DEBT SUSTAINABILITY OF EMERGING ECONOMIES IN SUB-SAHARAN AFRICA

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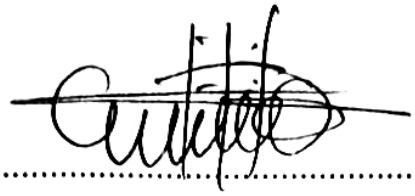
DECLARATION

I, OSEI JEPHTHAH OWUSU, hereby declare without any equivocation that this thesis is original research undertaken by me under the guidance of my supervisors; and except for references to other scholarly works dully cited, it has neither in part nor in whole been submitted for another degree or qualification whatsoever elsewhere.



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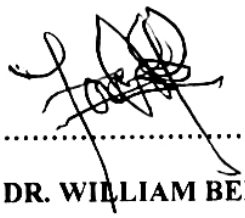

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ABSTRACT

Every developing economy aims to ensure long term economic growth. To achieve this, they embark on long term development projects which mostly create huge fiscal deficit. Financing the deficit leads to borrowing from both domestic and international markets to supplement the inadequate revenues generated. The excessiveness of borrowing and interest strings due payable mostly result in debt crisis with the possible adverse effect of unsustainability. This thesis examines debt sustainability of twenty-six (26) emerging Sub-Saharan Africa (SSA) economies using data from the year 2000 to 2018. In so doing, it investigates the effect of debt-to-GDP ratio on overall primary balances; analyses the effect of the output gap on the overall fiscal balances; and estimates a threshold value for measuring risk of unsustainable. To achieve these goals, a fiscal reaction function and threshold models were estimated using the System GMM and Hansen (1999) threshold estimator respectively. The results show a statistically significant positive relationship between primary balance and; the debt ratio and the output gap. It was unravelled that although debt ratio increases government revenues, the net effect is deterioration in the primary balances. The threshold estimator showed the existence of a non-linear relationship between sovereign risk of default and the debt ratio. It provided an average threshold value of 17.95 percent of GDP showing that, if the average debt-to-GDP ratio exceeds 17.95% there is a greater possibility of debt default. The study recommends that emerging economies in SSA must demonstrate fiscal discipline in public spending to reduce primary deficits. They must improve upon their domestic revenue mobilization to limit the rate of borrowing. Above all, they should resort to acquiring more concessional loans which are highly secured.

DEDICATION

I dedicate this thesis to my uncle, Mr Seth Bernard Appiah who has been the anchor behind my progress in education and all who have contributed one way or the other to make this thesis a success.

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I am very much grateful to God Almighty for how far He has brought me in life. His mercy, favour and love remain bountiful in all my endeavours. He is indeed worthy of gratifying.

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Finally, to my parents, siblings, sympathizers, and all my colleagues who have contributed in pecuniary and non-pecuniary means towards my growth, it is my prayer that the Almighty repays you in multiple folds.

To God be the glory for the great things He has done.

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LIST OF ACRONYMS

ADB	African Development Bank
AR	Auto-regression
BP	Primary effective Balance
BP*	Primary sustainable Balance
CRAG	Credit Rating Assessment Group
DSA	Debt Sustainability Analysis
DSF	Debt Sustainability Framework
DWH	Durbin-Wu-Hausman
FRA	Fiscal Responsibility Act
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GMM	Generalised Method of Moment
GNP	Gross National Product
HIPC	Heavily Indebted Poor Country
IDA	International Development Association
IFS	International Financial Statistics
IMF	International Monetary Fund

IPS	Im, Pesaran and Shin
LDC	Least Developed Countries
LICs	Low Income Countries
MDRI	Multilateral Debt Relief Initiative
NGOs	Non-Governmental Organisations
NPV	Net Present Value
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PFS	Sustainable Fiscal Position
PPG	Public and Publicly Guaranteed
PRGT	Poverty Reduction and Growth Trust
PV	Present Value
SDGs	Sustainable Development Goals
SRD	Sovereign Risk of Default
SSA	Sub-Saharan Africa
USD	United State Dollars
WEO	World Economic Outlook

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The goal of every economy is to achieve long-term economic growth. For Least Developed Countries (LDC), sustained economic growth is very important as it serves as the channel through which they can implement policies that support savings, and increase investment projects. In most cases, countries that embark on long term development projects create huge budget deficits. To finance these deficits most of them resort to borrowing if the internally generated funds are not enough. Borrowing is not a problem if the projected returns on the borrowed funds exceed the cost of borrowing (interest payment). However excessive borrowing without optimal use of the funds may lead the country into a serious debt crisis. Neoclassical growth theory proposes that debt has a positive effect on economic growth, but the excessiveness may impede the development and retard the growth of the economy in the long run.

