of external debt on economic growth and assess external debt sustainability in the area independently rather than addressing the effect and its sustainability jointly. The study attempted to address the effects and its sustainability of external debt in the area. Thus, its findings will be helpful for better understanding of the position of external debt in Sub-Saharan Africa countries and its effect on the economy. The result is also

expected to be helpful for the formulation of policies and in order to conduct further studies on the issue. In addition, the study will be alarming for governments, financial institutions and other concerned bodies in the area to take optimal action.

1.6 Scope of the study

The study seeks to analyze the effect of external debt on economic growth and assess its sustainability in Sub-Saharan Africa countries. In order to capture the effect and its sustainability of external debt in the study area, thorough empirical investigation is conducted with data covering a period of 18 years i.e. 2000 – 2017. This period was chosen because in order to account recent time data and data availability of most Sub-Saharan Africa countries.

1.7 Limitations of the study

Data availability and weaknesses remain a major setback in carrying out empirical research in most developing countries, particularly in Sub-Saharan Africa. The number of counties covered in this study and the number of time span used in this study is the basic limitations of the study. Even if, there are 48 Sub-Saharan Africa countries this study took 41 of them and the study is used 18-year data for each country. This is mainly due to lack of data on important variables and lack of adequate long time data series on important variable: to overcome these problems and generalize the finding for the remaining countries because large sample is more representative, panel threshold model is used in the estimation.

1.8 Organization of the study

The rest of the paper is organized as follows. Chapter **II** reviews the related theoretical and empirical literature. Chapter **III** includes the description of the study area, data source, methodology of the study and model specification. Chapter **IV** presents external debt and GDP growth profiles of Sub-Saharan Africa countries and its trend in the region. Chapter **V** provides empirical analysis and discusses the findings. Lastly, chapter **VI** concludes the study with the main findings and forward some policy implications based on the findings.

CHAPTER TWO

REVIEW OF THEORETICAL AND EMPIRICAL EVIDENCE

2. Introduction

The development of huge external debt [1]accumulation in developed and developing countries particularly in Sub-Saharan Africa countries has invited theories and empirical investigation into assessing the impact of external debt on economic growth and its sustainability. This chapter will discuss previous works done by various scholars, authors, and researchers in the subject matter. The first section of this chapter will discuss the theoretical review of the study and it includes the growth theory, theory of external debt-growth nexus and the theory of external debt sustainability. The second section will discuss the empirical literature on the external debt and growth nexus, and external debt sustainability analysis. The final section of this chapter is the conclusions of the empirical review.

2.1 Theoretical Review

In this section, the study briefly reviewed the theoretical aspect of economic growth, economic growth-debt nexus and external debt sustainability[2]. Up to date most of the empirical reviews were basically focused on the effect of external debt on economic growth and external debt sustainability analysis independently. Therefore, this study is trying to compile and review the two issues in theoretical and empirical review aspects.

2.2.1 Economic growth theory

The neoclassical growth theory which has its origin from the Harrod-Domar growth model which is one of the most important modern growth model, the primary element of economic growth also investment. For this model, increase the amount of saving, which means the investments, and then

[1] In this thesis, "external debt stock" refers to a country's total external debt that includes the stock of debt owed to nonresident governments, businesses and institutions and repayable in foreign currency, goods or services. According to World Bank (1993) and used in the entire thesis, external debt includes public and publicly guaranteed debt, as well as private debt. While Public debt (government debt) refers to a sovereign debt owed by the government. And it can be categorized as domestic debt (owed to lenders within the country) and external debt (owed to foreign lenders). Generally, government debt is all government liabilities, including future pension payments and payments for goods and services, which the government has contracted but not paid.

[2] A country can be considered to achieve external debt sustainability if it is expected to be able to meet its current and future external debt service obligations in full, without recourse to debt relief, rescheduling of debts, or the accumulation of arrears, and without unduly compromising growth(IMF,1997)

increase in the growth rate. External debt in this situation increases saving and increase the growth rate. Generally, according to this theory, production capacity is proportional to capital stock.

The Solow model (1956) was developed based on the popular Cobb-Douglas production function. The growth model is still used as one of the primary frameworks for analyzing differences in cross-country economic growth patterns and convergence. It takes into account technology, labour and capital. Based on these factors it is argued that differences in growth could arise from two separate channels: differences in total factor productivity and differing levels of capital per worker in the various countries. The basic assumptions behind the model are that savings and technological progress are exogenously given and that technological state is labour augmenting. In addition, Solow states that the only way a country can be on a sustainable growth pattern is by only investing in research & development and education. Furthermore, the economic literature has been enriched by the contribution of Conlisk (1967), who augmented the classical growth model by changing the technological state of the economy to endogenous. According to endogenous growth theory, the economic growth rate is determined by the forces that are internal to the economic system especially those forces that govern the opportunities and incentives for creating technological knowledge.

Notable contributions to the economic growth theory have been made by Lucas (1988) who augmented even further the neoclassical Solow model by adding human capital to it. This addition is very important as it catches the effect of education and acquired skills of workers on output. Lucas argues that there are two types of capital: human capital and physical capital.

Stiglitz and Hoff (2001) support the fact that the Solow model incorporates key determinants of economic growth. Their research augments even further the potential list of factors having an effect on growth and convergence among countries. The researchers focused on different factors such as the historical background of the country, institutions, culture, government and rule of law. And they concluded that these listed factors have significant effect on economic growth.

2.2.2 Theories of Growth-Debt Nexus

The impact of external debt on economic growth remains a controversial issue in both academic and policy-making circles. In recent time, theoretical and empirical studies try to analyze the

question of whether the rising external debt shows positive or negative effects on economic growth. There are different approaches dealing with the effect of external debt on economic growth and these approaches were with their own theoretical foundations. Harrod-Domar growth theory captures the positive effect of external debt on growth via an increasing level of saving. In addition, the Keynesian economist argued that the importance of external debt to motivate the economy, especially when the economy is at the recession period government borrowing helps to increase overall aggregate demand and then the economic growth (Seater, 1993). In contrary, classical economist defined the thought that the minimum government intervention and provides that the economic problems are solved by the market. And also government expenditure must be minimum level the taxes, debt and related instruments must finance these expenditures. From the classical economist, Ricardo is basically against the external debt because to pay the interest of the debt, the government increases the taxes and it can cause an outflow of capital. Ricardo discussed whether it is preferable to finance a deficit via new government debt or via a temporary tax. He argued that in fact there is no choice between them since debt is just deferred taxes (see Buchanan, 1976).

Generally, based on theoretical foundations the debt-growth nexus is inconclusive, there are three groups of relationships, and these are a positive, negative and non-linear relationship. There are also three groups of theoretical models describing this nexus.

The first group offered supporting evidence for the positive relationship between economic growth and external debt. These views are based on the provisions of the Harrod-Domar, Keynesian and neoclassical theory of growth, where external debt contributes to more intensive economic growth, provided the productive use of borrowed funds. The second group of models devoted to analyzing the adverse effects of external debt on economic growth. This group of models based on the theory of "debt overhang" developed by Krugman(1988). From classicalist, David Ricardo also supported that the negative effect of external debt and according to him a debt is deferred taxes (Buchanan, 1976). The third group of models, the most popular nowadays, was considering that the non-linear relationship and combine the above two group of models. This group of modes is based on the principles of the Laffer curve and debt overhang.

2.2.3 Theories of Debt Disincentive Effects

Debt disincentive effect focused on the relationship between debt and economic growth through investment. These theories have wider economic concept on debt sustainability analysis and in growth-debt nexus. The debt disincentive effect can be explained with the help debt overhang hypothesis, liquidity constraint hypothesis and debt Laffer curve. These models confirmed that there is exist non-linear relationship between debt and economic growth. Nowadays, these three models are widely used and influential. These theories say that at the very high level of debt put a negative effect or disincentive effect on economic growth. Theoretically, it is simple to analyze the effect of debt on economic growth and its sustainability using these models. These theories are briefly discussed in this section.

i. Debt Overhang Hypothesis

This model was first formulated and tested by the Krugman 1988. And he defines that Debt overhang means that a country's level of debt is much high that debtor country losses its ability to attract new investment due to the present inability to services its debts and prospects of sinking the investment return fully into future debt servicing. He adds and believed that the current debt overhung puts the disincentive effect on investment by discouraging future investors. The debtor country remains to fail to accumulate resources even the investment beneficial for the country and bring economic growth (Krugman, 1988). This theory establishes a negative relationship between high debt and economic growth.

ii. Liquidity Constraint Hypothesis

The other channel through which external debt affects economic growth is debt service requirement or debt repayment obligation. This hypothesis states that the requirements of external debt service reduce fund availability for investment purpose. Hence, a negative effect of debt service on investment would result in liquidity constraint (see Hofman and Reisen (1991)). A higher stock of outstanding debt and a large amount of external debt service obligations can affect economic performance through investment, due to decreased availability of funds and shut-off from foreign credit markets, it is expected that investments would have declined because of the decreasing in available resources for financing investment and macroeconomic conditions (Karagöl, 2002). Generally, DOH and LCH both imply an indirect adverse effect on economic

growth, via reductions in the level of investment. In contrast, the direct effect of debt hypothesis (DEDH) [3]suggests that external debt affect economic growth via its influence on the productivity of investment(Ibid).

iii. Debt Laffer Curve

For the first time, the concept of the Laffer curve was developed by one of the supply-sider economist Arthur B. Laffer in 1978 and used this concept in tax rate and taxation revenue. The debt Laffer curve was first introduced in the context of the "debt overhang" argument by Jeffrey Sachs (1989). Paul Krugman (1989) formalized the actual derivation of the curve and the underlying logic behind it. The curve illustrates a situation in which, if a country is borrowing too much, that is it surpasses a certain endogenous threshold of the level of debt, which may result in efficiency losses. The curve relates to the relationship between economic growth and debt. And it shows the inverted U-shape relationship between economic growth and debt (see Figure 2.1). In other words, according to this concept debt and economic growth does not have linear relationships i.e. there is a non-linear relationship between the two. The shape of this curve reflects that there is specific threshold level of debt and if debt exceeds that level will not only cap the growth process but also adversely affect the economic growth of that economy. Generally, the debt Laffer curve has two parts the first part is the portion of the curve that shows a positive relationship between economic growth and debt i.e up to the threshold level. The second part of the curve is the part that shows a negative relationship between economic growth and debt i.e beyond the threshold level. So the debt is considered to be sustainable if it is lower than or a least equal to that threshold level (see figure 2.1).

[3] Direct effect of debt hypothesis (DEDH) is that a country facing large debt service payments, relative to its available resource, is likely to exhibit a relatively low productivity of investment. And, then decreased output growth "directly" by diminishing productivity of investment or capital, because of adverse effect of investment.

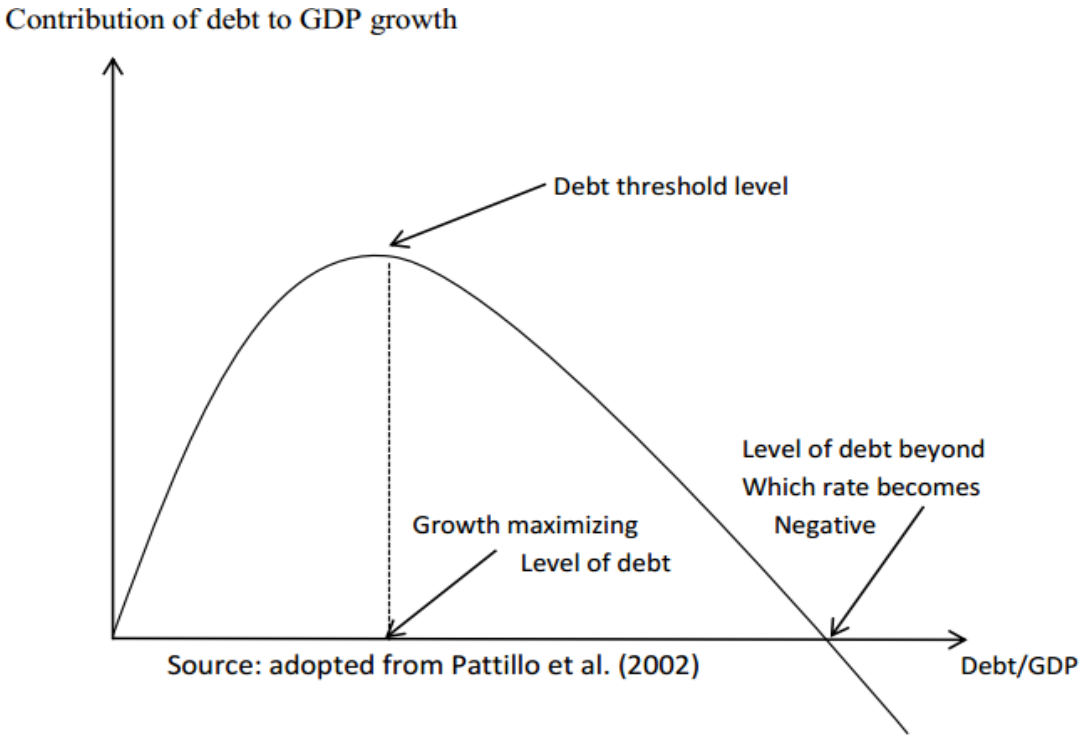


Figure 1: Debt Laffer curve

2.3 Theories of External Debt Sustainability Analysis Approaches

There are a number of approach to the external debt sustainability analysis which was explained by in different scholars. These approaches will review in this section. In a wider sense, the external debt sustainability analysis can be classified into financial sustainability perspective based approach and economic sustainability perspective based approach.

2.3.1 Financial Sustainability Perspective Based Approach

Financial sustainability perspective based approaches of external debt sustainability analysis are mainly concerned with the financial position of the borrowing country regarding repayment of their external debt. This perspective approaches also considers the impact of external debt on the financial position of the borrowing country. In this perspective based approach there are two types i.e borrower based and lender based perspective approaches which are explained in the following section.

A. The Borrower Based Approach to External Debt Sustainability

It focuses on the nature and behaviour of borrowing country about its capacity and willingness to repay its external debt obligation. The borrower based financial sustainability perspective based approach concentrates on the external and internal gaps which the borrower country faces and these gapes ultimately determine the debt capacity of a country. This perspective is known as the debt capacity perspective approach. The literature on this viewpoint can be divided into four types of a model i.e threshold model, debt optimizing model, non- optimizing model and Indicator based approach (WB and IMF external debt sustainability analysis).

Threshold models of external debt sustainability analysis approaches are based on the concept of a non-linear relationship between external debt and economic growth. According to these models, there are one or more threshold levels of external debt sustainability indicators. When external debt mounts up to these levels, it affects or hampers economic activities and the economic growth and considered to be external debt is unsustainable (Calvo, 1998). While if the level of external debt below these threshold points it speed up economic growth and in this case, the foreign debt is considered to be at the sustainable level. Furthermore, Nasa (2009) classifies the threshold models into two based on the method of determination of threshold level which is exogenous threshold model and endogenous threshold model.

External debt optimizing model is another borrower based and financial perspective based approach of external debt sustainability analysis. External debt optimizing model deals with the question of the optimal level of debt and it underlines that how much a country should borrow that mobilized resources would be beneficial for after receiving the debt. The concept of threshold model and external debt optimizing model are almost similar but the latter case determine the optimal level of external debt by using the concept of marginal cost and marginal benefit i.e (Marginal cost of external debt = Marginal benefit of external debt).

Non-optimizing model is borrower based financial perspective external debt sustainability analysis and this model further includes growth-cum debt model and debt dynamics model. Growth-cum model, according to this model it not only take into account the current benefit and cost from external debt but also the future benefit or opportunities (profitable investment opportunities and productivity of resources) and cost in order to analysis external debt

sustainability. Whereas, the debt dynamics model compares the benefit and the cost of a country regardless of economic growth. This model considers the value of export as the best indicators of the repayment capacity of a country by arguing that external debt repaid in foreign currency. In other words, this approach links the country's repayment capacity directly to export earnings (Nissanke and Ferrarini, 2001).

Indicator-based approach (The external debt sustainability framework for low-income countries) in this approach the WB and IMF redefined the external debt sustainability. Then, IMF and WB formulate their own approach to analyze external debt sustainability basically for HIPC[4] incentives in 1996. The incentives were built on the Debt Sustainability Analysis (DSA) which was basically a borrower based analysis and specific to the country. External debt sustainability analysis can be examined by conducting a forward-looking analysis of the indicators of debt burden or the evolution of debt burden under the baseline scenario and the stress test scenarios. This analysis requires the projection of income and expenditure flows considering the exchange rate change and flow of debt servicing, and the projection of external debt dynamics depends upon the financial and other macroeconomic development.

B. Lender Based Approach/ Inter-temporal Budget Constraint (IBC)/

According to IBC or lender based approach external debt sustainability analysis is based on the concept of Non- Ponzi Game condition (NPG). In this approach, if the country considered to be a sustainable external debt must satisfy NPG condition which requires the equivalence of actual external debt stock and the present discounted value of the country's future trade surplus. And sometimes this approach also called present value constraint (PVC). PVC testifies that a country's external debt is sustainable if the Inter-temporal budget constraint(IBC) transversality condition is fulfilled in an infinite time horizon. Empirically, in literature, the external debt sustainability using IBC has been analyzed by unit root and co-integration test.

[4] HIPC Initiative was a unique debt relief package compared to the traditional debt relief approaches, as it sought to reduce debt stocks to sustainable levels subject to satisfactory policy performance of beneficiaries, while situating debt relief within a framework of poverty reduction. It was expected to be a comprehensive debt relief framework dealing with the debt problems of some of the world's poorest countries, and being the only relief package that addressed the issue of multilateral debt and attempted to involve all stakeholders.

2.3.2 The Economic Sustainability Perspective Based Approach

The economic sustainability perspective based approach of external debt sustainability also called the development perspectives. It looks at the channel through which external debt burden affects the economic growth of the debtor country. This approach basically analysis the inter-linkage between external debt stock and debt servicing with economic growth, inflation, investment, exchange rate, import and export, and balance of payment. According to this approach, external debt affects economic growth in two main channels i.e cash flow effect and debt disincentive effect. These two channels are already mentioned and explained above in the theories of debt-growth nexus Arnone et al., (2005).

2.4 Risk Elements of External Debt

There is a risk attached to the level of the external debt stock and servicing external debt. In developing countries in general and Sub-Saharan Africa countries in particular, the risk attached to these countries is concerned with exchange rate fluctuation and export commodity price volatility. Because total external debt stock always expressed as a lender countries currency and as a result of this if the lender countries currency will appreciate the level of total external debt stock will also increase in borrower countries. External debt can turn to be most costly if raised in a currency whose value consistently appreciates relative to the domestic currency. Moreover, countries whose currencies are non-tradable in the international financial market often would have to devalue their currencies to solve BOP imbalances. Exchange rate risk is difficult to calculate while hedging against future risk over a long period of time could be challenging.

2.5. Empirical Review

In economic literature of recent times, there are different studies about the effect of external debt on economic growth. From these studies, some of the studies discussed the positive effect of external debt on economic growth. A vast majority of the studies were discussed about the negative and non-linear effect of external debt on economic growth. And will discuss all of these types of studies in the next section.

2.5.1 Empirical Review on Debt-Growth nexus

I. Studies which found a positive effect of external debt on economic growth

Okoye et al (2017) examined the impact of external debt on economic growth in Nigeria using time series data from period 1981 to 2015. The study analyzed using ordinary least square method and the regression result shows that external borrowing has a positive and significant effect on economic growth. In addition, other explanatory variables like exchange rate and inflation also positive effect on economic growth whereas gross fixed capital formation has a negative and insignificant effect on economic growth in the study area. Similarly, Usman et al. (2014) investigated the contribution of external debt to economic growth in Nigeria using time series data from 1970 to 2010. The finding of the study revealed that external debt contributed to economic growth positively.

Jayaraman and Lau (2009) investigated the impact of external debt on economic growth in six Pacific island countries between 1988 and 2004. Their study concluded that higher external debt level promotes higher economic growth in the study area. They also tested for causality by a panel - based vector error correction model and find that there is no causal relationship between economic growth and external debt in the long run, but there is a strong and significant causality relationship between external debt and economic growth in the short run. Another study by Spilioti (2015) examines the impact of average government debt on economic growth in the Euro area countries using data from 1981-2014. He found that the impact of debt on economic growth positive and statistically significant.

II. Studies which found a negative effect of external debt on economic growth

Babu et al. (2014), Senadza et al. (2017) and Fernando et al. (2017) were investigated the relationship between economic growth and external debt. The empirical result declared that external debt has a negative effect on economic growth. More specifically, Senadza et al. (2017) undertook a study on the effect of external debt on economic growth in Sub-Saharan Africa countries using panel data from 1990 to 2013. System Generalized Methods of Moments (GMM) estimation technique used to analyze its effect and the empirical result found that external debt and economic growth have a negative relationship in the study area. They also concluded that the nexus between external debt and economic growth does not support by non-linearity and country classification based on the level of per capita income does not a significant influence in growth-debt nexus.

Panizza and Presbitero (2014) conducted a study by posting a question "does debt have a causal effect on economic growth?" in a sample of OECD countries using an instrumental variable approach. The empirical analysis revealed that there is a negative relationship between external debt and economic growth. However, when they consider endogeneity problem in their model did not find any causal effect of debt on growth. Although this study sheds light on the causal relationship between public debt and economic growth, its findings are inconclusive. Thus, they might not be applicable in other countries.

In addition, Fernando et al. (2017) investigated the impact of public debt on economic growth in Srilanka using long time series data from 1960 to 2015. In order to analyze the effect of public debt on economic growth, they used the ARDL model. And, instead of using total debt as a major factor the focused on other prime factors that determine the effect of debt on economic growth and these factors are quality of debt stock as well as the quality of borrowing. The empirical result that they were found out quality of debt stock and quality of borrowings have significantly determined the impact of debt on economic growth. Heavy borrowing from non-concessional source (low-quality borrowing) may be the key factor that determines the negative impact of debt on economic growth in the study area. Similarly, Kharusi and Ada (2018) investigated the relationship between government external borrowing and economic growth using time series data from 1990 to 2015 in Oman and to estimate the result applied ARDL model.

The empirical result revealed that external borrowing a negative and significant influence on economic growth in Oman. Furthermore, gross capital formation found to be a significant and positive effect on economic growth in the study area.

Moreover, using large sample Presbitero (2005) have investigated the relationship between external indebtedness and economic growth, with particular attention of 121 developing countries. The study analyzed by taking into account the role of institutions in economic growth and disentangling the debt effects on public and total investment. He found out that the existence of a negative and linear relationship between external debt and growth, even controlling for institutional quality, so that external indebtedness has effectively correlated with lower growth. He also found that external debt would be irrelevant for countries with a weak institution. Another study conducted by Qayyum and Haider (2012), the study empirically investigated the impact of external debt and foreign aid on economic growth. The model empirically estimated using a panel of sixty developing countries and the time span from 1984 to 2008. The empirical result revealed that foreign aid affects economic growth positively while external debt affect negative.

III. Studies that found the non-linear effect of external debt on economic growth

A key focus of the current literature on the effects of external debt on economic performance has been the attempt to identify nonlinear and in particular threshold effects. Empirical studies conducted by Megersa (2015), Mencinger et al. (2014), Clements et al. (2003), Caner et al. (2011), Doğan and Bilgili (2014), Reinhart and Rogoff (2010), and Pattillo et al. (2002) concluded that there is a non-linearity link between debt and growth.