Public debt stock has been rising in all regions for the past decade but has strongly risen in Sub-Saharan Africa (SSA) and the Middle-East. Those of SSA economies in particular, arise mostly as a result of fiscal indiscipline which leads to huge budget deficits. Evidence shows that the debt burden for SSA countries more than tripled between 1980 and 2000 (Van Cauwenbergh, 2018). Thus, public debt as a share of GDP grew sharply from a median of 30 percent in 1980 to a whopping 103 percentage points in 2000 among African countries except for Liberia and Sao Tome and Principe (see Figure 1.1 below). Governments have been financing such deficit essentially through borrowing from both domestic and external

financial markets. This results in colossal debt accumulation and its adverse interest payment effect.

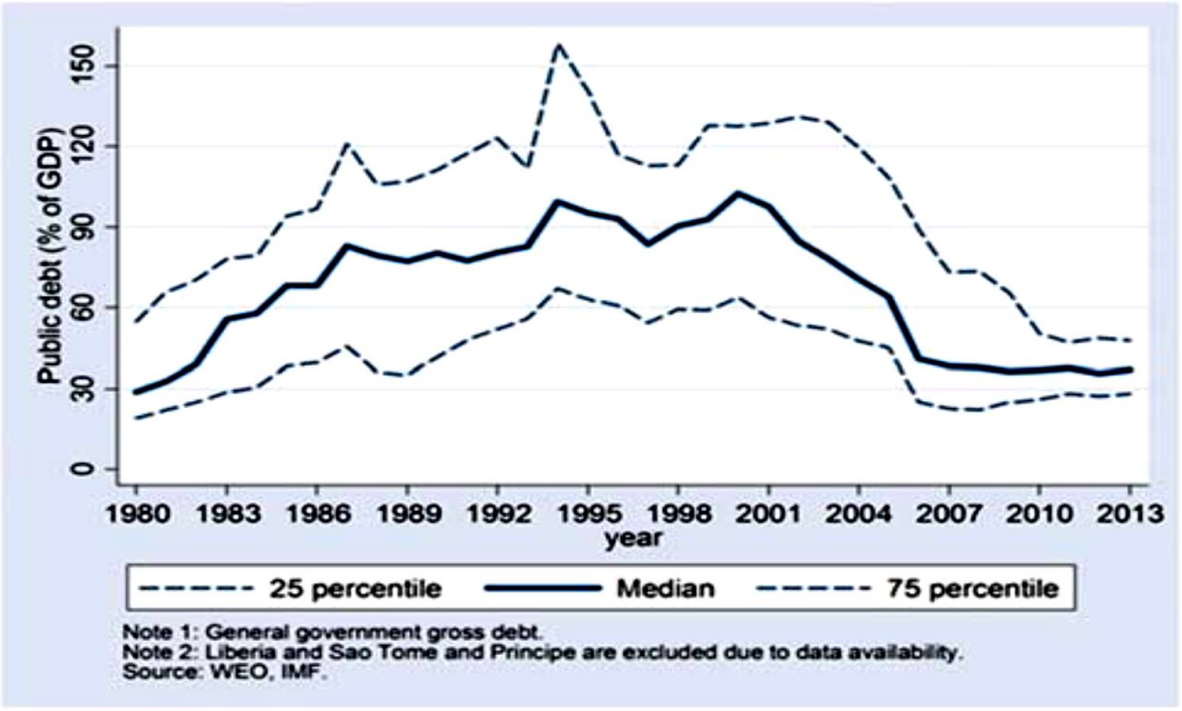


Figure 1. 1: Overall Government Gross Debt (1980 – 2013)

Most economies in SSA have pushed-up debt close to a level difficult enough to sustain. The excessive borrowing, especially from the external market, has plunged the majority of these economies into debt overhang problems calling for debt relief interventions. These were the reasons why the International Monetary Fund (IMF) and World Bank initiated the Heavily Indebted Poor Country (HIPC) policy in 1996 to provide debt relief and low-interest loans to either revoke or lessen external debt repayments to sustainable levels. Later in 2005, the Multilateral Debt Relief Initiative (MDRI) was approved to motivate debtor countries to continue in their policy reforms. Under the MDRI, economies nearing completion of the HIPC programme were granted full relief of their debt with IMF, International Development Association (IDA) and the African Development Bank (ADB). The implementation of these interventions resulted in an average rapid decline of the overall public and publicly guaranteed debt over the period from 2000 to levels last seen in the early 1980s (as shown in

Figure 1.1). As of 2014, the average public and publicly guaranteed (PPG) debt-to-GDP ratio of SSA economies stood at 42 percent (WEO/IMF, 2014).

Although these interventions coupled with improved economic growth policies led to a significant fall in the debt burden of the beneficiary countries, they do not address the root cause of unsustainable debt accumulation. This, therefore, makes the question of debt sustainability very pertinent. In their jointly propound framework for analysing debt sustainability, the IMF and World Bank defined debt as sustainable if governments are able to meet their debt obligations deprived of any debt relief or accumulating arrears. In other words, the economies are solvent and by solvency means, their initial debt in addition to the future streams of primary expenditures are less or exactly equal to the streams of revenues accumulated.

However, Kumhof & Yakadina (2007) explain that being solvent does not mean your debt is sustainable; this is because a country can have high debt and yet be solvent as long as primary surpluses are expected. Therefore what matters is not the level of debt itself but the ratio of debt relative to a measure of the ability to repay. The Debt Sustainability Analysis (DSA) of the IMF / World Bank provides a benchmark to assist countries and donors to determine the unwarranted debt build-up in the future. The framework classifies economies into one of three debts-carrying abilities (strong, medium, and weak) using a composite indicator based on the economy's historical performance, real growth, reserves coverage, remittances and the state of the global environment. Table 1.1 presents a summary analysis for measuring the risk of debt default and the capacity to sustain debt.

Table 1. 1: Threshold for Measuring Debt Sustainability and Debt Default

	PV of External Debt in Percent of		External Debt Service in Percent of		PV of Total Public Debt in percent of
	GDP	Exports	Export	Revenue	GDP
Weak	30	140	10	14	35
Medium	40	180	15	18	55
Strong	50	240	21	23	70

Source: IMF / World Bank DSA Framework

To evaluate debt sustainability for each economy, debt burden indicators are compared to the benchmarks in Table 1.1 over a projection period. The table shows that the threshold matching to strong performers is uppermost. This indicates that economies with highly performing macro variables and policies can handle larger debt accumulation.

The post-HIPC and MDRI era have seen debt stock rising again in Sub-Sahara Africa. The size of loans secured by SSA governments have progressively increased and reached, on average, $2billion per year (WEO database). Most of these debts are unilaterally and multilaterally owed. For instance, as of 2016, the Chinese government, banks, and contractors have extended $143 billion in loans to Sub-Saharan African governments (West Africa Brief, report). Some SSA governments have raised the concern of getting into a debt trap, calling for IMF warning of African debt rise, particularly in countries that already have heavy debt loads (such as Cabo Verde, Gambia, Ghana, Mauritania and Togo). The debt burden may not be problematic for all economies if properly managed; nonetheless, some fundamentals concerning the debt build-up are very worrying. For instance, the purposes of securing the loan are diverted due to political gains. Figure 1.2 depicts the debt ratio aftermath of the debt relief initiatives.