Pattillo et al. (2002) assessed the non-linear impact of external debt on growth using a large panel data set of 93 developing countries over 1969-98. The empirical result concluded that there is a strong non –linear link between growth and external debt. The empirical result confirmed that an inverted U-shaped relationship between debt and growth such that the average impact of debt becomes negative at about 160% to 170% of exports and 35% to 54% of GDP. Clements et al. (2003) also find that debt relief can raise the growth of debtor's countries by a similar amount. Their finding confirmed that there is non-linearity between debt and growth their debt thresholds are at 50 percent of debt –to- GDP ratios.

Another study by Cordella et al. (2005) investigated how the debt-growth nexus varies with indebtedness levels in a panel of developing countries. They employed the spline function and threshold estimation technique. The empirical result suggested that countries threshold level fails between 15-30 percent, and countries with good policies and institutions have a higher threshold level than countries with bad policy and institutions. Mencinger et al. (2014) conducting research in European Union countries by categorizing old and new member states. He found that the threshold value for the new member states is lower than the old member states.

Reinhart and Rogoff (2010) in their influential paper analyze the descriptive statistics to show that public and external debt as a share of GDP may have a threshold effect on the rate of growth of real GDP. More specifically, they argue that for the public debt- growth ratio is 90 percent and for the external debt-growth ratio is 60 percent, beyond which growth slows down considerably. The study formally confirmed that the nexus between debt and economic growth is non-linear and the threshold point across advanced and developing countries is similar. In the same year, Caner et al. (2010) estimated a much lower threshold an average of 77 percent for external public debt to GDP for both developed and developing countries, and an even lower threshold (64 percent) when the estimations have conducted for developing countries alone.

Furthermore, a study by Megersa (2015) addressed the question of non-linearity in the long run relationship between economic growth and public debt in low-income SSA countries. He used a panel of low-income SSA countries and established debt Laffer curve type relationship to determine the effect. The empirical result supported a bell-shaped relationship between economic growth and total public debt in a panel of low-income Sub-Saharan African countries with the threshold level 44 percent. Nhu et al. (2016) also provide evidence of non-linearity in the debt-growth relationships. The authors used a panel of 15 developing countries to examine the turning point of public debt and evaluate the impact of the level of indebtedness on economic growth. The findings suggest that the impact on economic growth is positive at a low level of public debt, whereas beyond a certain debt turning point a negative effect on growth exists and the debt-GDP turning point is roughly between 13 - 39 percent for developing countries.

A recent study by Chudik et al (2018) investigated the effect and rising of public debt to economic growth using a panel of 40 advanced and developing countries. The empirical result suggested that the debt- growth nexus is complex, varying across countries, affected by global

factors and there is no simple universal threshold above which debt to GDP significantly depresses growth.

In addition to the inconclusive effect of external debt on economic growth timing of the study and area coverage for the study is a significant effect on its nexus. The study by Swastika et al. (2013) investigated that the impact of external debt on economic growth has time-varying nature embedded in it. In addition, Pollin et al. (2013), and Gomez and Sosvilla (2015) point out that the relationship between external debt and economic growth varies significantly in time periods and across countries.

In summary, as stated in the empirical literature above there is a mixed consensus among the findings on the effect of external debt on economic growth this implies that there is a room for further research in the subject matter. In addition to mixed consensus among the findings, time and study area have a significant effect on the link between external debt and economic growth as presented in the literature. To the best of my knowledge, the effect of external debt on economic growth and its sustainability using panel threshold model in 41 SSA countries yet not addressed. In light of this, this paper wants to analyze the effect of external debt on economic growth using a panel threshold model and its sustainability in the study area.

2.5.2 Empirical Evidence on external debt sustainability Analysis

As indicated in most literature external debt sustainability analysis is a relevant issue in the region for the following reasons: to maintain foreign investor confidence in the region, to address the adverse effect on external debt position, and to prevent debt crisis and related risks, etc. The basic issues focusing on the sustainability of external debt has gained attention in developing as well as in developed countries in recent times. As a result, the excessive empirical literature has been done on this topic since the 1990s. A vast majority of the literature in this topic has been done by the IMF and world bank. Since the 1996s, the IMF and WB jointly formulated a model to analyze debt sustainability as well as the debt position of a country especially for HIPCs and MDRIs countries. Most of the assessment were specific to the country and used projection in methodology to assess external debt sustainability and its position.

Moreover, in empirical literature in most cases, time series methods and country-specific analysis have been done to examine whether a country level of external debt sustainable or not. However,

recently, some papers have conducted on the issue of external debt sustainability by adopting a unit-root test and co-integration tests for panel data. Llorca (2017) investigated external debt sustainability in a panel of 24 Asian developing countries. He used the present value methodology to determine whether a country external debt sustainable in the long run or not. In the methodology, he specifically used panel stationery of external debt, first and second generation test. The empirical result revealed that external debt sustainable in 24 Asian countries. Similarly, Sheikh et al. (2014) conducted a study on external debt sustainability for eight SAARC countries using panel data from 2000 to 2013. To estimate the result univariate unit root test, panel unit root and cointegration tests were applied. The univariate (country specific) and panel unit root test results revealed that the level of countries external debt unsustainable individually and sustainable wholly. Whereas the cointegration result showed that the level of external debt unsustainable wholly (panel result) and individually. Generally, the empirical result revealed that external debt in SAARC countries is unsustainable.

Another study by Lin (2014) investigated the sustainability of external debt for 21 OECD countries. He used the quantile autoregression (QAR) model to test the stationarity process of net external surplus. The empirical result revealed that the net external surplus process is stationary for six countries and as a result, external debt is sustainable.

External debt sustainability using a non-linear framework is more recent and very important to show sustainability and its effect at a time. Nasir and Noman(2012) conducted on the sustainability of external debt under a two-step non-linear framework. The first step used a general linearity test while in the second step applied a non-linear ADF unit root process. The analysis comprising data from 36 countries debt-to-external earnings ratios and from 55 countries current account-to-Gross National Income (GNI) ratios, and spanning the period from 19973-2008. The empirical result in dilinearity at the superior performance of the non-linear unit root test over the ADF test in determining the sustainability of external debt. From the total sample countries 5 debt and 10 current account ratios are found to be non-linear and on a sustainable path.

In conclusion, most empirical literature related to external debt sustainability is specific to the country and done using different models in different countries but the issue was limited in Sub-Saharan African countries in general. Therefore, this study used and followed the fundamental

debt-growth relationship and the recent cointegration approach in order to analyze external debt sustainability in the region. In addition, external debt sustainability analysis in this study has two main motives; one, external debt sustainability analysis, and its effect on the economy has been continuing and to be a current subject matter; two, the timing of the study is significant given Sub-Saharan Africa countries extensive use of external debt to finance its annual budget. Furthermore, the threshold level of debt that may be detrimental to economic growth and sustainability found to be different across the countries.

2.6 Evaluations of the theoretical and empirical literature in the context of SSA

In this subsection, the study will present a summary of related empirical studies and evaluations, which are specific to SSA. A study by Fosu (1996), examined the impact of external debt on economic growth using a panel data of 29 SSA countries over 1970-1986. Using the augmented production framework to analyze the direct effect of external debt economic growth, he found that external debt burden has deteriorated economic growth. However, he used a small sample and not considered the non-linearity effect of external debt on economic growth in the region. A similar study by Iyoha (1999), investigated the impact of external debt on economic growth in SSA using a simulation approach and Ordinary Least square approach. Result\ of the study suggest that the large stock of external debt and heavy debt service payments have negatively correlated with economic growth through investment. However, Iyoha (1999) used time series data and not considered the non-linearity effect of external debt on economic growth.

Another study by Senadza et al. (2017), assessed the effect of external debt on economic growth in 39 SSA countries over 1990-2013 using system GMM method. The study suggested external debt affect economic growth negatively in the region. They used quadratic specification model and revealed that non-linearity not exist between external debt and economic growth. However, testing non-linearity using quadratic specifications lacks statistical significance of the non-linearity.

Most of the empirical literatures on the external debt sustainability analysis in SSA countries were specific to the country and analyzed by IMF and WB. The IMF and WB periodically carry out debt sustainability analysis exercise, in which a country's debt is projected for twenty years horizon, to analyze whether such debt is sustainable or not. In addition, DSA based on IMF and WB alternatively, analyze the countries level of probability compared to the advisable probability

of debt distress over the projection period. However, the analysis applies mostly to low-income countries and for the countries that benefited from debt relief (HIPC and MDRI).

CHAPTER THREE

THEORTICAL AND METHODOLOGCAL FRAMEWORK

3. Introduction

This chapter presents the theoretical framework and empirical model employed in this study to investigate the effect of external debt on economic growth and it is sustainability in Sub-Saharan Africa. It also discusses the statistical tools and necessary diagnostic tests within panel regression that are employed in this study.

3.1 Data Source and Scope

This study is used secondary data mainly drawn from World Bank (World Development Indicators, International Financial Statistics and International Debt statistics) and IMF (World Economic Outlook) 2018 online databases. The study covers a period of 18 years from the period (2000 – 2017) which captures the effects on 2006 multilateral debt relief incentives and 2008 global financial crisis. However, data unavailability for some countries and years served as a constraint for choosing 41 countries and the time period of 18 years for the empirical analysis (see Appendix 8).

3.1.1 Description of the study area

Sub-Saharan Africa (SSA) region is made up of forty-eight (48) countries whose geographical locations are situated in the southern part of the Sahara. The region covers the total land area of 21,242,191 square kilometres and has an estimated total population of 1.062 billion with annual average population growth 2.73 percent from the period 2000 to 2017. In 2017, the total GDP of the region is 1648.71 billion US dollar with annual average GDP growth rate of 4.6 percent from the period 2000 – 2017 and total GNI of the region is 1542.63 billion US dollar with per capita income 1453.7 US dollar using Atlas method [5]in 2017 (WDI, 2018). World Bank categorizes countries as well as SSA countries into groups based on their levels of per capita income that calculated using the Atlas method. According to World Bank (2018), low-income countries are

[5] Atlas method is used for to smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country, and through 2000, the G-5 countries (France, Germany, Japan, the United Kingdom, and the United States). From 2001, these countries include the Euro area, Japan, the United Kingdom, and the United States.

defined as those with a GNI per capita income, calculated using the World Bank Atlas method of US$995 or less in 2018. Lower-middle-income countries are those with a GNI per capita of more than US$996 but less than US$3,895; upper middle-income countries are those with a GNI per capita more than $3, 896 but less than US$12,055; high-income countries are those with a GNI per capita of US$12,056 or more. Lower-middle-income countries and upper-middle-income countries are categorized under middle-income countries and the GNI per capita range from US$996 to US$12,055 in the 2018 fiscal year. The SSA region consists of twenty-seven(27) low-income countries, fourteen (14) lower-middle-income countries, six (6) upper-middle income counties and one high-income country i.e. Seychelles.

From the total of 48 countries in the region, however, due to unavailability of data on some important variables for some countries, annual data for 41 SSA countries were used in the study for empirical analysis (see Appendix 8). Data on external debt stock and for other important variables for the remaining seven countries in the region are unavailable as a result excluding from the study (see Appendix 9). The empirical investigation based on 41 countries in the region expected reveals the external debt situation and effect in SSA.

3.2 Theoretical Framework

The reason for opting for external debt or external finance, as a means of ensuring sustainable development, as against domestic borrowing is answered by 'Two-Gap's. These two gaps are known as the saving gap and the foreign exchange gap. The basic concepts of dual-gap analysis came from the linear programming formulation of optimal resource allocation with multiple constraints varying over time (Hollis B. et al, 1966). This theory explained that investment is a function of savings and investments that requires domestic saving is not sufficient to ensure economic growth, therefore, external savings is required to complement the domestic one. The major assumptions of the two-gap model are that most developing countries either face a shortage of domestic savings to augment for investment opportunities or they are faced with foreign exchange constraints to finance the needed capital and intermediate goods. Todaro and Smith (2004) noted that most two-gaps would be "binding" or "dominant" for any developing country at any point in time. the concept of dual-gap analysis, which was pioneered by Hollis Chenery and others, shows that foreign borrowings may also be viewed as a supplement to foreign exchange to achieve a faster rate of growth and development, the Foreign Exchange Gap

is larger than the saving gap, and foreign resources are not easily substitutable for one another. This study uses GDP identity following Root (1978) to explain the rationale for external borrowing to finance investment in the economy. Following Root (1978) and Bacha (1989), the derivations of two-gap and three-gap analysis are the following.

Start with the basic macroeconomic identity where Aggregate Output = Aggregate Expenditure. Thus, assuming that there is no government sector and on the assumption of no government influence in the domestic economy. GDP is made up of the sum of expenditures incurred by economic agents in an economy, namely, household consumption of goods and services, and firms' investment (I), and net export of goods and services (X-M) obtained by subtracting imports (M) from exports (X) and also specified as:

$$Y = C + I + (X - M) \tag{1}$$

From equation (1) above subtracting consumption(C) from both sides we get

$$S = I + (X - M)\ since: S = Y - C \qquad where: S = domestic\ saving \tag{2}$$

Rearranging equation (2) we get

$$S + M = X + I \implies Withdrawals = Injections \tag{3}$$

Equation (3) relationship can be restated as follows

$$M - X = I - S \tag{4}$$

(*Foreign Exchange Gap*) = (*Savings Gap*)

These two constitute two separate constraints and totally know as two-gap (dual-gap). Based on equation (4) take the investment to the left and rearrange then we get

$$I = S + (M - X) \tag{5}$$

The implication from the relationship derived from equation (5) is that when domestic savings are insufficient to finance domestic investment, import balance on the current account which is financed by net borrowing from abroad (M-X), is used to fund the deficit. Thus, the demand for total domestic investment is the sum of domestic savings and net foreign loan.

3.3 Conceptual framework

As presented in the above discussion the relationship between external debt and economic growth is determined by using open macroeconomic model. The framework is based on the concept that the relationship between external debt and economic growth can be direct or indirect linkages. The direct effect of debt theory suggests that external debt may adversely influence economic growth directly through the deterioration of the productivity of capital. The direct effect happens when using externally borrowed money for current consumption, existing debt services and current account deficit as a result of this long term project reduced (Fosu, 1996; Iyoha, 1999). On the other hand, the indirect effect of external debt theory focuses on the effect of debt on growth through investment. The theory states that higher current indebtedness act as higher tax in the future and hence reduce inactive to invest and save((Fosu, 1996). The effect of external debt on output explained through the debt overhang theory (Krugman, 1988 and Sachs, 1989).

3.4 Basic Model Formation

From the above theoretical perspective discussion, one can draw an empirical specification of the debt-growth model. This study used a reduced form of growth regression based on the studies by Pattillo et al (2001, 2004) and Yoke et al (2018). Moreover, this study followed the strand of literature on debt-growth by estimating the conditional correlation between debt and growth in panel growth regressions. However, this study departs from the existing literature by paying significantly more emphasis on the nonlinearity of the debt-growth relationship, in particular, the techniques employed to estimate the debt threshold.

The basic model estimated in this study is of the following form.

$$Y_{it} = \alpha_0 + \beta_1 D_{it} + X'_{it}\beta_i + \epsilon_{it} \quad (10)$$

Where; i and t are country and time index respectively, Y is the growth of the gross domestic product. D is external debt measured by the ratio External debt stock–to-GDP (external debt stock as the percentage of GDP), while X is a vector of standard control variables that affect economic growth (performance) including labour force, capital formation, inflation.

Although the basic panel regression model represents the relationship between economic growth and external debt, it does not show the nature of the relationship changes when the level of external debt increase. The relationship between external debt and economic growth is non-linear when there is threshold level. As the key aim of this study to know whether there is a threshold effect or not in SSA and empirically estimate the threshold value using the threshold model.

3.5 Model specification

A number of non-linear external debt-economic growth relationship widely discussed in the literature, the form of the relationships among different non-linear specifications has not been studied in details. Generally, there are two types of threshold model specifications these are; exogenous and endogenous threshold models.

Exogenous threshold models do not determine the threshold level endogenously but, these model take the threshold value as given or exogenously. Interaction debt dummy and linear spline is the most widely used in exogenous threshold model. Interaction dummy variables are created by the inclusion of high debt and low debt dummy variable in the growth regression functions. Interaction dummy variables capture different impacts of external debt to GDP ratio above and below the critical value. The linear spline is another type of exogenous threshold model and this model works by dividing the external debt-to-GDP into n segments and estimate n parameters for each segment. However, exogenous threshold model has the following basic limitations: In economics, many threshold variables depend on their dynamics but in this model, the threshold value determines exogenously and the model does not test the statistical significance of the threshold value (Kourtellos et al, 2007).

Endogenous threshold models are another type of non-linear model in the debt-growth nexus. These model determine the threshold value endogenously because of this the models are more accurate compared to exogenous models. Hansen threshold and quadratic specification models are the most common types of the endogenous threshold model. Except for Hansen threshold model other endogenous threshold models do not test the statistical significance of the threshold value. Hansen threshold model relatively accurate model and dealing with all other limitations of the threshold model. Therefore, this study will follow Hansen threshold model specification.

3.5.1 Hansen's Panel Threshold Model

Hansen (1999) approach enables one to endogenously determine and test the statistical significance of debt-threshold level in the debt-growth model whilst allowing us to estimate other coefficients at the same time. In this model, the threshold level(s) and the parameter coefficients are being estimated simultaneously. Hansen (1999) considers the problem of estimation and testing of threshold effects in the case of static panels with fixed effects and homogeneous slopes and deals with panels where the time dimension (T) is short and the cross section dimension (N) is large. He eliminates cross-sectional (individual-specific) effect by demeaning and as a result, his approach cannot be extended to dynamic panels or panels with heterogeneous slopes. The Hansen's threshold model used balanced panel data. Generally, in order to estimate panel threshold model Hansen followed the following methodology; firstly, in order to determine the threshold value, Hansen was used fixed effect model because the problem of unobserved country specific heterogeneity and associated omitted bias in cross-sectional country regression can be controlled by fixed effect approach. Secondly, test the significance of the threshold effect. The null hypothesis of no threshold effect is H_0: $\gamma_2 = \gamma_1$. Under H_0, there is no existence of a threshold in the model (linear model). If H_0 is rejected that means the model is non-linear. Finally, Hansen examine the significance of the threshold effect in the model with the given thresholds, using the LR statistic and bootstrap method.

Following the works of Hansen (1999) and Wang (2015), the panel threshold model written as follows:

$$Y_{it} = \alpha_i + \beta' X_{it} + \gamma_1 d_{it} I(d_{it} \leq \tilde{\gamma}) + \gamma_2 d_{it} I(d_{it} > \tilde{\gamma}) + \epsilon_{it} \quad (6)$$

$$y_{it} = \beta' X_{it} + f(d_{it}, \gamma) + \epsilon_{it} \quad (7)$$

Where; $f(d_{it}, \tilde{\gamma}) = \gamma_1 d_{it} I(d_{it} \leq \tilde{\gamma}) + \gamma_2 d_{it} I(d_{it} > \tilde{\gamma}), here\ I(.)$ is an indicator function. The impact of external debt is divided into two regimes depending on whether $\gamma \leq \tilde{\gamma}$ or otherwise.

3.5.2 Empirical model specification

Based on the above Hansen's threshold model this study has specified the following model

$$\boldsymbol{Growth = \alpha_i + \beta' X_{it} + \gamma_1 D_{it} I(D_{it} \leq \tilde{\gamma}) + \gamma_2 D_{it} I(D_{it} > \tilde{\gamma}) + \epsilon_{it}} \quad (8)$$

Based on equation (8) take the first difference in order to remove the cross-section specific effect and unobserved effect from the model and written as follows.

$$\boldsymbol{\Delta Growth = \beta' \Delta x_{it} + \gamma_1 \Delta D_{it} I(D_{it} \leq \tilde{\gamma}) + \gamma_2 \Delta D_{it} I(D_{it} > \tilde{\gamma}) + \Delta \epsilon_{it}} \quad (9)$$

Where $\tilde{\gamma}$, is the threshold parameters that split the sample into two sub-samples (assuming the model is a single-threshold model), D_{it} is external debt as a percent of GDP, and I(.) is the indicator function which is equal to 1 or 0, depending on the condition term. The regimes are distinguished by different regression coefficients $\gamma_{2,}\gamma_1$and X_{it} is a matrix of control variables used in this model.

Considering the above basic model formation and general panel threshold model specification by Hansen, this study used the following specific model.

$$\mathbf{Y_{it}} = \boldsymbol{\beta_0} + \mathbf{\beta_1 P_{it} + \beta_2 K_{it} + \beta_3 inpci_{it} + \beta_4 infl_{it} + \beta_5 area_{it} + \beta_6 gHDI_{it} + \beta_7 OPP_{it} + \gamma_1 D_{it} I(D_{it} \leq \tilde{\gamma}) + \gamma_2 D_{it} I(D_{it} > \tilde{\gamma}) + \epsilon_{it}} \quad (10)$$

Where**;** $\mathbf{Y_{it}}$ is GDP growth rate, $\mathbf{D_{it}}$ is external debt to GDP ratio, $\mathbf{P_{it}}$ is Population growth, $\mathbf{gHDI_i}$ is growth rate of human development index, $\mathbf{inpci_{it}}$ is initial per capita income $\mathbf{OPP_{it}}$ is trade openness, $\mathbf{K_{it}}$ is gross capital formation, $\mathbf{infl_{it}}$ is inflation and $\mathbf{area_{it}}$ is land area of the country.

3.6 Variable Description

Before embarking on the empirical investigation of the effect of external debt on economic growth in Sub-Saharan Africa, description of some variables in the specified model is outlined below in order to present some preliminary explanation to the relationships between some key regression variables.

3.6.1 Dependent variable

The panel threshold model estimated in this study use economic growth as a dependent variable. Empirical studies that investigated debt growth-nexus used GDP growth, Real GDP growth, GNP growth, GDP per capita growth as a measure of economic growth and as a dependent variable. This study adopts GDP growth as a measure of economic growth, consistent with works of (Iyoha, 1999).