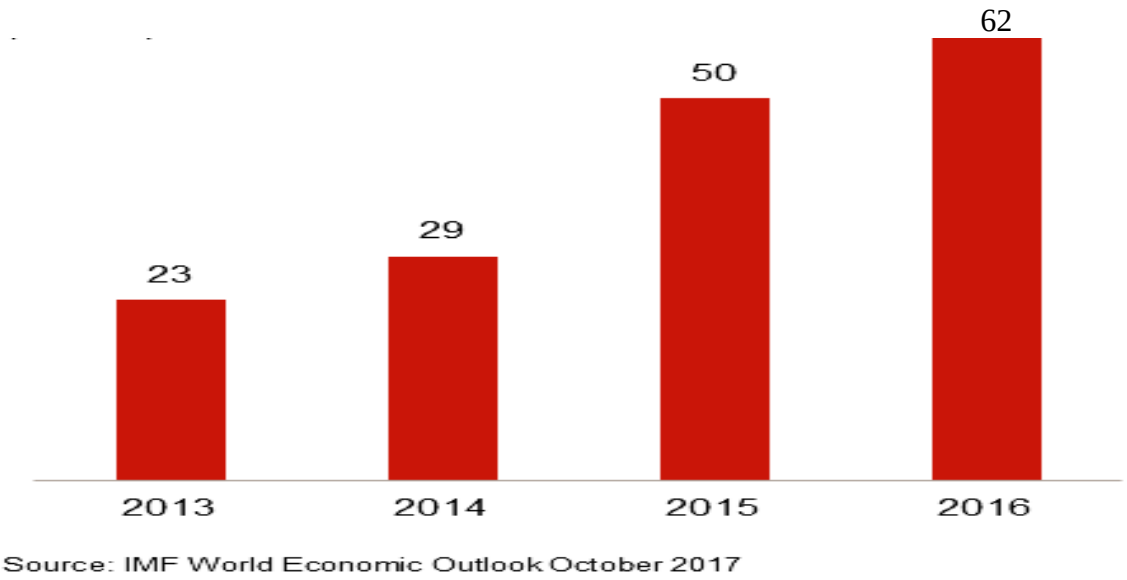


Figure 1. 2: Post Debt Relief Gross Government Debt (% GDP) for SSA Countries

An important issue that is worth emphasizing is that when the debt-to-GDP ratio of a country trends upwards or stabilizes at a higher level relative to peer countries or the country's historical records, such economies are most likely to run into debt overhang problems and may not be able to sustain their debt stock. A declining path for the debt-to-GDP ratio is not quite enough for sustainability, but also should be of sufficiently low risk of default. This means such a country must borrow up to or below a specified threshold beyond which sustainability is impossible. This study, therefore, analysis the debt burden of emerging economies within Sub-Saharan Africa and compare with a benchmark above which accumulated debt is unsustainable.

1.2 Statement of the Research Problem

The International Monetary Fund's (IMF) Government Finance Statistics (GFS) report 2014 defines debt as "all liabilities that require payments of interest and/or principal by the debtor to the creditor at a date or dates in the future". In Sub-Saharan Africa (SSA), debts build up from one government to the other swelling every election period. The region's debt to GDP ratio rose from 32.2% in 2014 to about 45% in 2017 (Van Cauwenbergh, 2018). Compared to

developed regions' (such as Europe and North America) standards, these ratios may seem encouraging and not worrying. However, unlike these regions; public revenue collection capacity is very low in SSA. Governments are unable to pay off their debt and simultaneously keep borrowing to finance expenditures. As such most of them have accumulated higher debt and interest due payments. Most of these governments do not have clear policy directions and transparency with regards to the management of public purse. Borrowed funds are disbursed to fulfil short term manifesto promises rather than national development plan hence raising the question of proper debt management and sustainability (Van Cauwenbergh, 2018).

Given this, international donors most often mandate fiscal prudence, economic and political steadiness, coupled with the sound banking system, low cost of doing business, and better atmosphere for investment to guarantee financial assistance. Debt, both domestic and external plays a significant role in financing public expenditure, but has contributed to macroeconomic instability and worsens the economic situation in the sub-region (Baffour, 1999). This study, therefore, probes further into the subject matter by conducting an empirical investigation to ascertain the debt sustainability capacity of emerging economies within SSA.

Although the literature harbours quite a number of cross-country studies on debt sustainability in SSA, the focus has been predominantly on external debt (see Helleiner, 1994; Fosu, 1996, 1999; Iyoha, 1999; and Abgemavor, 2015). This is mainly because external debt remains burdensome and deleterious to economic growth even if SSA economies grow up to 50% higher without accruing debt (Fosu, 1999). Meanwhile, World Bank reports that domestic debt comprehends a great and rising share of total fiscal debt for many countries. In 2013, internal debt encompassed averagely about one-third of the overall debt stock among 31 SSA countries, representing 14 percent of the region's GDP (World Bank DSA database). The 2008 global financial crisis forced most Low Income Countries (LICs) to develop their domestic debt markets and trusted profoundly on them to finance the

budget deficit. However, due to inadequate data on domestic debt, only a few of the existing literature have assessed the benefits and costs associated with domestic borrowing to foreign liabilities (see Bua, Pradelli, & Presbitero, 2014). Therefore there is the need to consider both domestic and external debts when assessing the debt profile of SSA economies especially the emerging ones which is a major focus of this study.

Even though some empirical studies on debt sustainability have been conducted on developing economies; most attention was centred on Latin America and Asia, with few selected countries in Sub-Saharan Africa namely; South Africa, Nigeria, Ghana, and Kenya (Celasun 2006 and Paret, 2017). The empirical literature has very little on SSA as a whole (see Painchaud, François and Tihomir, 2011; Battaile, 2015). Interestingly, the literature records no evidence of debt sustainability of emerging economies purely in SSA. The existing ones compare emerging economies among regions by selecting countries from all regions in their analysis (see Celasun, 2006; Neaime, 2014; Mustapha & Prizzon, 2015; and Paret, 2017). This approach does not provide a true picture of how SSA countries are emerging to sustain their debts since a hand full of countries is selected to complement other chosen economies for empirical analysis. Hence this study focuses completely on debt sustainability of the emerging countries in SSA