3.6.2 Independent variables

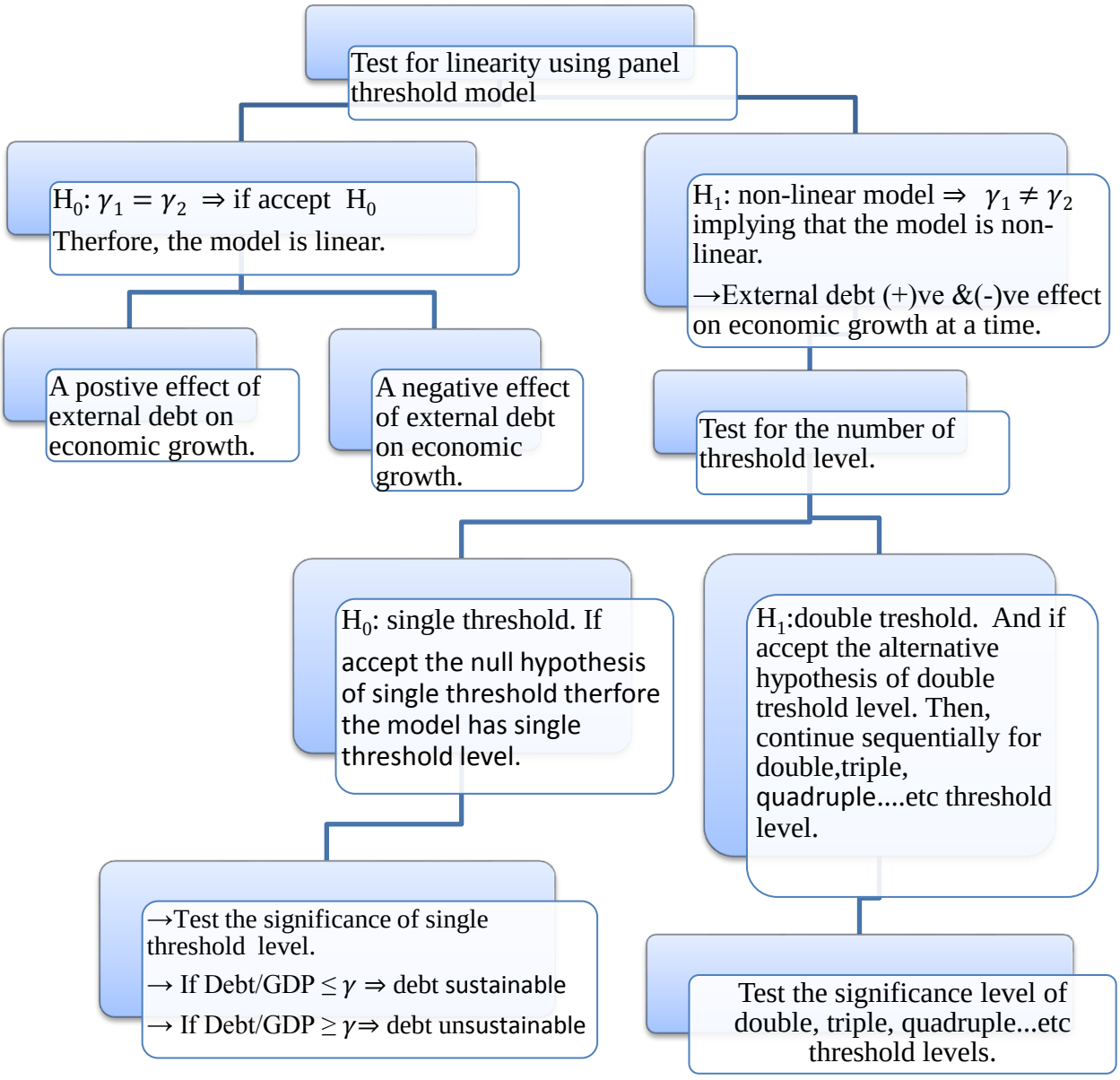
External debt stock as a percent of GDP is our main independent variable. The set of control variable encompasses population growth, gross capital formation (as proxy for total capital), inflation rate (as a proxy for macro-economic instability of a country), openness (export plus import over GDP and as a proxy for level of country's interaction to the rest of the world), and country's land area (as a proxy for countries total resource availability). In the standard economic growth theory, population growth and gross capital formation rates are expected to have positive coefficients, the coefficient on inflation rate is expected to be negative, while the coefficient on the land area is predicted to be positive. Trade openness will expect to be boost productivity through transfers of knowledge and efficiency gain.

Table 3.1: Summary of Variables, Expected Signs of their Coefficients and Data Sources

Variables	Indicator	Expected sign	Data source
Economic growth(Y)	GDP growth rate		World Bank& IMF
Population growth(P)	Population growth	Positive	World Bank
Initial per capita income	Initial per capita income	Negative	World Bank
Capital (K)	Gross capital formation	Positive	World Bank& IMF
Inflation(i)	Growth rate of CPI	Negative	World Bank& IMF
HDI	Growth rate of HDI	Positive	UNDP
Trade Openness(opp)	Export plus import as a% GDP	Positive	World Bank &IMF
External Debt	External debt stock as a % GDP	Mixed	World Bank
Land area	Land area in Sq^2 (A)	Positive	World Bank

Source: Source: Author's formulation

Summarized methodological frameworks for panel threshold model using diagram



Source: Own Formulation

3.7 Theoretical framework and model specification for external debt sustainability

In order to investigate the sustainability of external debt in SSA this studies used and followed Husted (1992) as a theoretical framework. This framework required that a countries' import and export be co-integrated, which is evidence for external debt sustainability through current account sustainability. Husted (1992) provides a simple-open economy framework in which representative consumer is able to lend and borrow freely in international financial markets at a given world interest rate, and the consumers maximize lifetime utility subject to inter-temporal budget constraint.

The representative consumer budget constraint is derived as follows:

$$Y_0 = C_0 + I_0 + (X_0 - M_0) \tag{11}$$

According to Husted (1992), the above small-open economy model assumes that without the government sector in the economy.

$$Y_0 = C_0 + I_0 + NX_0 \; where: NX_0 = (X_0 - M_0) \tag{12}$$

Now rewrite equation (12) into the following form:

$$Y_0 = C_0 + I_0 + (1 + r)B_{-1} - B_0 \qquad where: NX_0 = (1 + r)B_{-1} - B_0 \tag{13}$$

Where,Y_0,C_0, I_0, B_0 and r respectively current output, consumption, investment, external debt and one period world interest rate. $(1 + r)B_{-1}$ and rB_{-1} the initial external debt and external debt services at the end of the current period respectively.

From equation (13), the representative consumer faces the following current period budget constraint:

$$C_0 = Y_0 + B_0 - I_0 - (1 + r)B_{-1} \tag{14}$$

Equation (14) must hold for every time period. Iterating equation (14) for n periods forward yields the economy's inter-temporal budget constraint see Husted (1992).

$$B_0 = \lim_{n\to\infty} \sum_{t=1}^{n} \frac{NX_t}{(1 + r)^t} + \lim_{n\to\infty} \frac{B_n}{(1 + r)^n} \tag{15}$$

And write equation (20) as follows:

$$B_0 = \lim_{n\to\infty} \sum_{t=1}^{n} \delta_t \, NX_t + \lim_{n\to\infty} \delta_n B_n \qquad (16)$$

Where; NX_t[6] is the trade balance, which equals to $NX_t = X_t - M_t = Y_t - C_t - I_t$ represents the trade balance in period t, X_t equals exports, M_t is the imports, and δ_t is the discounted factor, which equals $\delta_t = \frac{1}{(1+r)^t}$.

A necessary and sufficient condition for external debt sustainability is that as $n \to \infty$, the discounted value of the external debt convergence asymptotically to zero. This transversally condition can be expressed as

$$\lim_{n\to\infty} \delta_n B_n = 0 \; or \; \lim_{n\to\infty} \frac{B_n}{(1+r)^n} = 0 \; since; \; \delta_n = \frac{1}{(1+r)^n} \qquad (17)$$

Equation (17) approaches to zero, as the number of periods increase, then the No-Ponzi-Game Constraint will be satisfied. No-Ponzi-Game Constraint is stating that the present value of external debt in the indefinite future converges to zero. To satisfy this condition, external debt B in the numerator must increases slower than the rate of interest rate r in the denominator. Equation (17) implies that a country cannot borrow (lend) indefinitely in global capital markets to finance its trade account deficit (surplus).

$$B_0 = \sum_{t=1}^{n} \delta_t \, NX_t \qquad (18)$$

Empirically if the external debt series is non-stationary, then it means that it is growing without limit over time, which means that subsequent debt will also grow without limit leads to external debt unsustainable. This will also violate the No-Ponzi-Game Constraint in equation (17). Equivalently, co-integration tests between the different components of the balance of payments are used in the empirical literature to depict external debt sustainability. If export and import

[6] External debt sustainability can also be measured by the current account balance (IMF, 2000). If deficits persist, the country's external position may eventually become unsustainable as reflected by a rising ratio of external debt to GDP. In other words, financing of continually large current account deficits by the issuance of debts leads to an increasing debt burden.

variables are cointegrated order of (1), then again equation (18) will not be violated, since net exports in the numerator will not grow without limit and therefore external debt B will tend to converge to zero. Therefore, a test for the sustainability of the external debt can check using the cointegration of these two variables (X_t and M_t) if they are integrated order (1). This cointegration regression takes the following form.

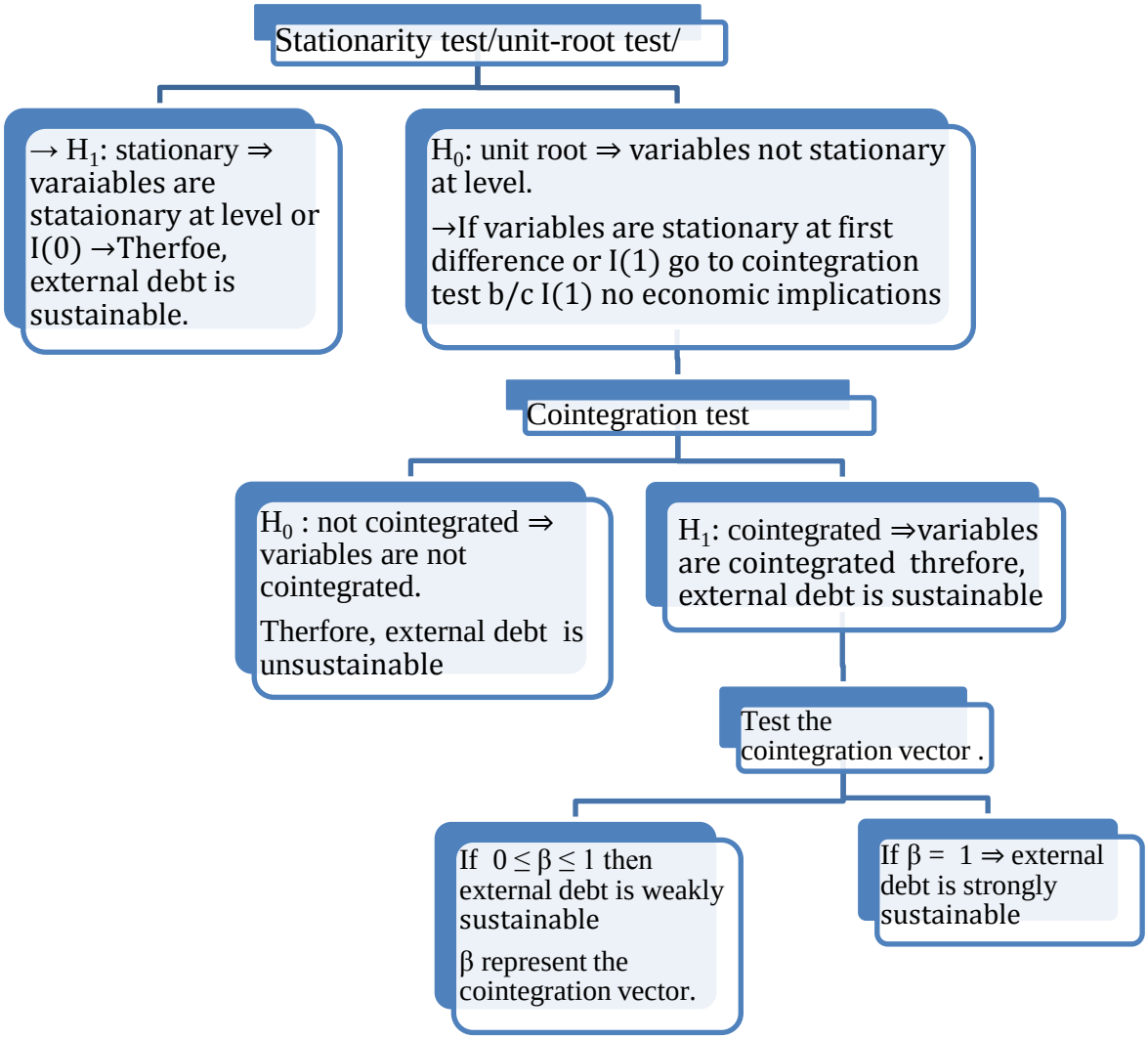
$$X_t = \alpha + \delta M_t + \varepsilon_t \quad (19)$$

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

3.7.1 Estimation method for external debt sustainability Analysis

To analyze the sustainability of external debt this study used different tests. The test starts with panel unit root tests to assess the stationarity and order of integration of the variables. It is important to determine the stationarity status of all the variables under consideration or to determine the order of integration. Recent literatures suggested that panel stationarity test have more power than time series stationarity tests. The panel unit root tests are based on Harris–Tzavalis (1999) and Im, Pesaran and Shin (2003) which allows for panel homogeneity and apply for short panel when N > T. If both variables are found to be non-stationary at level and integrated of order one I(1), then the estimation steps proceeds to the co-integration test. This study is followed Westerlund (2007) panel cointegration test. Because the test considering panel cointegration test with and without cross-sectional dependency.

Summarized methodological framework for external debt sustainability using diagram



Source: Own formulation

3.8 Econometric Technique

In undertaking an empirical investigation into external debt-growth nexus, this study employs panel threshold regression with STATA 14.2 as the main analytical software because; panel threshold regression is only available in STATA 14.2 and onwards. Panel threshold regression is designed for and only applicable for Fixed Effect model. Panel threshold regression with the fixed effect is eliminated cross-sectional (individual-specific) effect by first difference and as a result, this approach cannot be extended to dynamic panels or panels with heterogeneous slopes see (Hansen, 1999).

3.9 Data Inspection and Regressions Diagnostics

This study undertakes some diagnostic tests to ensure that the estimated model does not suffer any biases within panel regression analysis. Pre-estimation test like unit-root test and post-estimation tests like normality, Multicollinearity, Heteroskedasticity, autocorrelation and Panel cross-sectional dependency tests were conducted. Unit root test was tested using Harris-Tzavalis (HT) test (1999) and Im-Pesaran-Shin (IPS) Test (2003. Jarque–Bera test for the panel data model is used for testing the normal distribution of the error term. Multicollinearity test was conducted using Pearson correlation matrix for identifying a relationship between independent variables. In addition to the Pearson correlation matrix test, the multicollinearity problem was also tested using the variance inflation factor (VIF) and/or tolerance level (1/VIF). Heteroskedasticity test for varying nature of the error variance and autocorrelation test for correlation between the error variance was conducted using modified Wald test for heteroskedasticity and Inoue and Solon (2006), and Born and Breitung (2016) test for autocorrelation. Panel cross-sectional dependency test was conducted using Pesaran's (2006) cross-sectional dependence (CD) test and Friedman’s (1937) statistic.

CHAPTER FOUR

EXTERNAL DEBT AND ECONOMIC GROWTH OVERVIEW IN SUB-SAHARAN AFRICA

4. Introduction

This chapter outlines the external debt profile and economic growth of Sub-Saharan Africa using macro-economic variables, external debt structure, external debt compositions and other related indicators. Sub-Saharan Africa countries still heavily depend on external debt for fiscal sustainability and boost economic growth through agricultural modernization, expansion in the industrial sector and export diversification of their economies.

4.1 Debt Crisis and External Debt in Sub-Saharan Africa

Despite several economic reforms taken up over the past decades, most countries in Sub-Saharan Africa have recorded only modest growth with a rapid rise in inflation, huge budget deficit, unsustainable external debt and unsustainable balance of payments deficits coupled with a high level of external debt. The causes of this crisis were poor domestic policy performances, deteriorating trade balance and terms of trade, exchange rate fluctuation and a high debt burden (Onyekwelu and Ugwuanyi, 2014).

The problem of external debt default in Sub-Saharan Africa was seen as an integral part of the global external debt crisis that emerged in 1982. The crises are due to excessive borrowing by developing countries, low lending requirements by a foreign commercial bank in the 1970s, the fall in commodity prices especially petroleum product in early 1980s, and skyrocket increase in the international lending rate in the late 1982s. By the early 1982s, there was a sudden decrease in oil prices and a sharp increase in international lending rate causing a balance of payment problem in many developing and developed countries. Mexico announced unable to pay their external debt to the creditors in 1982, followed by other Latin American and developing countries Kmmm (1985).

The late 1980s global financial crisis caused a sudden end in the era of liberal lending. Developing countries could not more roll and borrow from the creditors because of the crisis and could hardly service their debt from extra borrowing from abroad. Export earnings were

insufficient for debt servicing due to a rapid fall in prices on the international market and because of this debt stock of countries increased. Consequently, countries were cut off their import in order to solve increasing current account deficits. The economic condition further worsened globally, and debt default replicated in other economies and this marked the emergence of the debt crisis in HIPC as well as in Sub- Saharan Africa countries.

In Sub-Saharan Africa countries, there were different factors that lead to an external debt crisis. Among these dominant factors are over-borrowing, the continual decline in terms of trade, high lending interest rate, exchange rate fluctuation, uncontrolled fluctuations in export earnings, deterioration of commodity price, the decline in net capital inflows, refinancing of debt and domestic policy (Greene and Khan, 1990). Drouin (1989) claim 27 out 44 Sub Saharan African countries had payments arrears hence debt financing and rescheduling were adopted to resolve the problem. But, this strategy seemed to relive debtor countries of external debt services burden in the short run, it leads to continual postponement of external debt burden without finding the fundamental structural solutions of their economies that cause the problem. This method continued until the 1990s where debt levels of the majority of countries in Sub-Saharan Africa were pronounced unsustainable.

International financial organization and community have been providing assistance to the debtor countries since the emergency of the debt crisis in focusing on reducing their external indebtedness, reducing poverty and increasing economic growth, and to achieve external viability (IMF, 1998). This assistance takes the form of lending to developing countries with high concessions and providing external debt relief (HIPC incentives). This assistance helped to reduce the external indebtedness of a country but could not reduce the rate of external borrowing and poverty in Sub-Saharan Africa countries. In addition to HIPC incentives assistance, the Multilateral Debt Relief Initiative (MDRI) provided assistance in 2006. This incentive was basically a continuation of HIPC incentives and two major objectives: depending on debt relief to HIPCs to help them reach the MDGs and encouraging the best use of additional donor resources for development by allocating them to low-income countries on the basis of policy performance (International Development Association, 2005). Even if, the international financial organization provide assistance for developing counties, the level of external debt stock in

developing countries in general and Sub-Saharan Africa in particular increase suddenly in post incentive periods than pre incentive periods as a result of debt relief.

4.2 External debt stock Trend in Sub-Saharan Africa countries

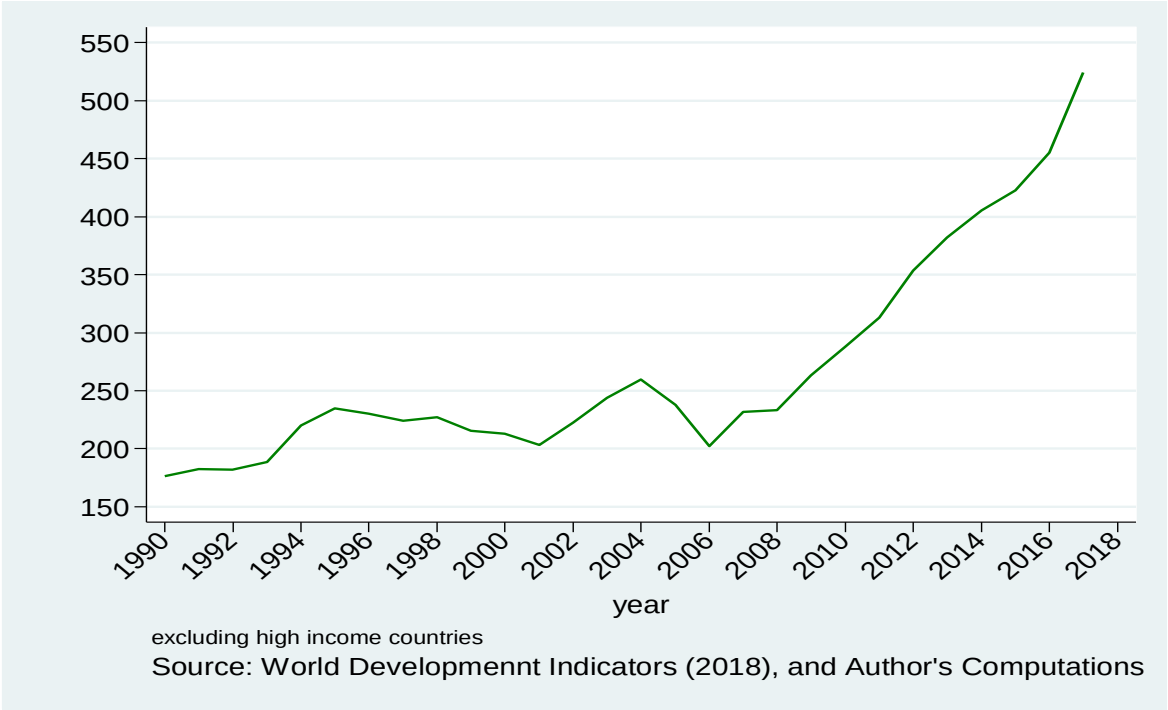


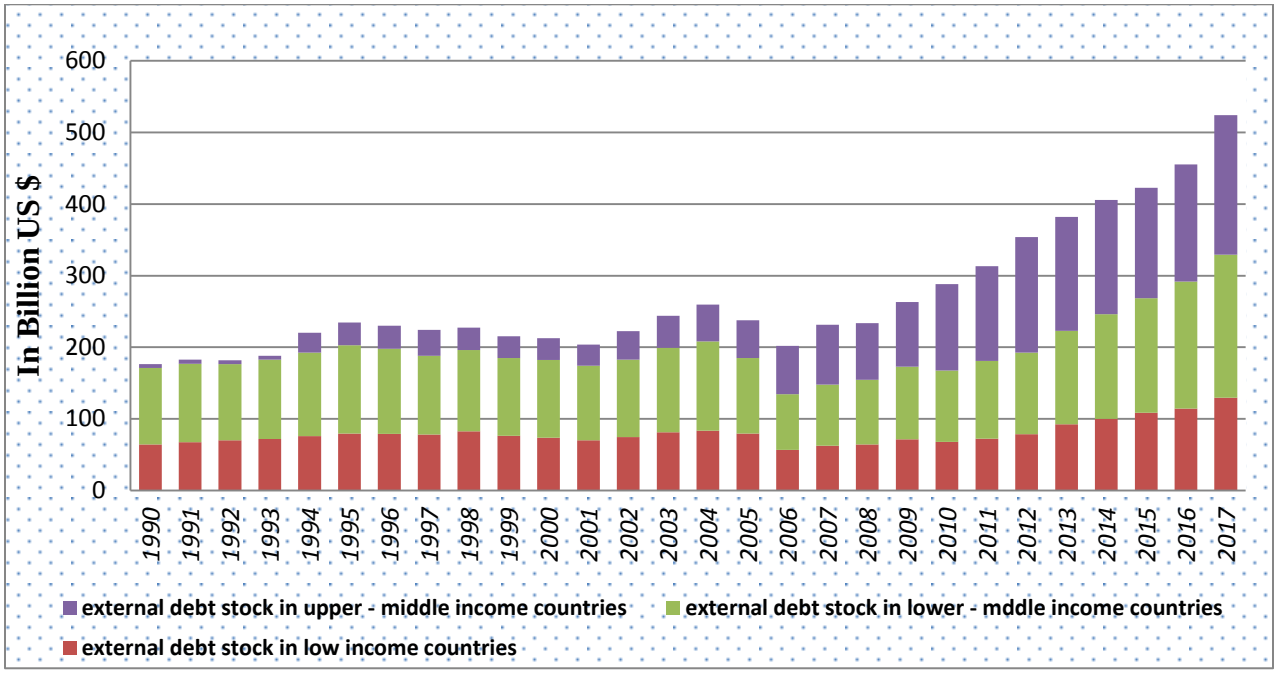
Figure 1: External debt stock trend in Sub-Saharan Africa countries

External debt stock is on the rise across Sub-Saharan Africa countries. The combination of debt relief incentives and sustained growth performance in most countries in the region has seen a debt to GDP ratios reduced since the mid-1990s. However, this trend is starting to rise because of the falling number of countries that have benefited from debt relief since 2007, worsening fiscal positions and exchange rate depreciation, particularly for countries dependent on commodity exporters (IMF, 2018). While external stock and external debt service have not returned to their per-HIPIC and MDRI incentives levels, they are greater than they were in 2005.

As per figure 2, external debt stock generally exhibits an upward trend with some level of fluctuation between 1995 and 2007. External debt stock rose from US$176.4 billion in 1990 to US$234.69 billion in 1995. Between 1996 and 2001, external debt stock for the region declined from US$230.15 billion in 1996 to US$203.52 billion in 2001. By the end of 2004, external debt stock jump to US$259.48 billion. External debt stock decreased from US$259.48 to US$202

billion in the period 2004 -2006. The external debt stock has begun to rise consistently and continued on an upward trajectory since 2007, rising from US$231.58 billion in 2007 to US$524.11billion in 2017.

Several countries in the region recorded a rapid rise in external debt stock. Between end of 2013 and 2015, the external debt stock of Ethiopia, Kenya, Liberia, Nigeria, and Zambia rose by over 35 percent and that of another 16 countries in the region by more than 10 percent. Increased debt stocks also raise the issues of debt sustainability, and as the most recent, publicly available IMF–World Bank debt sustainability analysis shows that several countries in the region including some that benefited from HIPC initiative, have a high risk of debt distress (International Debt Statistics, 2017).



Source: World Banks's WDI (2018), and Author's computations.

Figure 3: External Debt Stock Pattern in GroupWise Sub-Saharan Africa countries

External debt stock on the rise in SSA countries in general and in GroupWise countries of Sub-Saharan Africa in particular. External debt stock in low- income countries of Sub-Saharan Africa exhibits an upward trend except in the time of HIPC and MDRI incentives. In the late 1990s, external debt stock in low-income countries increased from US$64.46 billion in 1990 to US$79.57 billion. Between 1995 and 2001, because of massive HIPC debt relief, the level of

external debt stock had reduced from US$79.57 billion in 1995 to US$70.29 billion in 2001. Again, because of MDRI the level of external debt stock amazingly reduced from US$83.35 billion in 2004 to US$56.46 billion in 2006. Since 2007, external debt stock in low-income countries sharply increased from US$64.09 billion in 2008 to US$129.32 billion in 2017.

In lower-middle income countries of Sub-Saharan Africa, external debt stock followed the same trend as other groups of the country in the region. Between 1990 and 1995, the stock level increased from US$106.46 billion to US$123.26 billion but between 1995 – 2001 stock levels reduced from US$123.26 billion to US$103.92 billion. By the end of 2004, external debt stock increased to U$125.01 billion from 2001 but at the end of 2006, the stock level had fallen to US$78.08 billion. Since then and since 2010 in particular, external debt level increased considerably, reaching from US$99.64 billion in 2010 to US$200.07 billion in 2017. In general, the external debt stock of lower-middle income countries is greater than other groups in the region.

Upper-middle-income countries of sub-Saharan Africa within this group generally recorded a relatively low level of external debt stock over the years compared to other groups in the region up to 2006. Between 1990 and 1995, the debt stock level surprisingly increased from US$5.46 billion to US$31.85 billion. Countries in the upper-middle group not benefitted from HIPC and MDRI incentives. Since 2001, external debt stock sharply and consistently increased from US$29.30 billion in 2001 to US$194.72 billion in 2017. Generally, the above graph depicts that since 2006, in all groups of the country in the region had considerably increasing trend in external debt stock.

4.3 External Debt stock as the percentage of GDP in Sub-Saharan Africa countries

In Sub-Saharan Africa countries, [7]the total external debt stock as the percent of GDP is 66.2 percent before HIPC and MDRI. However, after the incentives, the share of external debt stock to GDP amazingly reduced from 66 percent to 22 percent and the value reduced because of debt

[7] List of Sub –Saharan Africa countries, Angola, Benin ,Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros Congo, Dem. Rep., Congo, Rep., Côte d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon Gambia, The, Ghana, Guinea, Guinea-Bissau , Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, South Africa, Seychelles, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

incentives (see table 4.1 below). As table 4.1 shows its value in Sub-Sahara Africa countries reached at the lowest point in 2011 i.e 20.2 percent. After 2011 in the region, the share of external debt stock to GDP surprisingly increased from 20.2 percent in 2011 to 31.4 percent in 2017.

Table 4.1 shows that in Low-income countries experienced high fluctuation in the debt to GDP ratio over the periods and it stood at 116 percent for the per- relief period, declining to 33 percent post-relief period. However, recently in these countries the ratio of external debt to GDP increased again from 23.6 percent in 2011 to 34.5 percent in 2017.

Table 4.1: Total external debt stock as a percent of GDP

Year	1995	2007	2010	2011	2012	2013	2014	2015	2016	2017
Sub-Saharan Africa countries	66.2	22	21.1	20.2	21.7	22.0	22.2	25.4	29.5	31.4
Low-income countries	116	33	26.6	23.6	24.3	25.9	26.1	29.6	31.5	34.5
Low-middle income countries	111.9	16.5	14.6	14.0	13.3	13.6	14.1	17.1	21.2	22.9
Upper-middle income countries	18.8	25.2	29.2	28.6	36.6	38.6	40.1	43.1	48.5	49.4

Source: World Banks's WDI (2018), and Author's computations.

Lower-middle income countries generally recorded the lowest of external debt to GDP ratio over the period when compared to the other regions except 111.9 percent in 1995. The value, however, consistently depicts a fluctuated trend record 14 percent, 13.6 percent and 14.1 percent in 2011, 2013 and 2014 respectively. However, in the recent time in low-middle income countries, the value continuously increasing and recorded 17.1 percent, 21.2 percent and 22.9 percent in 2015, 2016 and 2017 respectively.

There are six Upper-middle income countries in Sub-Saharan Africa and from this; Namibia and Equatorial Guinea have no data for their external debt stock. Within this group of countries generally recorded the highest value of external debt to GDP ratio over the recent years. However, in the pre-debt relief period recorded a value of 18 percent in 1995, which lower than other among the categories of countries in Sub-Saharan Africa. In upper-middle income countries, external debt to GDP ratio persistently increased which recorded 40.1 percent, 43.1 percent, 48.5 percent and 49.4 percent in 2014, 2015, 2016 and 2017 respectively.

4.4 GDP and External Debt Stock Growth in the Region

4.4.1 GDP and External Debt Growth rate in Sub-Saharan Africa Countries

From the figure below, GDP and external debt growth rate generally exhibit a high level of fluctuations between 1990 and 2017 within the range between -5 percent to 15 percent. External debt growth rate rose from 3.53 percent to 16.96 percent from 1990 to 1994 representing about 13.43 percent increase whilst GDP grew 1.69 percent to 14.68 percent from 1990 to 1995, representing 12.99 percent increased. Most countries in Sub-Saharan Africa adopted the Structural Adjustment Program (SAP) and the Economic Recovery Program (ERP) within this period to ensure that growth targets were realized but not achieved. Structural adjustment was presented as a programme that would restore stabilization in the short term and facilitate sustainable growth in the medium to long term (Iyoha, 1999). The deflation required by the SAPs led to a fall in domestic product and a reduction in national income available for consumption, provision of public services and investment. A reduction in investment means a fall in economic growth. The SAP and ERP era was characterized by and lead to an increase in total debt, debt service payments and low external resource inflow (Iyoha, 1999).

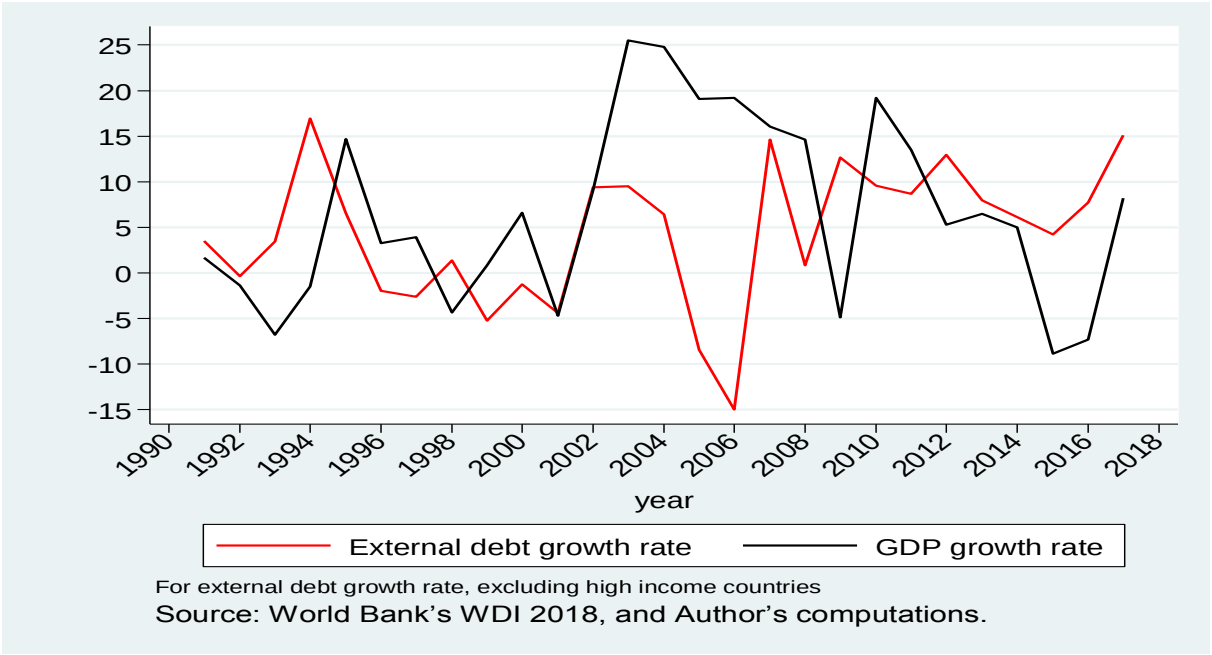


Figure 4: GDP and External Debt Growth rate in Sub-Saharan Africa Countries

By the late 1990s, most countries in SSA adopted the Highly Indebted Poor Country (HIPC) initiative and were being relieved of their external debts. Between 1995 and 2001, external debt stock growth for the region was negative and reduced from 6.56 percent to negative 4.37 percent representing about 10.93 percent (stock of external debt reduced from 234.69 billion US Dollar to US$203.52 billion). While GDP growth rate reduced from 14.68 percent to negative 4.67 percent by 19.35 percent.

By the end of 2004, external debt stock increased to US$259. 48billion representing 10.78 percent increase from 2001, GDP growth also increased by 29.44 percentage points for the same period. GDP growth declined from 24.77 percent to 19.18 percent with external debt stock decreasing from US$259.48 billion to US$202.02 billion by 21.38 percent from the period 2004-2006. The external debt stock has begun to rise consistently thereafter, US$231.58 billion, US$422.77 billion and US$524.11 billion in 2007, 2015 and 2017 respectively. However, the GDP growth rate consistently depicts a fluctuated trend record 16.05 percent, -8.86 percent and 8.20 percent in the same period.

Generally, the above figure depicts an upward trend in external debt and GDP growth rate. This trend denotes some level of a positive correlation between external debt growth rates and GDP growth rates over the period (1990-1997). The trend also shows a negative correlation between GDP growth and external debt growth rate over the period (1997-2002) and (2004 – 2017).

4.4.2 GDP and External debt growth in Low-income countries [8]of SSA

As clearly presented in figure 5, indicates that Low-income countries have been experienced highly fluctuated GDP and external debt growth rate. This situation indicates that in low-income counties economy is expanding opposite to the level of external debt inflow in countries. Low economic performance in view of the high external debt stock leads to exacerbate its debt burden and making it unsustainable external debt. This study, therefore, seeks to investigate whether the external debt stock level has anything to do with the growth performance in the region and its sustainability.

[8]List of Low income countries, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Eritrea, Ethiopia, Gambia, The, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Somalia, South Sudan, Tanzania, Togo, Uganda and Zimbabwe.

Over the period in low-income countries recorded the lowest GDP growth rate and the value negative 20.98 percent, negative 9.56 percent and -3.27 percent in 1994, 2001, and 2015 respectively. Whilst the lowest values of external debt stock growth were negative 29.14 and negative 4.37 percent, which recorded in the period 2006 and 1999 respectively. In low-income countries, extern debt growth was the lowest value in 1999 and 2006 compared to other groups of countries in the region, and this because of almost all of the country in the low-income countries benefited from HIPC incentive and MDRI.

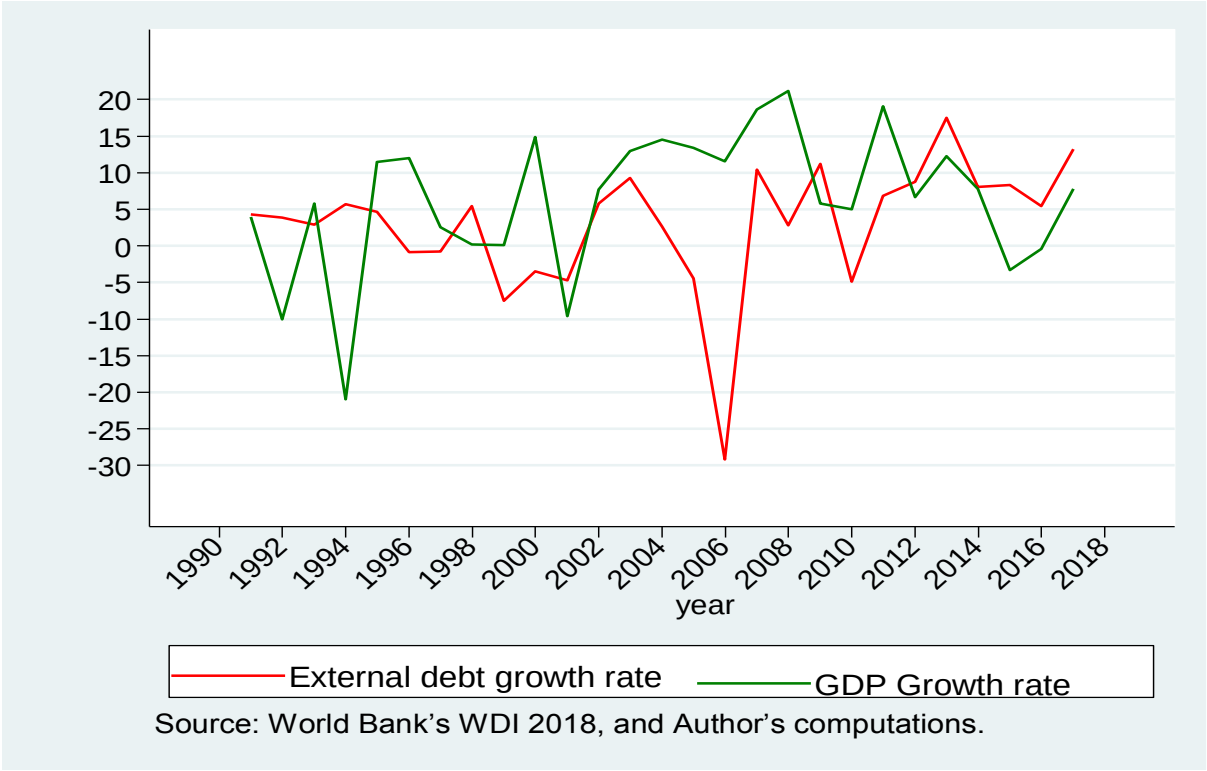


Figure 5: GDP and External debt growth in Low-income countries of Sub-Saharan Africa

Generally, in low-income countries, the growth rate of GDP and external debt trend shows that there is negatively correlation between the two variables from the period (1990-2011). However, in recent time, it shows a positive correlation over the period (2012-2017).

4.4.3 GDP and External debt growth rate in Lower Middle Income Countries [9]of SSA

By the late 1990s, most countries in lower middle-income countries of SSA adopted the Highly Indebted Poor Country (HIPC) initiative and were being relieved of their external debts. Between 1995 and 2001, external debt growth rate reduced from 5.74 percent to -5.06 percent. While GDP reduced from 19.66 percent to 4.69 percent.

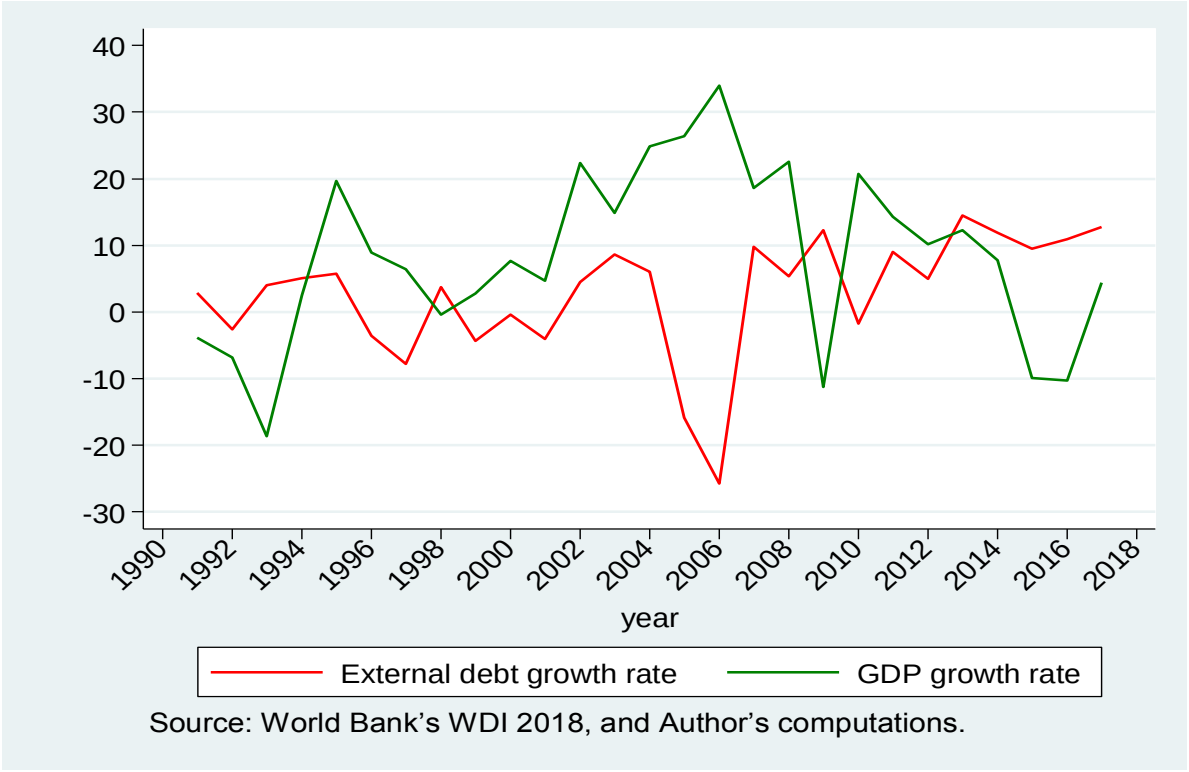


Figure 6: GDP and External debt growth rate in Lower Middle Income Countries [10]of SSA

By the end of 2004, external debt growth increased to 5.99 percent from 2001, GDP growth also increased to 24.82 percent from the same period. GDP growth rose from 24.82 percent to 33.93 percent while external debt growth significantly decreased from 5.99 percent to -25.74 percent from the period 2004 -2006 because of MDRI. Since 2006, growth rate of external debt stock has begun to rise consistently from negative 25.74 percent in 2006 to 12.71 percent in 2017. However, GDP growth rate highly fluctuates in over the period, which recorded -19.02, -11.24

[9] List of lower middle income, countries Angola, Cabo Verde, Cameroon, Congo, Rep., Côte d'Ivoire, Eswatini, Ghana, Kenya, Lesotho, Mauritania, Nigeria, São Tomé and Principe, Sudan and Zambia.

percent, 20.69 percent, 12.25 percent and -10.32 percent in 1993, 2009, 2010, 2013 and 2016 respectively.