Furthermore, studies on debt sustainability differ in their methodologies, the period covered and geographical locations leading to conflicting findings and conclusions. For instance, Celasun (2006) used “fan chart” analysis to illustrate the degree of risks-upside and downside posed by primary deficit to fiscal sustainability in emerging market countries. Battaile, Hernandez, & Norambuena (2015) included sensitivity analysis in the IMF/World Bank’s Debt Sustainability Analysis (DSA) framework and conducted a simulation to assess the influence of various macro-fiscal conventions on economies’ estimated debt liability and changes in indebtedness. However, these approaches have some short-comings which affect

the reliability of their results and findings. The DSA, for example, assumes equal reactions of economies to changes in their macroeconomic variables such as real GDP growth rate. Specifically, it hypothesised that fiscal reaction to debt stock and the output gap is differentiated only in terms of country fixed effects. While the fan-chart approach neglects the effect of currency risk and fiscal policy responsibilities which are key to emerging economies. These dissimilarities suggest an ensuing controversy in the literature concerning debt sustainability, especially in Sub Saharan Africa. Therefore, there is a need for further empirical investigation into the subject matter.

In addressing these caveats, the study considers the heterogeneous nature of fiscal policy responses to historical debt and changes in the business cycle across countries in multiple periods. With this, a dynamic rather than static model is estimated where the lagged dependent variable will be included to account for past fiscal changes on primary balances. This approach is more robust and reliable than the homogeneous fiscal reaction function which differentiates countries' behaviour only through individual fixed effects. Also to control for currency risk and fiscal policy responses, the study uses the exchange rate to regulate changes in foreign currency on sovereign debt in the international market. A major relevance in doing this is the ability to overcome all possible limitations arising from the insufficient number of observations when estimating a fiscal reaction function for countries within a short time.

A major controversy in the existing literature happens to do with inconsistencies associated with finding a uniform threshold value for several economies. Some studies are of the view that the debt limit is specific to a country and cannot be measured collectively (see, Kraay & Nehru, 2006; Ghosh, Kim, Ostry & Qureshi, 2013). However, recent studies (such as Paret, 2017; Ngan, 2018) have found that a common threshold is adequate for comparison and a good determinant of debt default especially among economies within the same development

bracket. As such this study bridges the gap by estimating a threshold model to investigate the existence of a unified threshold value for appraisal and decision making. This benchmark measures the risk of default (something deficient in previous measurement models) by setting a standard for these economies (SSA) beyond which debt sustainability is impossible.

1.3 Research Questions

The study seeks to find answers to the following questions;

i. to what extent has debt-to-GDP ratio affected overall primary balances among emerging economies in SSA?

ii. what is the effect of the output gap on the overall primary balance?

iii. what threshold value is adequate for measuring debt sustainability for emerging economies in SSA?

1.4 Objectives of the Study

The primary objective of the study is to examine the debt sustainability of emerging countries in Sub-Saharan Africa. To achieve this, the under listed specific objectives are determined:

i. to investigate the effect of debt-to-GDP ratio on overall primary balances.

ii. to analyse the effect of the output gap on the overall primary balance.

iii. to find a threshold beyond which accumulated debt burden is unsustainable.

1.5 Significance of the Study

Debt accumulation in sub-Saharan Africa in recent times is becoming worried especially in election periods (Van Cauwenbergh, 2018). Funds solicited through the issuance of sovereign bond in the international capital market and non-concessional loans are channelled into short term manifesto promises and other political gains rather than long-term development projects (Baffour 1999). There is, therefore, the need to study the debt trend to unravel a better procedure of debt management and determine the probability to sustain. This is a key reason for the study.

There is no doubt that the literature accommodates several studies on debt sustainability. However, the attention has centred on external debt (see Helleiner, 1994; Fosu, 1996, 1999; Iyoha, 1999; and Abgemavor, 2015) neglecting the impact of domestic borrowing. A few studies on internal borrowing or the integration of both domestic and international borrowing are documented in the literature (Christensen, 2004; Bua, Pradelli, & Presbitero, 2014; Battaile, Hernandez, & Norambuena 2015). This study, therefore, aims at marrying both internal and external sources of borrowing using more recent data (from 2000 to 2018) to assess the debt sustainability behaviour of emerging economies in SSA.