4.4.4 GDP and External debt growth rate in Upper Middle Income Countries [11]of SSA

GDP and external debt growth in upper middle-income countries of Sub-Saharan Africa have experienced increasing growth performance compared to other groups of countries in the SSA. According to World Bank(2018) countries classification based on GNP per capita and categorized in upper middle-income countries of Sub-Saharan Africa have six countries from these Namibia and Equatorial Guinea have no data for their external debt

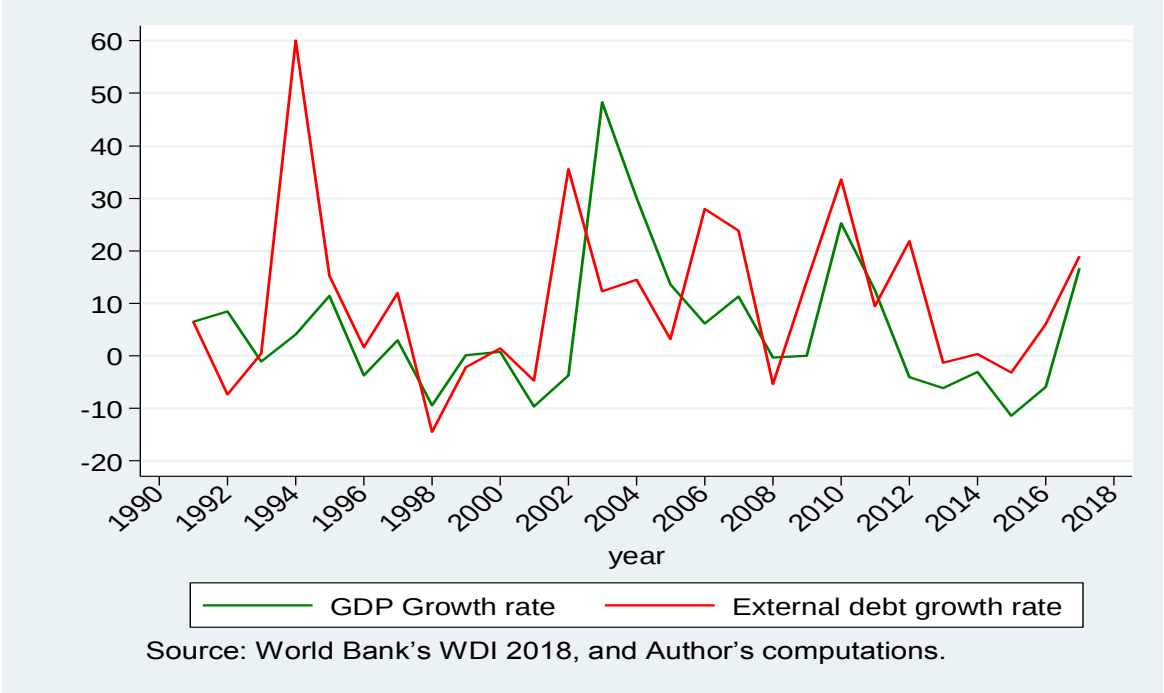


Figure 7: GDP and External debt growth rate in Upper-middle Income Countries [12]of SSA

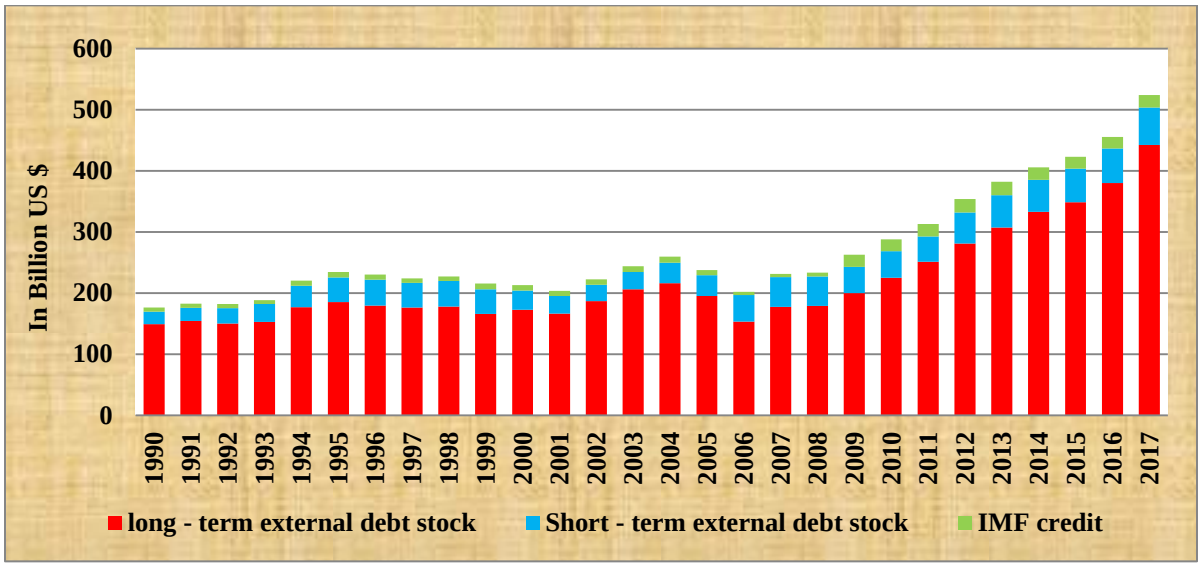
By the end of 1994, the growth rate in external debt amazingly increased from -7.33 percent in 1992 to 60 percent. Similarly, the GDP growth rate increased from 8.48 percent in 1992 to 11.43 percent in 1995. Between the period 1996-2001 GDP and external debt growth rate have

[11]List of upper middle income countries, Botswana, Equatorial Guinea, Gabon, Mauritius, Namibia and South Africa.

followed the same pattern and at lowest points. Again external debt growth rate begun to rise and reached 35.61 percent in 2002 and GDP growth also rise to 48.27 percent in 2003.

In the recent time in upper middle income, countries of SSA GDP and external debt growth rate have consistently fluctuated and followed the same pattern. In contrast to other groups of countries in the region, this group was not benefited from HIPC and MDRI incentives. Generally, compared to other groups of country in this group have stable economic and external debt growth performance. In addition to this, the graph above depicts that GDP growth and external debt growth have positively correlated over time.

4.5 External Debt Stock Components in the Region



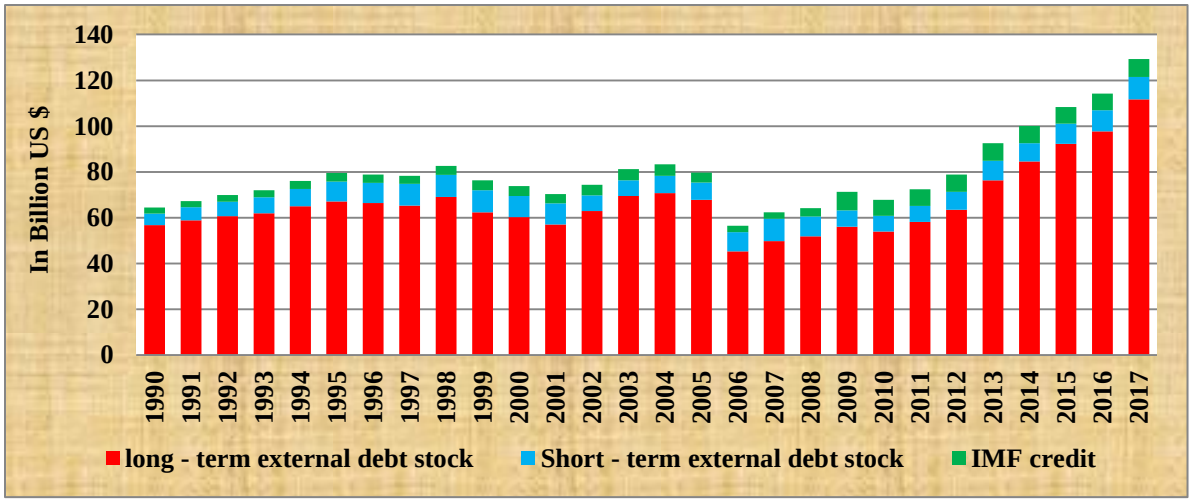
Source: World Banks's WDI (2018), and Author's computations.

Figure 8: External debt stock components in Sub-Saharan Africa countries

The components of external debt stock into long-term, short-term debt and IMF is an important factor external debt analysis since it has a direct bearing on the process of external debt repayment, rescheduling, relief, sustainability analysis and its effect to the economy [13](see the classifications in Appendix 12). The external debt sustainability of developing countries is affected not only the evolution of total debt stocks and debt-servicing burdens relative to their

[13] The **interest rate composition** of external debt, both short- and long-term, may also have significant implications. Sharp increases in short-term interest rates, such as those experienced in the early 1980s, can have profound implications for the real cost of debt.

growth and export performances but also by the composition of their external debt (UN report, 2016). The external debt stock consists of the following three components: short- term debt, long-term debt and IMF credit. Long-term external debt again consists of public and publicly guaranteed long- term debt and private non-guaranteed long-term debt. The above graph revealed that in Sub-Saharan Africa the long- term debt remained the largest component of external debt. In 1994, the level of long-term debt, short-term debt and IMF credit reached US$176 billion, US$35 and US$8 billion respectively. Since 2006, all the components of external debt were growing rapidly and rising long-term debt from US$153 billion in 2006 to US$442 billion in 2017, short-term debt rising from US$34 billion to US$60 billion in the same period and debt from IMF credit increased from US$5 billion to US$20 billion. Short-term debt was the fastest growing component of external debt and it accounted for 12 percent of total external debt stocks at end 2017.

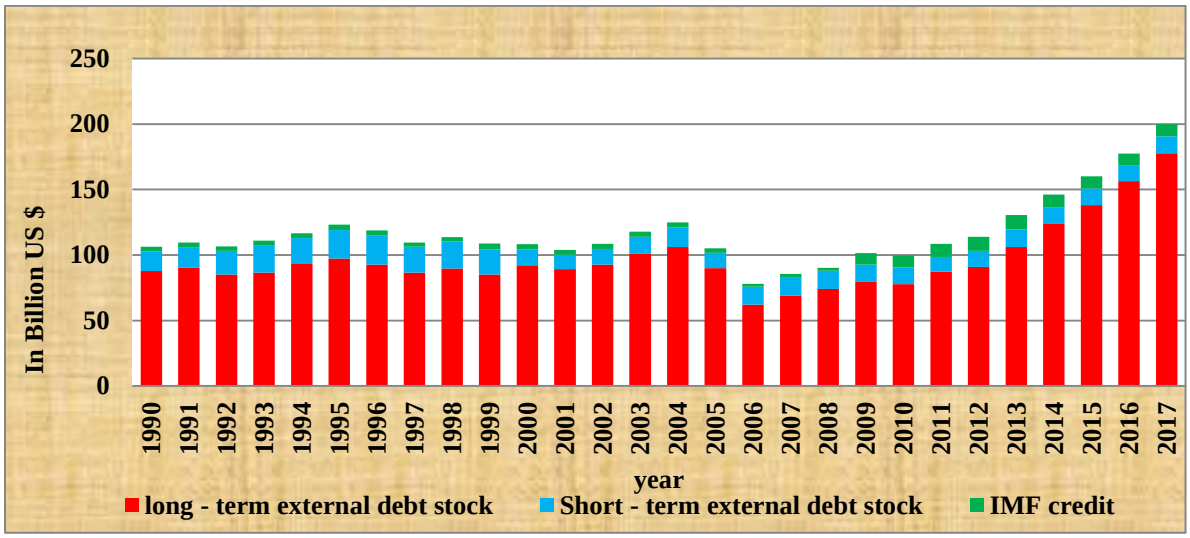


Source: World Banks's WDI (2018), and Author's computations.

Figure 9: External debt stock components in Low-income countries of SSA

In low-income countries, the total external debt stock reached US$129 billion in 2017, an increase of 13 percent from 2016. Rising external debt in low-income countries associated with important changes in external borrowing patterns in recent years. As per figure 9, long-term external debt accounted for the lion share in all periods followed by short-term and IMF credit. In 1994, the level of long-term debt, short-term debt and IMF credit reached US$64 billion, US$7 billion and US$3 billion respectively. In 2006, because of MDRI long-term and IMF credit reduced to US$45 billion and US$2 billion respectively but short-term debt increased to

US$8 billion. Again, since 2007, the components of external debt stock increased rapidly more specifically, long-term debt increased from US$49 billion in 2007 to US$111 billion in 2017, short-term debt increased from US$7 billion to US$9 billion and IMF credit also increased from US$2 billion to US$7 billion in the same period. Generally, in low-income countries, the share of short-term debt to external debt has increased in the recent time and recorded 9 percent in 2017 whilst the share of IMF credit continuously decreased and recorded 6 percent in 2017.



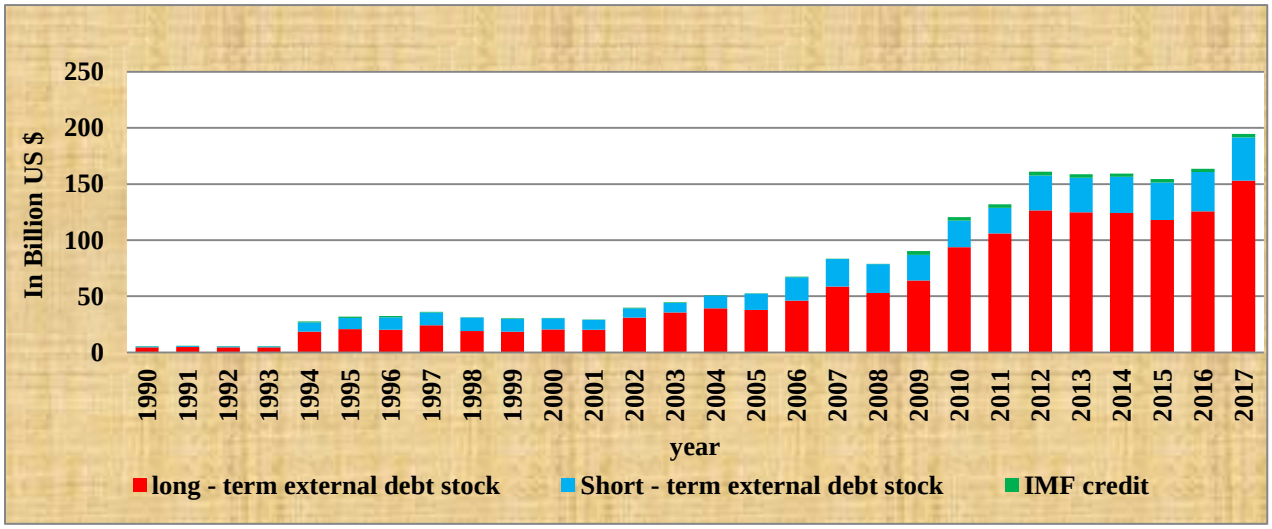
Source: World Banks's WDI (2018), and Author's computations.

Figure 10: External debt components in Lower-middle income countries of SSA

In lower-middle income countries, the total external debt stock increased to US$200 billion in 2017, an increase of 12 per cent from 2016. The composition of external debt and its trend in lower-middle income countries is the same as in low-income countries. Long-term external debt increased sharply from US$62 billion in 2006 to US$177billion in 2017. While short-term external debt stock has stagnant since 2006 and recorded US$12 billion in 2017. IMF credit has slightly increased from US$2 billion in 2008 to US$9 billion in 2017.

The total external debt stock in Upper- middle income countries are estimated to have increased five-fold in the past 15 years, reaching US$194 billion in 2017, from US$39 billion in 2002. Short-term debt increasing progressively from US$20 billion in 2006 to US$38 billion in 2017. This trend, most pronounced in other groups of countries in the region, is wrong, as short-term debt carries higher rollover and factor for unsustainable external debt. Long-term external debt

on the other side increased from US$46 billion in 2006 to US$153 billion in 2017. While IMF credit almost constant since 2009 in US$3 billion.



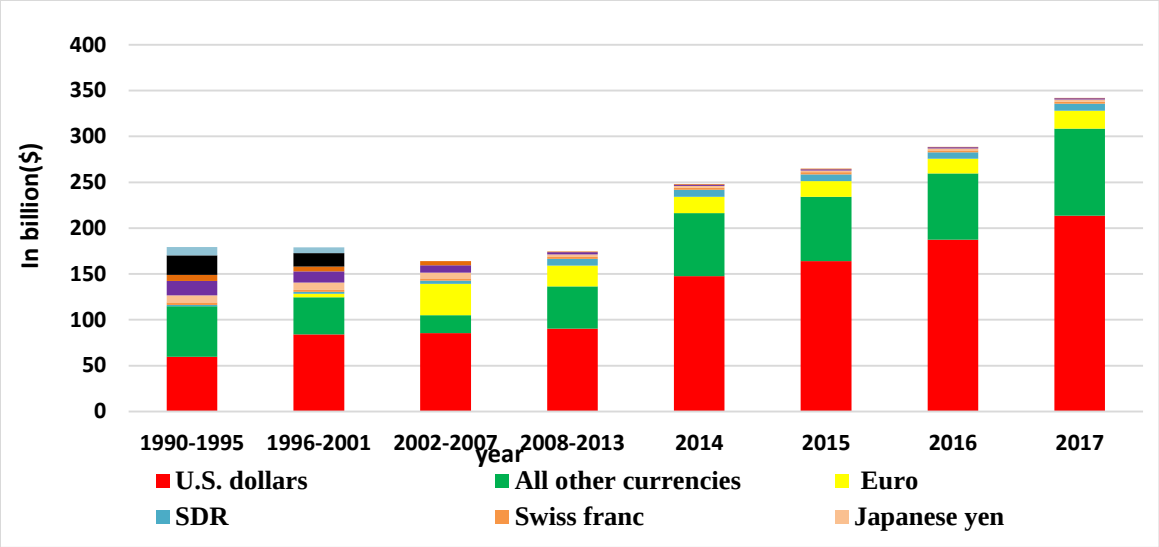
Source: World Banks's WDI (2018), and Author's computations.

Figure 11: External debt components in Upper-middle income countries of SSA

4.6 Currency Composition Of External PPG Debt in the Region

The currency in which external debt is denominated could potentially also have significant impacts on the evolution of the credit cycle in the borrowing economy (Avdjiev et al, 2017). A number of recent studies have emphasized the unique role that the US dollar plays as the premier global funding currency in the international financial system. Bruno and Shin (2015) have outlined a mechanism through which fluctuations in the value of the US dollar influence the global financial cycle. More concretely, a depreciation (an appreciation) of the US dollar vis-à-vis the domestic currency of a given country can increase (reduce) the level of external debt stock in the borrower countries with currency mismatches, thus easing (tightening) economic conditions and debt sustainability in the borrowing country. The currency compositions of external debt and maturity should be interpreted with caution due to caveats related to data availability[14].

[14] The **currency composition** of external debt is also important. There is a significant difference between having external debt payable in domestic currency and having external debt payable in foreign currency. In the event of a sudden depreciation of the domestic currency, foreign currency external debt (including foreign-currency-linked debt) has potentially important wealth and cash flow effects for the economy. For instance, when public debt is payable in foreign currency, a devaluation of the domestic currency could aggravate the financial position of the

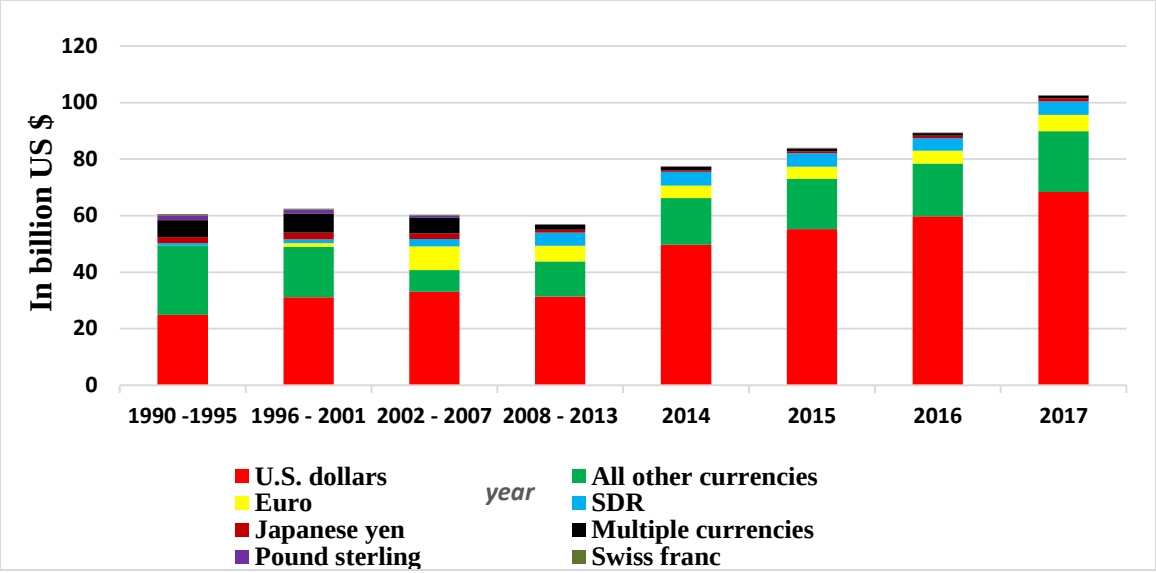


Source: World Banks's WDI (2018), and Author's computations.

Figure 12: Currency Compositions of External PPG Debt in SSA

The currency composition of external debt is important because there is a significant difference between having external debt payable in domestic and foreign currency. In sub-Saharan Africa, as the figure above displayed that the currency compositions of external PPG debt dominated by the U.S. dollar. In 2017, 62 percent of total external PPG outstanding debt was contracted in U.S. dollars, 27 percent in all other currencies and 6 percent in Euro. Between 2016 and 2017 US dollar contracted external PPG debt slightly decreased from 64 percent to 62 percent (US$213 billion) while all other currency contracted external PPG debt increased from 25 percent to 27 percent (US$95 billion). Because of the larger share of U.S dollar contracted external PPG debt, burden has increased further due to larger domestic currency depreciation against U.S. dollar since 2014 in SSA countries (IFC, 2018).

public sector, so creating an incentive for the government to avoid a necessary exchange rate adjustment. Information on the currency composition of debt at the sectorial level, including resident and nonresident claims in foreign currency, is particularly important because the wealth effects also depend on foreign currency relations between residents.

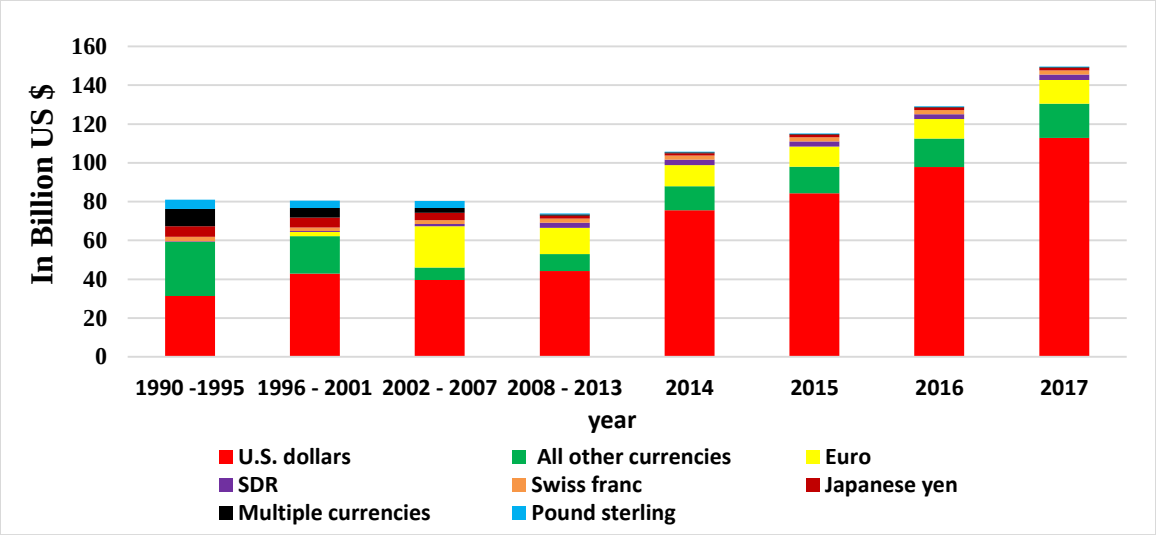


Source: World Banks's WDI (2018), and Author's computations.

Figure 13: Currency Composition of External PPG Debt in Low-income Countries of SSA

In low-income countries, the currency composition of External PPG debt is almost similar to Sub-Saharan Africa. From the total external PPG debt currency contracted in the US dollar was the dominant one in all periods followed by all other currencies and Euro. At the end of 2001, currency contracted as a percent of total external PPG were 66 percent (US$68 billion) in U.S. dollars, 21 percent (US$21 billion) in all other currencies, 6 percent (US$5.7 billion) in Euro and 5 percent (US$4.7 billion) in SDR[15]. The rest consists of multiple currencies, the Japanese Yen etc.

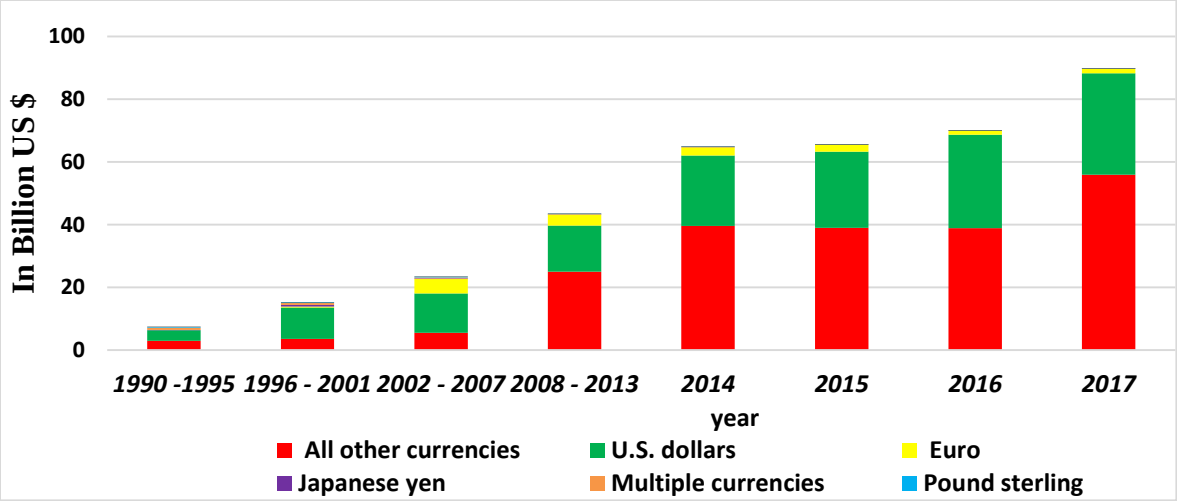
[15] SDR is the percentage of external long-term public and publicly-guaranteed debt contracted in special drawing rights for the low- and middle-income countries.



Source: World Banks's WDI (2018) and Author's computations.

Figure 14: Currency Compositions of External PPG Debt in Lower-Middle income countries of SSA

Compared to other groups of countries in lower-middle income countries since 2014, around 95 percent of external PPG debt contracted in U.S. dollars, all other currencies and in Euro. In 2017, from the total external PPG debt contracted 75 percent (US$112 billion) in US dollars, 11 percent (US$17 billion) in all other currencies and 8 perecent (US$12 billion) in Euro. Currency composition has moved significantly towards U.S. dollars at end-2017 compared with end-2004, from about 41.2 percent of total outstanding debt to 75.4 percent while Euro composition external PPG debt has decreased from 33 percent to 8.2 percent in the same period.



Source: World Banks's WDI (2018), and Authors computations.

Figure 15: Currency Composition of External PPG Debt in Upper-Middle Income countries of SSA

Currency compositions of external PPG debt in upper-middle income countries are different from other groups of countries. In upper-middle income countries, currency compositions of external PPG debt dominated in all other currencies[16] while for other group of countries U.S. dollar is the dominant one. Between 2001 and 2016, U.S. dollar contracted external PPG debt has sharply decreased from 71.7 percent to 42 percent while other currencies contracted increased from 5 percent to 55 percent. At the end of 2017, from the total external PPG debt contracted 62 percent (US$55 billion) in all other currencies and 32 percent (US$32 billion) in U.S dollars.

Generally, the large share of external debt contracted in a single foreign currency affects the external debt sustainability path through domestic currency depreciation in the region. Developing countries that have a large share of public debt in foreign currency and frequently face terms of trade or other shocks that result in considerable depreciation of the domestic currency. According to Vergara et al. (2009), domestic currency depreciation is a crucial factor for external debt sustainability when the country debt dominated in foreign currency contract.

[16] The percentage of external long-term public and publicly-guaranteed debt contracted in all other currencies not specified for the low- and middle-income countries.

4.7 Creditors Composition of External Debt Stock in Sub-Saharan Africa

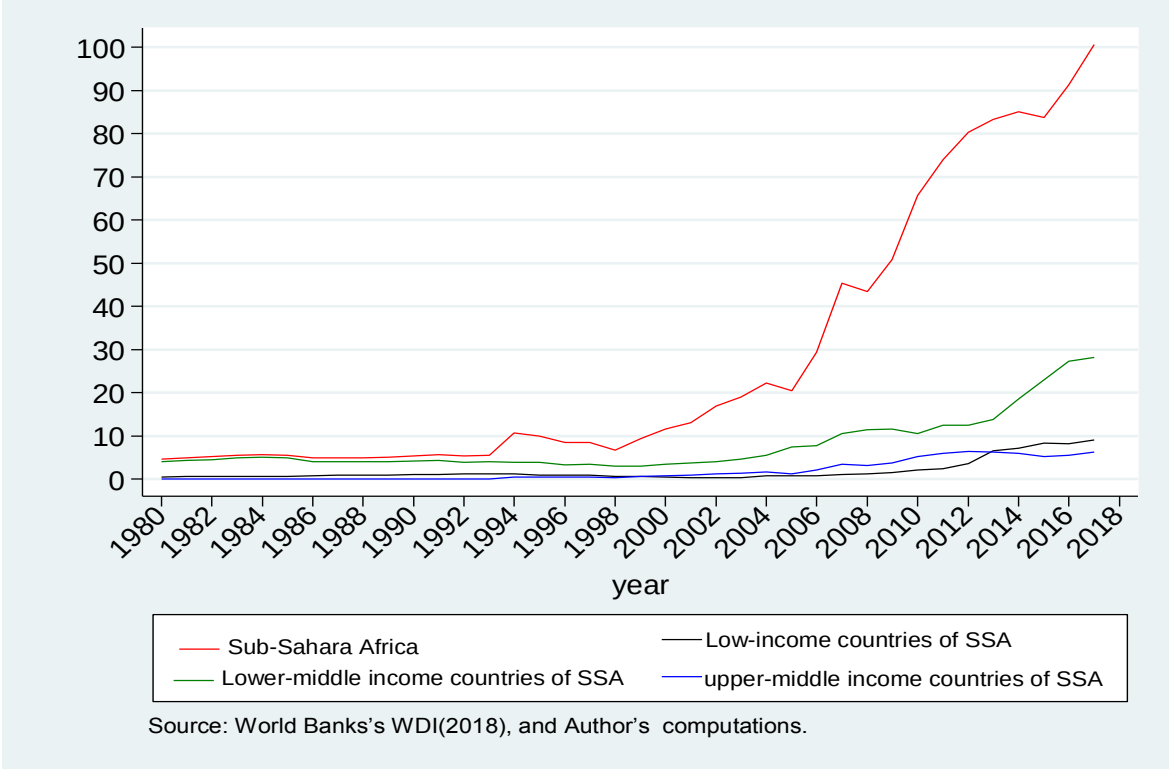


Figure 16: Long-term private creditor's composition of external debt in SSA

In Sub-Saharan Africa, long-term debt stocks from private creditors were the fastest growing component of external debt stock growing extremely since 2006 and rose from US$29.29 billion in 2006 to US$100.56 billion in 2017 because of sudden current account deficit in the region. Inflows from private creditors accounted for 22.7 percent of total long-term public and publicly guaranteed external debt stocks, up sharply from 10.5 percent in 2005. According to international debt, statistics (2018) private creditors and lending by commercial banks and other private entities accounted for 40 percent of the long-term debt stock of Sub-Saharan African countries at the end of 2017. As shown in the graph below the composition of external debt in Sub-Saharan Africa countries shifted towards the riskier and more expensive source of financing (private creditors). Generally, since 2010, in all income groups of SSA countries, the composition of long-term creditors to the external debt stock is rapidly increasing. Because of fast growing in private creditors, the concerns about external debt sustainability rise in the area.

4.8 Concessional term of External Debt Stock in Sub-Saharan Africa

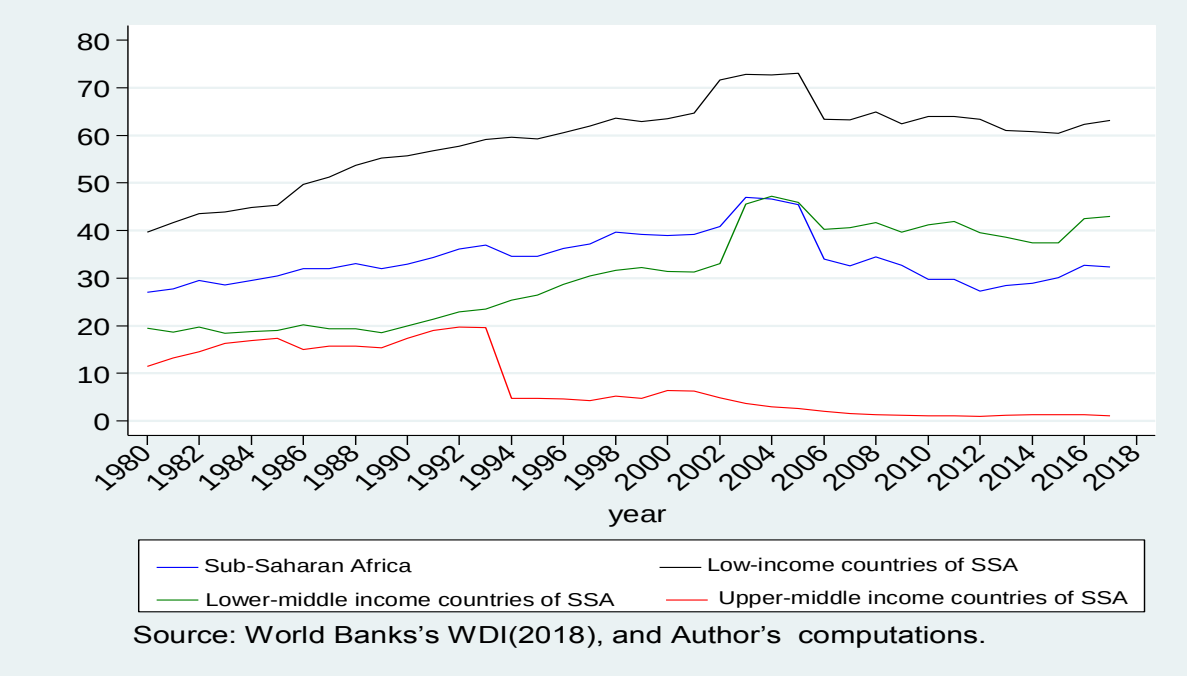


Figure 17: Concessional debt as the percentage of total external debt stock in SSA

The composition of debt portfolios has changed over the past few years, away from traditional concessional sources of financing and toward new bilateral lenders and more market-based borrowing. The indications of these trends found in the figure above. The importance of concessional credit, i.e. credit with a grant component higher than 25% of the total loan, has declined, which confirms the smaller reliance on non-market priced loans. The share of concessional debt to total external debt stock in the region has peaked in 2005. Thereafter, the shares of concessional debt in regional and in their income group debt stocks have fallen continuously. As the figure above indicated, the share of concessional external debt has declined in Sub-Saharan and in their respective income group countries. Between 2005 and 2017, concessional debt declined as a share of total external debt stock outstanding from 45.43 percent to 32.40 percent respectively in Sub-Saharan. At the time, in Low-income and Lower-middle income countries, the share of concessional external debt to external debt stock has declined, from 73 percent to 63 percent and from 47 percent to 42 percent respectively. In upper-middle income countries, the share also reduced significantly from 3 percent in 2005 to 1.15 percent in 2017. Generally, in upper-middle income countries, the share of concessional debt to external

debt stock at lowest point compared to other groups of countries. The increasing use of non-concessional financing sources and the declining in concessional financing sources differentiates today's borrowing from that before debt relief. As the IFC noted, many African countries external debt increased, with compositions of debt shifting toward higher priced non-concessional financing. External debt repayment profiles and external debt sustainability are therefore more challenging.

4.9 External Debt Services and Export in the Region

4.9.1 Ratio of External Debt Service to Exports in Sub-Saharan Africa

The ratio defined as the ratio of external debt-service payments of principal and interest on long-term and short-term debt to exports of goods and services for any one-year (International debt statistics, 2017). This ratio is a possible indicator of external debt sustainability because it indicates how much of a country's export revenue will be used up in servicing its external debt. As the figure 17, indicated between 1980 and 1994, the ratio of external debt service to exports for SSA highly fluctuated and reached a maximum in 1985, which recorded 19 percent. However, between 1994 and 2008, the value declined from 15 percent to 4 percent. Then, the ratio started to rise from 3.3 percent in 2011 to 11 percent in 2017, and this is because of the detonations of export earnings in the region. Increasing external debt-to-exports ratio over time, for a given interest rate, implies that total external debt is growing faster than the economy's basic source of external income, indicating that the country may have problems meeting its debt obligations in the future (IMF, 2000).

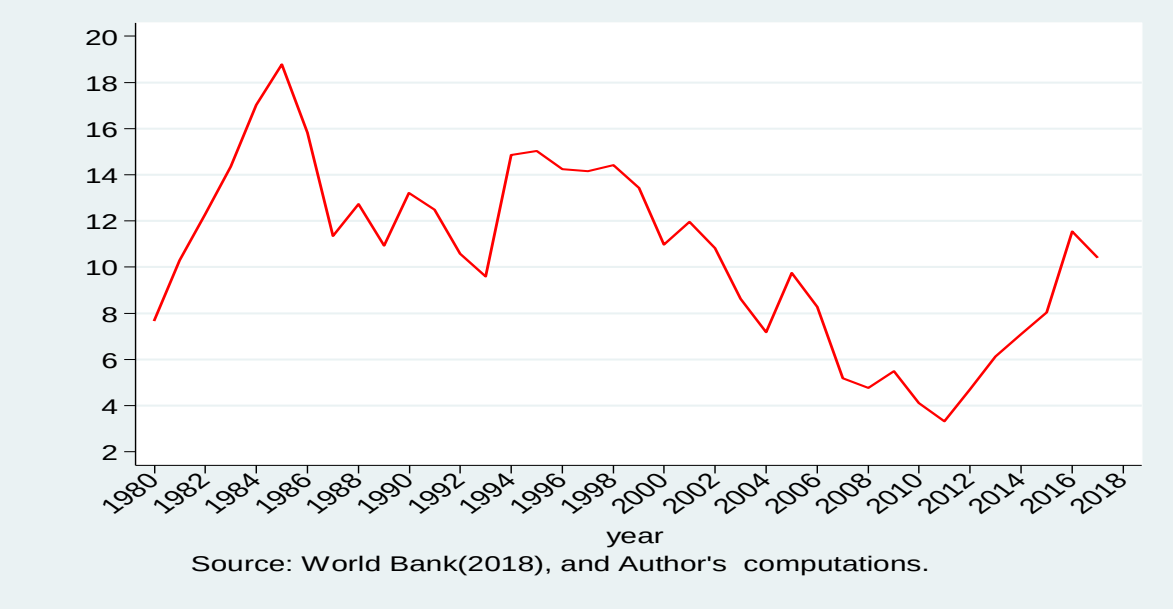


Figure 18: Ratio of External Debt Service to Exports in Sub-Saharan Africa

4.9.2 Ratio of External Debt Service to Exports in GroupWise SSA Countries

Figure 19, depicts that in 1985 the ratio of external debt service to exports for low income and lower middle-income countries reached maximum, which recorded 44 percent and 49 percent respectively. However, for upper-middle income countries, the ratio was stagnant around 1 percent from 1980 to 1993. Between 1990 and 2008, the ratio in low-income and lower-middle income countries sharply reduced from 28 percent to 6 percent and from 32 percent to 2 percent respectively. While in upper-middle income countries increased from 1 percent in 1993 to 12 percent 2002. Between 2008 and 2011 in all income group countries of SSA, the ratio of external debt service to export was continuously increasing from 6 percent to 9 percent for low-income countries, from 2 percent to 10.5 percent for lower-middle income countries and 5 percent to 12 percent to upper-middle income countries. Generally, in all income groups the ratio is increasing since 2006, this is because of the detonations of export earnings and continually increased the level of external debt.

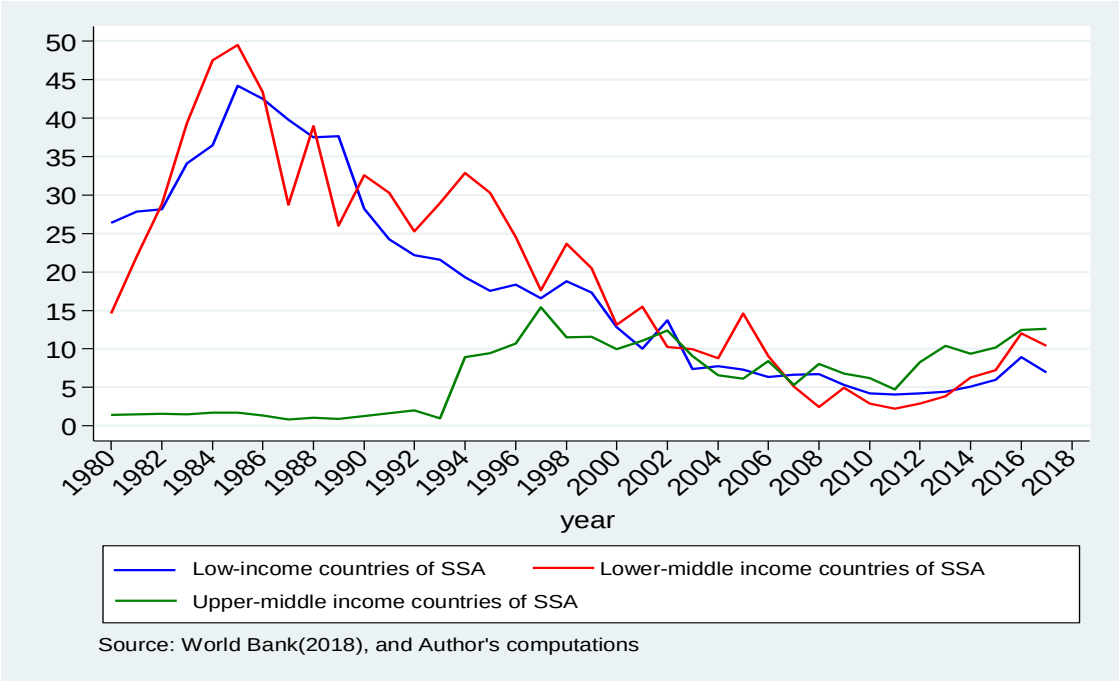
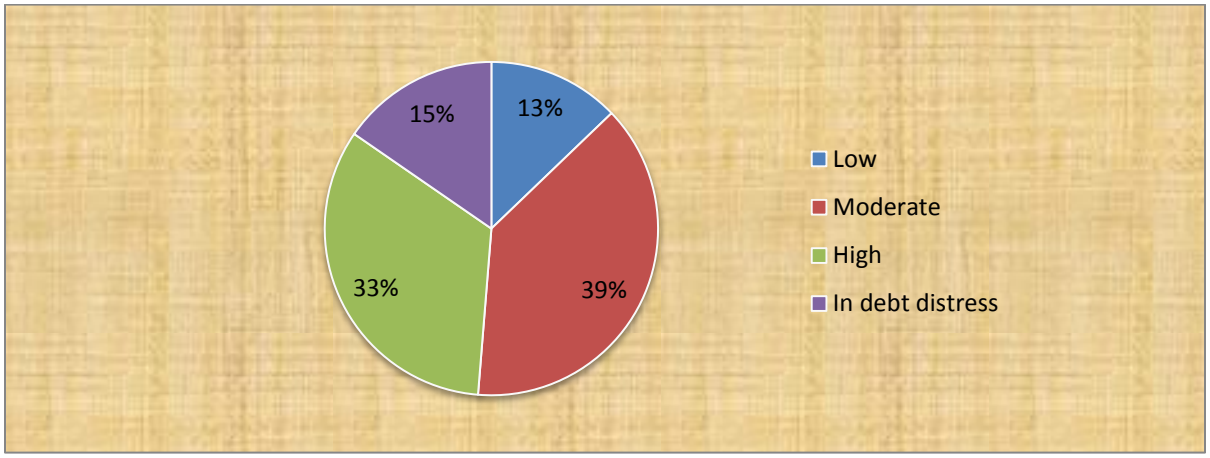


Figure 19: Ratio of External Debt Service to Exports in GroupWise SSA Countries

4.10 IMF and WB Debt sustainability Assessment for SSA countries

As per figure 20 below, in Sub-Saharan Africa 6 countries were classified as in debt distress, 13 countries were classified as high risk, 15 countries were classified as moderate risk and 5 countries were classified as low risk at the end of 2018. The number of countries in high risk more than double since 2013 (IMF, 2017).



Source: IMF and WB debt assessment result and Author's Computations

Figure 20: IMF & WB (IDA) Debt Sustainability Assessment for SSA Countries in 2018

According to regional economic outlook and IMF debt sustainability assessment as presented in figure 20 for Sub-Saharan Africa countries, six countries from the region are in debt distress (Gambia, Mozambique, São Tomé and Príncipe, South Sudan, Sudan and Zimbabwe) meaning that they are unable to service external commitments. Generally, based on IMF and WB debt sustainability assessments as shown in the above figure, 49 percent of countries in the region were in debt distress and high risk meaning that level of debt in these countries unsustainable. List of the countries based on IMF and WB debt suitability assessment result presented in appendix 11.

CHAPTER FIVE

EMPERICAL RESULTS AND DISCUSSIONS

Results from the estimation of the effects of external debt on economic growth and its sustainability in Sub-Saharan Africa are presented in this chapter. The empirical analysis uses annual data on 41 Sub-Saharan Africa countries for 18 year period (2000-2017). There are five sections under this chapter. The second section presents descriptive statistics of variables used in the model whilst the third section reports the outcome of diagnostic tests conducted. Results from the estimated model are present and discussed in the fourth section. The last section concludes the chapter.

5.1 Summary statistics and Description

The descriptive statistics considered the mean, standard deviation, maximum and minimum values of the dependent and independent variables. The statistics are based on 41 Sub-Saharan Africa countries out of the total of 48 countries in the region due to the unavailability of data for some countries in relevant variables. The mean represents the average value of the variables whilst standard deviation indicates how variables are distributed around their mean values. Table 5.1 shows the descriptive statistics of the variables.

The real GDP growth rate for 41 Sub-Saharan Africa countries used in the empirical analysis averaged 4.54 percent between 2000 and 2017 ranging from negative 20.59 percent for Sierra Leone in 2015 to positive 23.18 percent for Angola in 2007 with a standard deviation statistics of 4.17. This growth variation among countries in the region may be because of occurrences in domestic and external factors such as continuous deterioration in terms of trade, falling commodity prices, global economic downturn and financial crisis in the international economies.

The level of external debt stock in the region remains high averaging 57.47 percent of GDP for the period 2000 to 2017. The minimum level of external debt stock as a percent of GDP stood at 2.47 percent for Niger in 2007 whilst the maximum value recorded at 873.26 percent for Liberia in 2003. This is an indication that countries in the region heavily dependent on the external financial source to fill their financial gaps.

Table 5.1: Summary Statistics

Variables	*Obviations*	*mean*	*Std. Dev.*	*Min.*	*Max.*
GDP growth (annual %)	738	4.57	4.17	-20.59	23.18
External debt stock to GDP	738	57.47	77.11	2.47	873.26
Inflation rate	738	9.14	27.44	-9.61	513.90
Openness	738	77.27	50.03	19.10	578.44
Population growth	738	2.57	0.98	-1.41	11.84
Gross capital formation to GDP	738	22.44	9.40	1.09	73.77
Export to GDP	738	30.72	16.78	4.68	89.68
Import to GDP	738	41.72	23.35	10.79	236.39
External debt service to Export	738	9.11	12.384	0.22	157.45
Growth of HDI	738	1.49	1.50	-10.42	11.34
Land area (sq. km)	738	539415.5	5877455.2	1861	2505810

Source: Author's calculations from the WDI (2018).