Irrespective of the aforementioned, studies on debt sustainability vary in terms of methodology and scope. There is no widely accepted criterion for measuring debt sustainability. Researchers employ several means of measurement; notable among them includes the DSA, and fun chart approaches (see Celasun 2006; Paret, 2017; &, Battaile, 2015). However, the fun chart in particular has failed to provide a unison threshold for comparison especially among economies within the same development. The DSA has been proven to be not growth supportive but rather act as a binding growth constraint (Kidochukwu 2015). The need therefore arises for a comprehensive methodology capable of

estimating the risk of default and simultaneously providing a unison threshold for comparison and that is the goal of this study.

Moreover, the study's analysis opens up the debate for regional comparison among emerging markets in developing economies. It will also be beneficial to stakeholders such as policymakers, international organisations, financial institutions, and international traders to better control and regulate debt issues to avoid debt overhang problems. The findings of this study will also be of good interest in academia as a source of motivation for further research studies.

1.6 Scope of the Study

According to the IMF (2014), an economy is classified as emerging if it is characterised by accountability and democratic government; practical economic policies; appropriate management of debt; technological advancement; development of representatives, activist and business leaders; and above all with a trajectory growth of five to six percent. As of 2008, Seventeen (17) countries in SSA had qualified to be classified as emerging economies (see map in the appendix). However, as a result of the recent trajectory growth in the region's GDP (over 6.6%) coupled with improvement in bank performances, foreign direct investments and external loans received, the IMF upgraded some countries in the region to the rank of emerging markets in 2017. Among these countries are Botswana, Zambia, and, Uganda. Currently, there are 26 countries in SSA classified as emerging economies according to the IMF/World Bank's standard. Yin (1994) postulates that restricting research to a sample may not provide a representative population. However, it helps to use the chosen sample to decide for the population. Hence this study uses as a sample, these twenty-six (26) emerging economies in sub-Saharan Africa for the purpose of comparison. The study covers a period of

nineteen years spanning from 2000 to 2018. The study settled on this time frame because of the non-existence of data for the majority of these countries prior to the year 2000.

1.7 Organisation of the Study

The study is structured into five chapters. The first chapter covers the introduction which consists of a background, statement of the research problem, objectives, significance, and the scope of the study. Chapter Two presents an overview of debt structure in SSA, while Chapter Three focuses on the review of theoretical and empirical literature relating to the subject matter. Chapter Four presents the research methodology reports the findings and analyses of the results. The final chapter discusses the conclusion and recommendations for policy purposes.

CHAPTER TWO

OVERVIEW OF DEBT STRUCTURE IN SUB-SAHARA AFRICA

2.1 Introduction

This chapter discusses the debt profile over the years in sub-Sahara Africa before and after the debt relief initiatives. It further explains the basis of current debt build-up from both the domestic and external source. It concludes with the various challenges arising from excessive borrowing and some intervention measures to curb it.

2.2 Debt Profile in Sub-Saharan Africa

The challenging macroeconomic conditions in the late 1970s and early 1980s saw several low-income countries accumulate debt especially external debt rapidly. The situation became unbearable when the world suffered a global recession coupled with oil price shocks in the 1970s. Most developing countries ran into serious balance of payment problems due to massive external borrowing to finance public sector spending (Tran, 2018). Debtor countries subsequently instigated the sense of having to make appropriate payments on their increasingly expensive foreign debt and for some, problems such as arrears, penalties and debt defaults arose. The Net Present Value (NPV) of debt to export ratio increased to almost 800 percent (that is 160 percent of the regions' Gross National Product) in the mid-1990s although it stood below 150percent in the early 1980s (Amoating & Amoaku-Adu (1996). Most of these countries (such as Ghana, Angola, and Uganda) were heavily sinking with huge debts and interest payments so much that funds needed for essential public investment were channelled to defray debts and interest on debts (Neaime, 2012). The excessiveness of debt

payments led to an energetic campaign by some Non-Governmental Organisations (NGOs) and poverty alleviation campaigners to agitate for immediate action to reduce debt burdens.

In the wake of this call, the international organisations (IMF and World Bank) provided a temporal liquidity relief initiative in the 1980s by rescheduling the debt service payments plan. Governments of least developed economies were persuaded to tighten macroeconomic policies, diversify non-performing state-owned enterprises and encourage trade liberalization. Even though the plan saved most developing countries from defaulting on their debt, it did not provide a lasting solution to the problem of debt sustainability, especially for the poorest and heavily indebted developing economies. In finding a lasting solution to this conundrum, the Heavily Indebted Poor Country (HIPC) initiative which happens to be the first international solution to debt overhang problems to the poorest and heavily indebted countries in the world was initiated by the International Monetary Fund (IMF) and the World Bank in 1996.