According to the summary statistics table 5.1, the mean value of the inflation rate in the region is 9.14 percent for the period 2000 to 2017. The minimum and the maximum value of this variable is negative 9.61 percent for Lesotho in 2002 and positive 513.9 percent for the Congo Democratic Republic in 2000 respectively. The variation from the mean for inflation rate is 27.44 percent. This highest variation from the mean is an indication of macro-economic instability in the region through overall price skyrocketing.

Openness is measured by the sum of exports and imports value dividing by Gross domestic product. And, the mean value of this variable is 77.27 percent for the period 2000 to 2017. The minimum and maximum value for this variable are ranging from 19.1 percent for Sudan in 2012 to 578.44 for Malawi in 2007 respectively. The variation from the mean is 50.03 percent. In the region, the value of imports always greater than the value exports and this leads to the current account balance deficit in the region. And, the summary statistics showed that Population growth for the period 2000 to 2017 stood at an average of 2.57 percent with a standard deviation of 0.989 percent. Additionally, in the same period, the minimum and the maximum value ranging from negative 1.4 percent to 11.84 percent.

As per table 5.1, the average gross capital formation as a percentage of GDP is 22.44 percent from the period 2000 to 2017. The ratio is ranging from a minimum value at 1.09 percent for Sierra Leone in 2000 to the maximum value at 73.77 percent for Guinea in 2017. The standard deviation of the variable is 9.4 percent.

As per table 5.1, the average values of exports as a percent of GDP is 30.72 percent per annum for a group of countries considered under the study from 2000 to 2017. In the same period, the minimum value of exports as a percent of GDP recorded at 4.68 percent for Burundi in 2002 whilst the maximum value is recorded at 89.68 percent for Angola in 2000. The differences in export ratio among the countries may be attributed to variations in the nature of export commodities. Discovery of natural resource like oil and diversifications of export commodities in some countries and reliance on traditional export commodities by other countries may cause for the difference among the economies. The mean value of imports as a percent of GDP in the region is recorded at 42.72 percent from the period 2000 to 2017. The minimum and the maximum values of the variable ranging from 10.79 percent for Nigeria in 2015 to 236.39 percent for Liberia in 2007. Generally, as the summary statistics showed the average value of import is higher than the average value of exports as a percent of GDP and this, in turn, an indication for current account deficit in the region.

The summery of growth of human development index showed in tenth raw. The standard deviation shows that lower dispersion in the growth of HDI over the countries. On average each countries growth rate of HDI varies by 1.50 from the mean of 1.49. The maximum growth rate of HDI is 11.34 for Malawi in 2004 whereas the minimum value is -10.12 for the same countries in 2003. This indicates low level of variation in HDI growth across SSA countries.

5.2 Regression Diagnostics Test Results

To ensure that the data used in the model estimation is appropriate, unit root, cointegration, normality, multicollinearity, heteroscedasticity, autocorrelation and cross-section dependency tests are conducted.

5.2.1 Unit Root Test

Unit root test is generally considered as time series phenomenon, however, testing stationarity for panel dataset have greater power and advantage than time series stationary test. Testing stationarity for panel data may help prevent unrelated regressions. There are different types of panel unit root tests in the recent strand of literature like Levin-Lin-Chu (2002), Breitung and Das (2005), Harris-Tzavalis (1999), Im, Pesaran, and Shin (2003) and Hadri (2000) panel unit

root tests. However, this study used Harris-Tzavalis (1999) and Im–Pesaran-Shin (2003) unit root tests because out of all panel unit root testes these two tests are valid when the number of time periods (years in this study) is small and the number of individuals (country in this study) is large. Harris-Tzavalis(HT) test is based on within estimation and allows non-normality. Im-Pesaran-Shin(IPS) test is more general than HT and it is based on the combination of independent Dickey-Fuller tests besides IPS allowing heteroskedasticity, serial correlation, and non-normality.

Table 5.2: Panel unit root test

Variables	Harris-Tzavalis test		Im-Pesaran-Shin test	
	Z- Statistic	stationary	Z- Statistic	Stationary
GDP growth	-15.287	I(0)***	-11.6087	I(0)***
External debt stock to GDP@FD	-8.8164	I(1)***	-10.5262	I(1)***
Inflation rate	-3.6799	I(0)***	-10.2925	I(0)***
Openness@FD	-16.9519	I(1)***	-12.2789	I(1)***
Population growth	-27.9428	I(0)***	-10.0608	I(0)***
Gross capital formation to GDP	-1.6328	I(0)*	-4.3596	I(0)***
Growth of HDI	-21.2407	I(0)***	-12.5095	I(0)***

Source: Author's calculations from the WDI (2018). The null hypothesis of non-stationarity and the alternative hypothesis are stationary. *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. FD refers to first difference stationarity.

As per table 5.2, the result of HT and IPS panel test statistics showed that the four variables; GDP growth, inflation rate, population growth and gross capital formation to GDP were stationary at level. Whilst the two variables; external debt stock to GDP and openness were not stationary at level but, were stationary after the first difference.

5.2.2 Panel cointegration test

After conducted panel unit root tests, the next step was to establish whether the non-stationary variables are cointegrated or not. Usually, when variables are differenced to attain stationarity, the long-run properties are lost. Cointegration means that there is a long-run relationship between two or more non-stationary variables. Since the dependent variable (GDP growth) was stationary at level (I (0)), it is not necessary to check for cointegration in this particular model.

5.2.3 Test for Normality

The normality assumption plays a crucial role in the validity of inference procedures, specification tests and forecasting. Non-normal error components in the panel data affect the performance of several tests, like the performance of panel heteroskedasticity tests severely affected Blanchard and Matyas (1996). In order to check the normality of the disturbance term, this study applied the extended version of famous Jarque - Bera testes for the panel data model. The test was developed by Galvao et al. (2013) and the test particularly useful for the case where the number of individuals (in our case country), N greater than the number of time periods (in our case year), T. The tests are constructed based on the moment conditions of within and between residuals. As per table 5.3, the joint and individual tests for normality in both components of error terms indicated not reject the null hypothesis of normality because the P-value is greater than 5%.

Table 5.3: Normality test

Tests for skewness and kurtosis — Number of obs = 738; Replications = 50

(Replications based on 41 clusters in country)

	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
Skewness_e	262961.1	285693.6	0.92	0.357	-296988	822910.2
Kurtosis_e	3.75e+08	2.57e+08	1.46	0.145	-1.29e+08	8.80e+08
Skewness_u	468248.7	316927.9	1.48	0.140	-152918.6	1089416
Kurtosis_u	1.12e+08	6.22e+07	1.80	0.072	-9932847	2.34e+08

Joint test for Normality on e: chi2(2) = 2.98 Prob > chi2 = 0.2259

Joint test for Normality on u: chi2(2) = 5.42 Prob > chi2 = 0.0664

Source: Author's computation in STATA 14.2

5.2.4 Test for Heteroskedasticity

The heteroskedasticity assumption states that the variance of the unobservable error ($\in_i$) across observation is constant. If the variance of the error term is not constant is it side to be heteroskedasticity (Wooldridge, 2004). If the presence of heteroskedasticity error terms in the model the regression coefficient, results will consistent estimates but the estimates will not efficient. The loss of efficiency of the estimates will lead to invalid inference through biased standard error (Gujarati, 2004). In order to check the presence heteroskedasticity in the regression or not, this study used a panel level heteroskedasticity using the Likelihood Ratio (LR) test proposed by Poi and Wiggins (2001). The null hypothesis of this test was that the error variance was Homoskedastic. As shown in Appendix 2, the chi-square value was statistically insignificant even at 10 percent level of significance and hence the null hypothesis of constant variance was strictly accepted or did not have the problem of heteroskedasticity.

5.2.5 Test for Multicollinearity

In the presence of multicollinearity, the explanatory variables correlated with each other and the regression coefficients possess large standard errors (in relation to the coefficient themselves). Because of the presence of multicollinearity in a given model, the coefficients cannot be estimated with great precision or accuracy (Gujarati, 2004). To check the presence of multicollinearity or not this study used Pearson pairwise correlation and variance inflation factor. Accordingly, all variables of this study were with a correlation coefficient below 0.8, even below 0.5 which is acceptable. The test was shown in Appendix 3. Moreover, according to appendix 3, the mean-variance inflation factor (VIF) for the model is 2.86 which is less than 10 and 1/VIF which is tolerance level is more than 0.10 for all explanatory variables of the study. These tests confirm the presence of a lower degree of multicollinearity among variables (see Appendix 3).

5.2.6 Test for Autocorrelation

The covariance between two consecutive error terms i.e $COV(U_{it}U_{jt}) = 0$ we can say that the error term uncorrelated to each other or simply the error terms subject to autocorrelation Verbeek (2000). The classical error component panel data model assumes serially uncorrelated disturbances, where the covariance between error terms over time is zero. If the error terms are correlated with one another, it is said to be they are autocorrelated or that they are serially correlated. A number of tests for the presence of autocorrelation in a fixed effects panel data model have been proposed in the literature. The most common test for autocorrelation includes Durbin-Watson test, Breusch Godfrey test, Wooldridge-Drukker and Baltagi and Li (1995) LM statistic. However, this study used the tests developed by Inoue and Solon (2006), and Born and Breitung (2016) because these tests compared to aforementioned tests the test statistics applied for any order serial correlation and valid for N > T. As shown in appendix 4, the Inoue–Solon and Born-Breitung test for serial correlation indicated that in all tests the P-value greater than 0.05. The tests do not reject the null hypothesis, indicating the residuals are not serially correlated.

5.2.7 Test for cross-section dependency

Cross-sectional dependence arises because of the presence of common shocks and unobserved components that ultimately become part of the error term. If there is a cross-sectional dependency in the model, the standard fixed effect and random effect estimators are consistent but not efficient, the estimated standard errors are biased Hoyos and Sarafidis(2006). Lagrange multiplier (LM) test, developed by Breusch and Pagan (1980) is widely used in cross-sectional dependency test through the command xttest2 but this test valid for T > N. This study used tests developed by Pesaran (2006) and Friedman(1937), which readily available in the Stata through the Stata command xtcds (Sarafidis et al., 2006). These tests are valid when N > T. As per appendix 5, Pesaran and Friedman's tests do not reject the null hypothesis of cross-sectional independence because of the p-value in both testes more than 0.05. Hence, there is enough evidence suggesting the absence of cross-section dependency in the model.

5.3 Empirical Findings for Debt-Growth Nexus

5.3.1 Threshold effect

In this section, the study provides a formal statistical analysis of external debt-threshold effect on economic growth, using a relatively large panel of 41 SSA countries over the period 2000 – 2017. First, this study fit the single threshold model, with the null hypothesis $H_0: \gamma_1 = \gamma_2$(no threshold effect), and alternative hypothesis $H_1: \gamma_1 \neq \gamma_2$ (threshold effect does exist). The result indicates the estimator of a single threshold is 21.787 percent with 95 percent confidence interval (21.7729 ; 21.7955).

Table 5.4: Threshold estimator in a single threshold model

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	21.7870	21.7729	21.7955

Source: Author's computation in STATA 14.2

The study uses 400[17] bootstrap replications to test for a single threshold effect. The F statistics is 27.46, larger than the critical value even at 1 percent level of significance (26.7993) and the bootstrap P value is highly significant with the value 0.01. Therefore, the null hypothesis of the linear model is rejected. In other words, the relationship between external debt and economic growth is non-linear, and there is the existence of threshold effect.

[17] 400 bootstrap replications are recommended by Hansen but the default is 50 republications. Large republication give us more powerful result than small replications.

Table 5.5: Results of a threshold effect in the single threshold model

Threshold effect test (bootstrap = 400):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	1.30e+04	18.0454	27.46	0.0100	17.8830	20.9422	26.7993

Source: Author's computation in STATA 14.2

In the next step, in order to determine the number of thresholds and the threshold-effect test, this study sequentially estimates the model with one and two thresholds. As per table 5.5, accept the alternative hypothesis of a single threshold model, then this study tests the double-threshold model in table 5.6. The null hypothesis single is a single-threshold, and the alternative hypothesis is a double-threshold model. The same bootstrap number is used for each of the two bootstrap tests.

Table 5.6: Results of threshold estimators and threshold effect test in double-threshold model

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	21.7870	21.7729	21.7955
Th-21	21.7870	21.7729	21.7955
Th-22	20.1795	20.1637	20.2087

Threshold effect test (bootstrap = 400 400):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	1.30e+04	18.0454	27.46	0.0100	17.8830	20.9422	26.7993
Double	1.29e+04	17.8641	7.31	0.5575	16.9687	20.7845	27.9085

Source: Author's computation in STATA 14.2

In the threshold effect test table 5.6, test for a single threshold with (H_0: linear model and H_1: single-threshold model), F_1 statistics of 27.46 is greater than its 1 percent level significance (26.7993) with highly significant bootstrap P-value of 0.01. F_2 statistics in the test for double threshold model with (H_0: singe-threshold model and H_1: double-threshold model), F_2 statistics

of 7.31 is lower than its corresponding level of significance even at 10 % significant level of 16.9687. Therefore, F_2 statistics is highly insignificant with the bootstrap P-value of 0.5575 (reject the alternative hypothesis of the double-threshold model and accept the null hypothesis of a single-threshold model). The implication from the above results is that there is a single-threshold in the model. The single-threshold model supports that the nexus between external debt and economic growth follows inverted u shape (debt Laffer curve)[18]as predicted by Krugman (1988) and Sachs (1989), Calvo (1998) and Megersa (2015). The Lower threshold point recorded in this study compared to other studies because of the following reasons. Firstly; out of total public debt this study focused on external debt but the other studies consider the total public debt. Secondly; in general the threshold level in developing countries much lower than that of developed countries because of different factors (like institutional quality, level of development etc.).

5.3.2 External debt sustainability and Debt-growth nexus

In this section, the study, analyze external debt sustainability analysis using debt-growth nexus. As per table 5.5 and table 5.6, the relationship between GDP growth and external debt change from positive to negative at the turning point of 21.78 percent. External debt sustainability is directly linked with debt-growth nexus when the relationship is non-linear and follows the debt Laffer curve. The shape of the Laffer curve reflects that there is a country's specific threshold level of debt and also it shows inverted U-shape. So external debt is sustainable when external debt as a percent of GDP is lower than and at least equal to 21.78 percent whilst above the threshold level is unsustainable. Currently, in most SSA countries, external debt as a percent of GDP is greater than 21.78 percent; therefore, external debt in the region is unsustainable.

[18] Inverted U-shaped curve and debt Laffer curve is similar since there is statistically significant and single threshold level (single optimal point from the whole sample). There are two opposite effects: the first effect is positive and the second effect is negative effect. The nature of debt and economic growth nexus is supported inverted U-shape.

Table 5.7: Results of Fixed Effect Panel Threshold Estimation in 41 SSA countries

γ	21.787	
95% Confidence Interval	(21.7729 , 21.7955)	
Impact of regime-dependent regressors: DebtGDP		
	Estimated coefficients	Standard errors
γ_1	0.0134**	0.00555
γ_2	-0.0150***	0.00297
Impact of regime-independent regressors		
Variables	Estimated coefficients	Standard errors
inpci	-0.0378	0.119
area	0.000016	0.000016
P	0.960***	0.263
infl	-0.0181***	0.00653
gHDI	0.0316***	0.118
K	0.0730***	0.0275
opp	0.118***	0.024
Constant	-12.26	8.879
Observations	738	
Number of country	41	

Notes: */**/*** indicate significant at the 10/5/1 % level respectively.

5.3.3 The effect of external debt on economic growth

Based on table 5.7 and Appendix 6, the estimated external debt to GDP threshold is 21.78% and the 95% confidence interval of (21. 77, 21.79) **is** obtained. Both regimes-dependent coefficients of external debt to GDP are statistically significant at 5% and 1% level. These results plausibly indicate that when external debt as a percent of GDP is below the threshold value of 21.78%, external debt positively correlates with the economic growth in the SSA countries ($\boldsymbol{\gamma_1}$= 0.0134). By contrast, when external debt as a percent of GDP is above the threshold value (21.78%), external debt negatively correlated with economic growth ($\boldsymbol{\gamma_2}$= -0.0150). The negative relationship between external debt and economic growth is due to the following reasons; First, large external debt-services repayment can hinder economic growth by running out the public resource and reduce public savings, which could be used for infrastructure development, and

human capital. Second, most countries in the region use current external debt for payment for the previously borrowed loan, current expenditure and unproductive projects instead of using for long term productive projects. Also, above the threshold level, external debt servicing becomes problematic as it takes the large part of export earnings due to this the external debt servicing rate far outweighs the return from external debt or diminishing returns exist.

The result of debt variable shows that there is a non-linear effect of external debt on GDP growth with positive relationship below the threshold value and negative relationship is above the threshold value. The result also implies that the threshold value of 21.78% is the maximum percent that the increment of external debt can stimulate economic growth in SSA countries. This result consistent with the findings of Reinhart and Rogoff (2010), Egert (2012), Megersa (2015) Kaur and Mukherjee (2014), Dogan and Bilgil (2014), Clements et al. (2003), Cordella et al. (2005). However, this study contrary to the findings of Folrunso and Felix (2008), Herdon et al. (2013) and Agbemover (2015) noted that does not exist non-linear nexus between external debt on economic growth.

5.3.4 Impact of Control variables on GDP growth

Based on the estimation result presented in table 5.7 and appendix 6, the coefficient of capital variable shows that gross capital formation as a percentage of GDP has a positive effect on GDP growth at 1 percent significance level. An increase in gross capital formation as a percentage of GDP by 1 percent then GDP growth on the average will encourage by 0.073 percent holding other explanatory variables constant. This result agrees with the expectations of the study and consistent with neoclassical growth models such as Solow (1956) and Koopmans (1965) explained that capital is a crucial determinant of economic growth.

The coefficient of population growth is significant at 1 percent level of significance and positive indicating that 1 percent increase in population growth encourages the growth of GDP by 0.96 percentage points. This result derived from the panel threshold model is in consensuses with the findings of Presbitero (2005), Agbloyor et al.(2014) and Kremer (1996). Kremer (1996) argues that if there is high population growth then there are more scientist and investors contribute to innovation and technology progress. But, the result is inconsistent with the finding by Megersa (2015), Mencinger et al. (2014) and Pattillo et al. (2002).

In line with the panel threshold estimation of the model, the initial per capita income had a negative and insignificant relation with GDP growth as was expected prior. This result confirms the findings of Solow (1957) implies that the conditional convergence growth among countries avers that countries with relatively lower per capita income tend to grow faster than those higher per capita income. The coefficient of openness is positive and statistically significant at 1 percent level of significance. This implies that a 1 percent increase in trade openness leads to 0.118 percent increase in SSA countries' GDP growth. Trade openness boosts productivity through transfers of knowledge and efficiency gains. This result consistent with the findings by Megersa (2015), Presbitero (2005), Qayyum and Haider (2012), Babu et al. (2014) and Pattillo et al. (2002) who found a strong link between trade openness and GDP growth. Whilst this result inconsistent with the findings by Cordella et al., (2005) and Yoke et al. (2018).

The variable human development index coefficient is positive and statistically significant at 1 percent level of significance, which indicates that if the growth rate of human capital index increased by 1 percent, the economy grows by 0.316 percent, holding the other explanatory variable in the model constant. The positive effect of human development on GDP growth due to the fact that an increase in human development leads to an increase in labour productivity, innovation and technological improvements. This has led to increase in the productive capacity of the SSA countries, which boost GDP growth. This result confirms to the findings by Megersa (2015), Presbitero (2005) and they found out the positive effect of human capital on per capita income growth.

Inflation is used to proxy for macroeconomic stability. The link between inflation rate and economic growth is negative and statistically significant at 1 percent level of significance in the SSA countries. A 1 percent increase in inflation rate associated with a 0.0181 percent decrease in GDP growth. This result is not contrary to theoretical expectations and confirm the findings of Presbitero (2005), Cordella et al. (2005), Mencinger et al. (2014). But, this finding inconsistent with the findings of Yoke et al. (2018), Usman et al. (2014) and, Qayyum and Haider (2012) who found a positive link between inflation rate and GDP growth**.** Land area is an insignificant effect on GDP growth in the region.

5.4 External Debt Sustainability Analysis: Results and Discussion

There are two main types of techniques to check the status of countries regarding the external debt sustainability that are panel unit root tests and panel cointegration tests. In this section following Llorca et al. (2017), panel unit root tests used to check the time series properties of series in order to know about the robustness of the results. External debt sustainability requires that the external variables be integrated of order zero (I(0)). The stationary properties of the export, import, stock of external debt as a percent of GDP and total external debt services as a percent of export were studied using unit root tests for panel data. External debt sustainability requires that these external variables (import and export) and debt indicator variables (stock of external debt as a percent of GDP and total external debt services as a percent of export) are stationary at level (integrated order zero).

5.4.1 Panel Unit Root Test Results

In this section two panel unit root tests, these are Harris-Tzavalis (1999) and Im –Pesaran-Shin (2003) have been applied on the external debt sustainability indicators (external debt stock as a percent of GDP and total external debt service as a percent of export), import and export.

Table 5.1 sums up the results of the above mentioned two types of panel unit root test in level after considering the effect of cross-sectional dependency using demean (subtract the cross-sectional averages from the series) in all panel unit root tests. The first test includes the constant terms and trend in the model. The second test is tested by including only time trend because this model does not allow for the constant terms. The Z- Statistic are mentioned in parentheses below the statistical values. Maximum 10 percent probability of error is set as the benchmark for making a decision regarding the significance of results. For both tests, if the P-value less than 10% then we reject the null hypothesis of unit root and accept the alternative hypothesis of stationary.

Table 5.8: Summary of Panel Unit Root Test for SSA countries at level from 2000 to 2017

Variables	Harris-Tzavalis test		Im-Pesaran-Shin test	
	Z- Statistic	stationarity	Z- Statistic	Stationarity
External debt Stock to GDP ratio	1.8443	unit root	-0.1399	unit root
External debt services to export ratio	-1.3536	unit root	-1.3536	S at 10%
Export to GDP	0.0691	unit root	0.7097	unit root
Import to GDP	-0.646	unit root	-1.0725	unit root

Notes: HT and IPS represent the Harris-Tzavalis (1999) and the Im, Pesaran, and Shin (2003). All tests examine the null hypothesis of unit root. The alternative hypothesis is that at least one of the individual series in the panel is stationary. S indicates that stationary and Z- Statistic values are in the parenthesis**.**
Source: Author's calculations from the WDI (2018).

As per table 5.8, HT and IPS calculations are showing that accept the null hypothesis of "external debt stock to GDP ratio" is unit root, which means that "external debt stock to GDP ratio" unit root at level. "For the external debt services to the export ratio" out of two unit root tests, HT test is unit root at level and IPS is stationary at level when tested at 10 percent level of significance. In overall, "external debt service to the export ratio" is not stationary at level, this result leading to the conclusion that SSA countries have not the capacity to generate resource to services its external debt and therefore external debt unsustainable in the region. In all panel unit root test, the export and import variables are not stationary at level.