In 1999, the HIPC initiative was expanded to include poverty reduction and social interventions at a faster and deeper level to strengthen macroeconomic indicators achieved through lower debt thresholds for eligible countries. In 2005, the Multilateral Debt Relief Initiative (MDRI) was launched to supplement the HIPC initiative. The MDRI cancelled 100 percent of all debts owing by countries that had reached HIPC completion point to the International Monetary Fund (IMF), International Development Association (IDA), and African Development Bank (ADB). Together, both initiatives provided over USD100 billion in the form of non-payment of current and future debt obligations. Thirty (30) of the entire Thirty-seven countries representing 85% who received these commitments were from sub-Sahara Africa (see Table 2.1).

Table 2. 1: Distribution of HIPC and MDRI Debt Relief Funds

in US$ bil	nominal terms	PV terms	nominal terms as a share of total	PV terms as a share of total
HIPC	65.7	49.4	62	64
MDRI	41.0	28.3	38	36
Total	*106.8*	*77.7*	*100*	*100*

Source: HIPC Progress Report (2013) *Note: PV = Present Value*

Although both initiatives share similar objectives, they differ in terms of country coverage, participating creditors, and debt relief provided. For instance, to be eligible for HIPC benefit, a country must have debt burden above the HIPC threshold and qualify for IMF and International Development Association (IDA) supported programmes whiles MDRI is implemented at the final point of the HIPC interventions.

2.3 Debt Structure Aftermath of Debt Relief Initiatives (HIPC and MDRI)

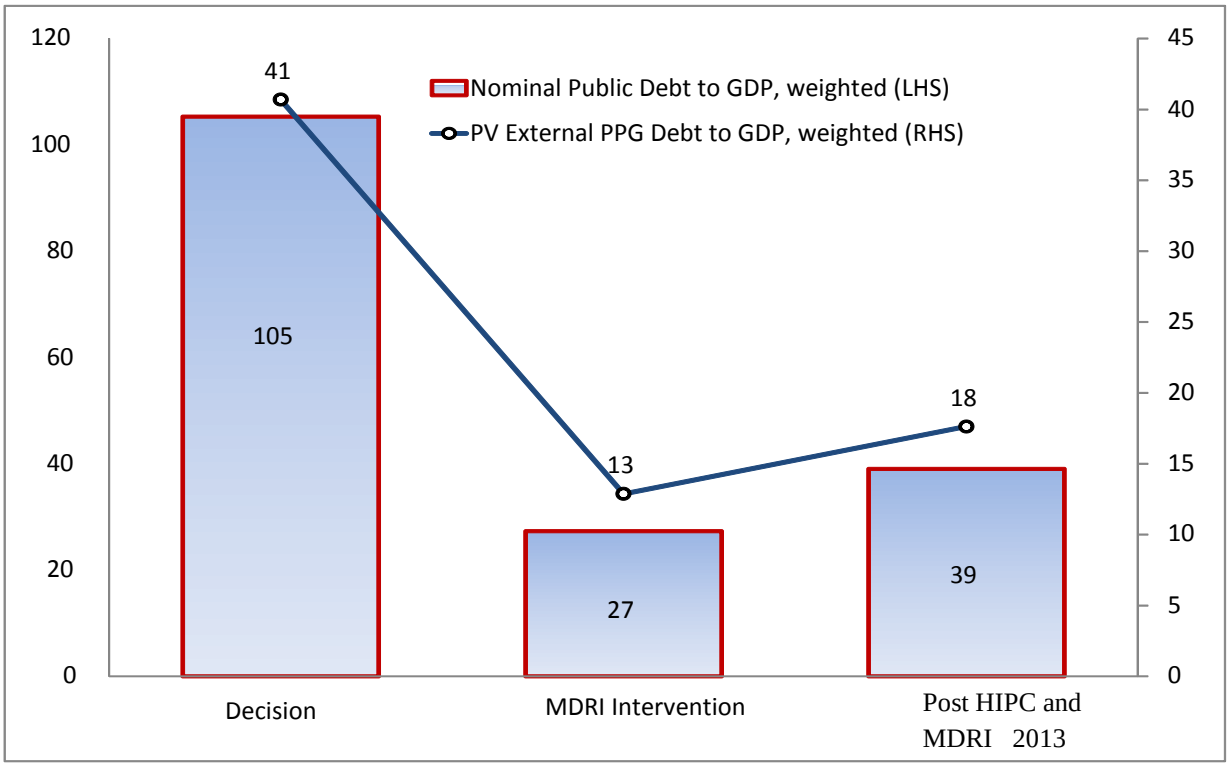
As of the year 2012, thirty-three (33) out of the entire forty-five (45) Sub-Saharan Africa countries had benefitted from the HIPC initiative (IMF/World Bank report, 2013). Thirty (30) of them reached decision-making level by 2010 (except for Eritrea, Somalia and Sudan). Twenty-nine (29) out of the thirty (30) states had attained completion point by that same period (except for Chad). This meant a permanent debt relief on these 29 countries and a direct termination of debt payable to IMF, The World Bank, and African Development Bank. Table 2.2 presents the list of SSA countries who had reached the completion stage as of May 2014.