Table 5.9: Summary of Panel Unit Root Test for SSA countries at first difference from 2000-2017

Variables	Harris-Tzavalis test		Im-Pesaran-Shin test	
	Z- Statistic	stationary	Z- Statistic	Stationary
External debt Stock to GDP ratio	-8.8164	I(1)***	-11.0286	I(1)***
External debt services to export ratio	-18.3331	I(1)***	-11.5225	I(1)***
Export to GDP	-16.6358	I(1)***	-12.7347	I(1)***
Import to GDP	-14.419	I(1)***	-10.9837	I(1)***

Notes: HT and IPS represent The Harris-Tzavalis (1999) and the Im, Pesaran, and Shin (2003). All tests examine the null hypothesis ofunit root. The alternative hypothesis is that at least one of the individual series in the panel is stationary. ** and *** indicate statistical significance at 5% and 1% levels, respectively. Z- Statistic values are in the parenthesis**.**
Source: Author's calculations from the WDI (2018).

Table 5.9 recapitulates the outcomes of the same two testes for panel unit root i.e. HT and IPS in first difference for the previously mentioned region. The whole structure of the table and evaluation criteria is the same as used in table 5.8. The results reveal that the all external debt sustainability indicator variables, export and import variables are stationary when once differenced in all types of panel unit root tests. This result does not lead to the conclusion that external debt sustainability in the region because taking the first difference to make the series stationary has no economic meaning in external debt sustainability criteria. The results reported in table 5.9 clearly indicate that both import and export are first difference stationarity after accommodating cross-section dependency using demean, i.e., they are I(1) variable at 1% level of significance.

5.4.2 Panel Co-integration Testes

As a result of import and export variables are integrated order one I (1), this study proceeded to examine whether export and import are co-integrated in the long run. Co-integration between the export and import is a sufficient condition for external debt sustainability see (Matthieu, 2017).
Panel co-integration tests can be examined using tests proposed by Pedroni (1999, 2004), error correction tests suggested by Kao Residual Cointegration test, and/or Johansen Fisher Panel Cointegration test and error correction tests suggested by Westerlund (2007). Except for

Westerlund (2007) panel cointegration tests all aforementioned testes are first generation cointegration tests, as a result, these tests does not considering the presence of cross-sectional dependence when compared to Westerlund's test (2007). Therefore, In order to investigate these two trade variables cointegrated or not this study used Westerlund's tests.

Westerlund Panel Cointegration Test

This panel co-integration test is a second-generation test and takes into account the cross-section dependency using bootstrap critical values to obtain robust *p*-values. Table 5.10 reports Westerlund (2007) co-integration test results.

Table 5.10: Westerlund Panel Cointegration Tests

Statistic	Value	Z-value	P-value	Robust *p*-value
G_t	-7.270	39.175	0.000	0.300
G_a	-12.854	-0.921	0.179	0.940
P_t	-13.751	0.259	0.390	0.880
P_a	-10.392	-1.542	0.062	0.990

Notes: G_t and G_a are the group mean statistics. P_t and P_a are the panel statistics. Westerlund's panel cointegration tests take no co-integration for all countries in the panel at the null hypothesis.
Source: Author's calculations from the WDI (2018).

As per table 5.10 and appendix 7, the null hypothesis of no cointegration is accepted at any meaningful significance level by P-value and more importantly the null hypothesis of panel tests (P_t and P_a) can be highly accepted. The last column of table 5.10 revealed that when the study considering the effect of cross-sectional dependencies in the model and the robust p-value obtained by bootstrapping critical values under the null hypothesis with 100 replications (since the default is 50 replications). As clearly presented in table 5.10, all the group and panel statistic testes are accepted the null hypothesis of no cointegration. Reject the alternative hypothesis and accept the null hypothesis indicates that export and import variables are not cointegrated in the long run, in other words, external debt is unsustainable in Sub-Saharan Africa as outlined Husted (1992) in USA and Llorca(2017) in Asian countries. Thus, this study concludes that exports and imports are not cointegrated in SSA panel because of this external debt is unsustainable in the region.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Introduction

This chapter presents the summary of findings, conclusion and policy recommendation based on the findings from the study. Summary of findings and conclusions from the estimated results is presented in the next section whilst section 6.3 presents policy implications on the basis of the findings of this study. Section 6.4 presents the limitations of the study and recommendation on areas for further research.

6.2 Summary of Findings and conclusions

Over the past two decades, the region heavily depends on foreign financial resources to solve what is known as the "financial gap" problem in the region. The limited supply of domestic financial resource has remained persistent resulting in huge external borrowing to supplement low domestic saving and to fill the gap. Borrowing from abroad to finance the dual gap in developing countries is based on the assumption that foreign capital inflows would promote economic growth.

Empirical literature provided varied conclusions regarding the nexus between external debt and economic growth. Some studies posit that external debt is beneficial to economic growth i.e there is a positive relationship between these two variables. Others argued that external debt a detrimental to economic growth. The other group of studies suggested that there exists a non-linear relationship between the two variables and hence concluded that external debt has a positive and negative effect on the growth of the economy.

The existence of controversy in the literature about the effect of external debt on economic growth and the very limited recent studies on SSA has been the motivation for this study. In addition, the study distinguishes itself from previous studies by using recent data (2000-2017) to meet the study objectives given the rapid growth of external debt stocks of many countries in the SSA.

This study sought to analyze the effect of external debt on economic growth and its sustainability in Sub-Saharan Africa for a period of 18 years (2000-2017) using a sample of 41 selected countries from the region. The study employed the panel threshold model developed by Hansen (1999) to investigate the effect of external debt on economic growth. In order to investigate the sustainability of external debt in the region, this study employed a panel unit-root test and panel cointegration test.

The main goal of this study is to analyze the effect of external debt on GDP growth and its sustainability in the SSA.

The second objective was to analyze the effect of external debt on economic growth in SSA. This was accomplished through a regression analysis using a panel threshold model. The outcome of panel threshold estimation shows that external debt affects economic growth positively up to a certain point after that point affects negatively in SSA. In conclusion, this study shows there is a link between lower/higher external debt levels and higher/lower economic growth rates respectively. As some might suggest, this result could possibly depend on the set of countries examined, the level of countries development that examined and time period. Bearing this in mind, the conclusions of this study are specific to the study panel.

The third objective of this study is examined whether the nexus between external debt and economic growth is nonlinear for the study area. To address this issue the study employed Hassen (1999) threshold model that determines the threshold endogenously, allows for multiple thresholds and test the statistical significance of nonlinearity for a panel of 41 SSA countries. The results suggest that there is a single and statistically significant threshold level in the region. The threshold value is at a debt-to-GDP ratio of 21.78 percent suggesting that external debt becomes detrimental to growth once the debt reaches this threshold. In other words, external debt is sustainable as long as the external debt-to-GDP ratio remains below 21percent. Therefore, the nexus between external debt and GDP growth in SSA is non-linear and supported that there is an inverted U-shape relationship, which was evident from a single threshold level.

The fourth objective is to examine the sustainability of external debt in the region. The analysis begins with the testing for a panel unit root by using IPS and HT unit root tests. Basically, the results of these panel unit root tests are consistent and external debt in the region unsustainable

level which was evident from their non-stationary series of external debt stock to GDP, external debt services to export, export to GDP and import to GDP at level. Having the stationarity of the trade variables are integrated at first difference I(1) then this study proceeded to panel cointegration analysis for the possible long-run relationship between import and export. In order to analyze the cointegration properties of the variables, this study utilized Westerlund panel cointegration test that allows for with and without cross-sectional dependency. The estimated results suggest that import and export does not have a long-run relationship. Cointegration results in this study indicate that external debt is unsustainable in the SSA.

The other control variable such as population growth, capital, openness, growth of HDI, inflation rate, initial per capita income and land area have mixed effect on economic growth. Population growth, capital, openness and growth of HDI have positive and statistically effect on economic growth but land area positive and insignificant effect. Whilst, the inflation rate has a negative and significant effect but initial per capital income negative insignificant effect on economic growth.

6.3 Policy implications

A number of policy implications are derived based on the outcomes of the study in order to realize the positive effect of external debt and its sustainability in SSA countries. In addition, it is expected that these policy implications may provide direction for policymakers and the government as a whole to come up with potential measures to solve problems existing in external debt.

Countries in the region should utilize their externally borrowed resource in productive and development purposes so that the government can generate revenue and better repayment capacity. This can make sustainable external debt leading to substantial economic growth as well as removes from the debt disincentive effect and attracts investment. To do this, the government seriously administers the debt-based projects in order to get revenue and repay timely debt services from the project. In addition, externally borrowed funds should not be diverted into current expenditure, payment for previously borrowed loans, and unproductive projects. Instead, the government should channel the externally borrowed funds into long-term investment projects as a result country's manufacturing sector growth rate be able to increase.

Does the finding of a negative relationship between a high level of external debt and economic growth imply that SSA countries should cut back the external debt in order to boost economic growth?. This would be the difficult policy decision for most countries in SSA given a huge saving gap in most countries in the region. Countries in the region would continue to rely on foreign financing development programs and projects in the short term, and medium-term period. In doing this, countries in the region enhancing domestic revenue mobilization and generate enough returns to amortize the external debt will also go to in the long term to reduce the over-reliance on external debt.

The finding suggests that strong and sound external debt management policy in terms of currency composition, creditor's composition, concessional term of external debt and interest rate composition of external debt. In other words, the composition and the structure of external debt need a crucial policy. Moreover, to reduce the expenditure on debt servicing it can be achieved with better professional and skilled negotiation with the donor agencies and countries.

There is also a need to implement an appropriate policy measure in order to achieve the positive impact of external debt on economic growth and to sustain its suitability. This is through widening export revenue base (export diversification), promote industrialization to reduce import dependency, substitute imported goods by domestically produced goods and gradually the economy should transform from traditional export earning to modern export earnings.

Generally, the relationship between high external debt and low growth rate is a potential warning for the necessity of external debt sustainability in Sub-Saharan Africa countries.

6.4 Further research area

To arrive at a final conclusion of external debt and economic growth relationship, an exhaustive array of tests and plenty of further research will be required. Thus far, no one has been delivered indisputable evidence of the link between external debt and economic growth. This will requires in-depth studies of transmission channels linking the external debt and economic growth. In addition, the nexus between two variables will require further research by considering institutional quality in the nexus between external debt and economic growth.

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APPENDIX

Appendix 1: Summery of Descriptive Statistics

```
. xtsum Y DebtGDP Infl opp P K gHDI area
```

Variable		Mean	Std. Dev.	Min	Max	Observations	
Y	overall	4.539057	4.878515	-36.69995	33.73577	N =	738
	between		1.871962	.2457848	9.023204	n =	41
	within		4.514034	-32.6426	31.61631	T =	18
DebtGDP	overall	57.47151	77.11419	2.47	873.2691	N =	738
	between		50.52401	10.33064	342.0847	n =	41
	within		58.76056	-257.3593	588.6559	T =	18
Infl	overall	9.146256	27.44274	-9.616154	513.9068	N =	738
	between		11.31052	1.624636	57.49556	n =	41
	within		25.06247	-47.6051	465.5575	T =	18
opp	overall	30.72482	16.78938	4.685804	89.68583	N =	738
	between		15.39156	7.244074	78.04514	n =	41
	within		7.10265	-2.16923	75.51026	T =	18
P	overall	2.577345	.9894047	-1.409509	11.84982	N =	738
	between		.7821847	.40706	4.77036	n =	41
	within		.6174312	-3.602525	9.656804	T =	18
K	overall	22.44237	9.401266	1.09681	73.77735	N =	738
	between		7.220441	9.105098	41.42259	n =	41
	within		6.119772	-3.786781	69.81159	T =	18
gHDI	overall	1.49329	1.504556	-10.42781	11.34328	N =	738
	between		.6040205	.5502735	2.866234	n =	41
	within		1.381037	-10.2467	11.52439	T =	18
area	overall	539415.5	587455.7	1861	2505810	N =	738
	between		594266.2	1861	2455328	n =	41
	within		9889.882	460087.2	589897.2	T =	18

Appendix 2: Test for Heteroskedasticity

```
. estimates store homosk

. local df = e(N_g) - 1

. lrtest hetero homosk , df(40)

Likelihood-ratio test                                 LR chi2(40) =   -593.52
(Assumption: hetero nested in homosk)                 Prob > chi2 =    1.0000
```

Appendix 3: Test for Multicollinearity

```
. vif, uncentered
```

Variable	VIF	1/VIF
inpci	1.13	0.885062
area	2.25	0.443785
P	5.80	0.172484
Infl	1.20	0.831678
gHDI	1.97	0.506780
K	6.33	0.158059
opp	4.23	0.236345
_cat# c.DebtGDP		
0	1.53	0.652064
1	1.32	0.755950
Mean VIF	2.86	

```
. corr Y inpci area P Infl gHDI K opp DebtGDP
(obs=738)
```

	Y	inpci	area	P	Infl	gHDI	K	opp	DebtGDP
Y	1.0000								
inpci	-0.0330	1.0000							
area	0.1024	-0.0031	1.0000						
P	0.1970	-0.0299	0.2140	1.0000					
Infl	-0.0664	0.1579	0.2059	0.0297	1.0000				
gHDI	0.1188	-0.0088	0.0861	0.0237	0.0232	1.0000			
K	0.2100	-0.0763	0.1563	0.0964	-0.0321	0.0338	1.0000		
opp	0.0247	0.0253	-0.0899	-0.1804	0.0266	0.0982	0.2180	1.0000	
DebtGDP	-0.1207	0.1323	-0.0999	0.0363	0.0557	-0.0363	-0.1233	0.0948	1.0000

Appendix 4: Test for Autocorrelation

```
. xtqptest, order(2)

Bias-corrected Born and Breitung (2016) LM(k)-test as postestimation
Panelvar: country
Timevar: year
k (order): 2
```

Variable	LM(k)-stat	p-value	N	maxT	balance?
Post Estimation	1.14	0.256	41	18	balanced

```
 Notes: Under H0, LM(k) ~ N(0,1)
    H0: No serial correlation of order k.
    Ha: Some serial correlation of order k.
```

```
. xtistest, lags(1)

Inoue and Solo (2006) LM-test as postestimation
Panelvar: country
Timevar: year
p (lags): 1
```

Variable	IS-stat	p-value	N	maxT	balance?
Post Estimation	21.49	0.205	41	18	balanced

```
 Notes: Under H0, LM ~ chi2(p*T-p(p+1)/2)
    H0: No auto-correlation of any order.
    Ha: Auto-correlation up to order 1.

. xthrtest ui

Heteroskedasticity-robust Born and Breitung (2016) HR-test on ui
Panelvar: country
Timevar: year
```

Variable	HR-stat	p-value	N	maxT	balance?
ui	0.83	0.404	41	18	balanced

```
 Notes: Under H0, HR ~ N(0,1)
    H0: No first-order serial correlation.
    Ha: Some first order serial correlation.
```

Appendix 5: Test for cross-section dependency

Pesaran's cross-section dependency test

```
. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =     1.557, Pr = 0.1194

Average absolute value of the off-diagonal elements =     0.224
```

Friedman's cross-section dependency test

```
. xtcsd,friedman

Friedman's test of cross sectional independence =    24.935, Pr = 0.9701
```

Appendix 6: Panel Threshold Regression Result

```
. xthreg Y inpci area P Infl gHDI K opp , rx(DebtGDP) qx(DebtGDp) thnum(1) grid(400)trim(0.01) bs(400)

Fixed-effects (within) regression               Number of obs      =       738
Group variable: country                         Number of groups   =        41

R-sq:  within  = 0.1347                         Obs per group: min =        18
       between = 0.0788                                        avg =      18.0
       overall = 0.0262                                        max =        18

                                                F(9,688)           =     11.90
corr(u_i, Xb)  = -0.9680                        Prob > F           =    0.0000
```

Y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
inpci	-.0377715	.1192544	-0.32	0.752	-.2719178	.1963747
area	.0000165	.0000165	1.00	0.318	-.0000159	.000049
P	.9599397	.2625799	3.66	0.000	.4443857	1.475494
Infl	-.0181009	.0065282	-2.77	0.006	-.0309185	-.0052834
gHDI	.3160583	.1184958	2.67	0.008	.0834016	.548715
K	.0730413	.0274968	2.66	0.008	.0190536	.1270289
opp	.1176332	.0239516	4.91	0.000	.0706062	.1646602
_cat#c.DebtGDP						
0	.0134477	.0055456	2.42	0.016	.0025594	.0243361
1	-.0149808	.0029702	-5.04	0.000	-.0208126	-.0091491
_cons	-12.26086	8.879474	-1.38	0.168	-29.69498	5.173265
sigma_u	9.4952396					
sigma_e	4.3458899					
rho	.82680061	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(40, 688) = 3.46                     Prob > F = 0.0000
```

Appendix 7: Westerlund Panel Cointegration Test

```
. xtwest ExporttGDP ImporttGDP , constant trend lags(1 2) leads(0 1) lrwindow(2)bootstrap(
```

Calculating Westerlund ECM panel cointegration tests.....

Results for H0: no cointegration
With 41 series and 1 covariate
Average AIC selected lag length: 1.93
Average AIC selected lead length: 1.88

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-7.270	-39.175	0.000	0.300
Ga	-12.854	-0.921	0.179	0.940
Pt	-13.751	-0.259	0.398	0.880
Pa	-10.392	-1.542	0.062	0.990

Appendix 8: List of Sub-Saharan Africa countries included in the study sample.

Angola	*Congo, Rep.*	*Liberia*	*Senegal*
Benin	*Cote d'Ivoire*	*Madagascar*	*South Africa*
Botswana	*Ethiopia*	*Malawi*	*Sierra Leone*
Burkina Faso	*Eswatini*	*Mali*	*Sudan*
Burundi	*Gabon*	*Mauritania*	*Tanzania*
Cape Verde	*Gambia, The*	*Mauritius*	*Togo*
Cameroon	*Ghana*	*Mozambique*	*Uganda*
Central African Republic	*Guinea*	*Nigeria*	*Zambia*
Chad	*Guinea-Bissau*	*Niger*	*Zimbabwe*
Comoros	*Kenya*	*Rwanda*	
Congo, Dem. Rep.	*Lesotho*		

Appendix 9: List of Sub-Saharan Africa Countries exclude from the study sample

Equatorial Guinea	*São Tomé and Principe*
Eretria	*Seychelles*
Namibia	*South-Sudan*
Somalia	

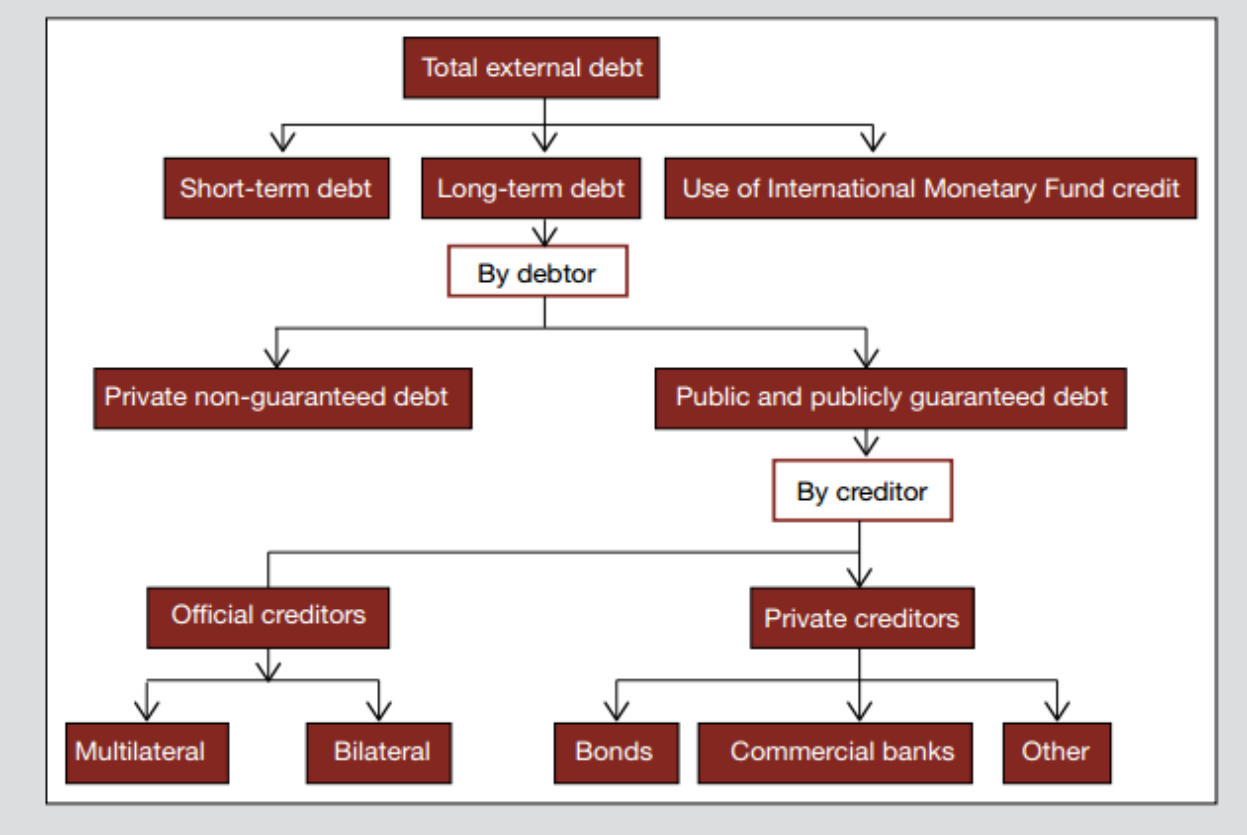
Appendix 10: List of Sub-Saharan Africa countries by income group in 2018

Low-income		***Lower-middle income***	***Upper-middle income***	***High income***
Benin	*Burkina Faso*	*Angola*	*Botswana*	*Seychelles*
Burundi	*Comoros*	*Cape Verde*	*Equatorial*	
Chad	*The, Gambia*	*Cameroon*	*Guinea*	
Guinea,	*Mali*	*Congo Rep.*	*Gabon*	
Eritrea	*Malawi*	*Côte d'Ivoire,*	*Mauritius*	
Ethiopia	*Niger*	*Eswatini*	*Namibia*	
Madagascar	*Somalia*	*Ghana*	*South Africa.*	
Liberia	*Rwanda*	*Kenya*		
Senegal	*Sierra Leone*	*Lesotho*		
South Sudan	*Uganda*	*Mauritania*		
Tanzania	*Togo*	*Nigeria*		
Zimbabwe.		*São Tomé and Principe*		
Guinea-Bissau		*Sudan*		
Congo,Dem. Rep.,		*Zambia*		
Central African Republic				

Appendix 11: List of Sub-Saharan Africa countries based on IMF and WB Debt sustaiablity assessement results 2018.

Low-risk	*Moderate risk*	*High risk*	*In debt distress*
Lesotho	*Benin*	*Burundi*	*Gambia, The*
Rwanda	*Burkina Faso*	*Cameroon*	*Mozambique*
Senegal	*Comoros*	*Cape Verde*	*São Tomé and*
Tanzania	*Congo, Democratic*	*Central African*	*Príncipe*
Uganda	*Republic of*	*Republic*	*South Sudan*
	Congo, Republic of	*Chad*	*Sudan*
	Côte d'Ivoire	*Djibouti*	*Zimbabwe*
	Guinea	*Eritrea*	
	Guinea-Bissau	*Ethiopia*	
	Kenya	*Ghana*	
	Liberia	*Mauritania*	
	Madagascar	*Sierra Leone*	
	Malawi	*Somalia*	
	Mali	*Zambia*	
	Niger		
	Togo		

Appendix 12: External debt and its components



Source: World Bank, 2015a.