Table 2. 2: Debt Relief Period

2006	2007	2009	2010	2011	2012
Benin (2000)	Gambia (2000)	Burundi (2005)	Congo, R. (2006)	Togo (2010)	CIV (2012)
Burkina Faso (2000)	STP (2000)	CAR (2007)	DRC (2003)		Comoros (2010)
Cameroon (2000)			Guinea-Bissau (2000)		Guinea (2010)
Ethiopia (2001)			Liberia (2008)		
Ghana (2002)					
Malawi (2000)					
Mali (2000)					
Madagascar (2000)					
Mauritania (2000)					
Mozambique (2000)					
Niger (2000)					
Rwanda (2000)					
Senegal (2000)					
Sierra Leone (2002)					
Tanzania (2000)					
Uganda (2000)					
Zambia (2000)					

Source: HIPC Progress Report, 2013
Note: Year in bracket shows decision making level

Thomas Merotto, & Stucka (2012) compiled debt-to-GDP ratios at three different points for these countries. The first point considered pre HIPC decision-making point; followed by immediate completion point (that is, benefitting from MDRI debt relief as well) and finally, determining their ability to sustain any subsequent debt by using the IMF/World Bank Debt Sustainability Framework (DSF). Figure 2.1 summarizes the weighted debt ratios for these countries at all three points by comparing the trends for nominal and Present Value GDP.



Source: Thomas et al, 2012 using IMF/World Bank DSF

Figure 2. 1: Weighted Average of Public Debt-to-GDP Ratio

The figure displays that, the nominal debt-to-GDP ratio was 105% before decision-taking point indicating an unsustainable position for economies with average per capita GDP of less than USD3.00 (as at that time) a day per person. The PV debt-to-GDP ratio, on the other hand, stood at 41 percent which is less than half of the nominal ratio and represents a better reflection of loans on indebted countries targeted by debt relief policies. According to Thomas et al., (2012), most of these loans were concessional obtained from development banks and agencies.

The implementation of debt relief initiatives (by HIPC and MDRI) reduces these debt ratios more than two-thirds. Figure 2.1 depicts that the average nominal debt ratio decreased from 105 percent to 27 percentage points while in PV terms the ratio decreased from 41 to 13 percentage points. The post HIPC and MDRI excess can be attributed to failure to participate in the HIPC initiatives by some commercial creditors, outstanding obligations to some

participating creditors, multilateral loans contracted elsewhere after December 2004, and those secured between decision making and completion points (Thomas *et al*., 2012).

It is also evident from figure 2.1 that the average nominal debt ratio has increased from 27% to 39% (representing 2.5 percent increment yearly) by 2013 after most countries had exited the HIPC programme. The PV debt ratio also increased from 13% to 18% in the same period, signifying 1% annual increment. This shows that debt relief policies were not to maintain the debt ratios at their current levels after implementation but instead, to guide such economies to borrow reasonably. Therefore, borrowing to finance public expenditures is not the problem for an economy but the ability to sustain and prevent debt overhang problems.

2.4 Public Debt Build-up in Sub-Saharan Africa

The past decades have greatly analysed the effect of international debt burden on sustainability and economic growth in Sub Saharan Africa. The debate has centred on various debt relief initiatives especially HIPC and MDRI and how they have reduced external borrowing to free up resources for pro-growth government spending. Prior to these interventions, less attention had been given to domestic borrowing in SSA irrespective of its impact on public budget financing, economic stability, private-sector lending, and above all growth performance. As a result of the inability to fully finance government deficit ultimately through external borrowing and monetary policy implementation, most governments in SSA resort to domestic borrowing (Christensen, 2005). This has led to a continuous build-up in domestic debt.

A major question often debated in literature hinges on the degree of substitutability of external borrowing for domestic borrowing to finance public expenditures aftermath of debt relief initiatives. Christensen (2005) argues that the decision to borrow from the internal or

external source is subject to the cost of borrowing (interest rate), maturity structure, and the risk associated with issuing either of them. Evidence from the Debt Sustainability Analysis (DSA) of the IMF/World Bank indicates that SSA countries have not made proportionate use of domestic borrowing after the HIPC initiative. Figure 2.2 displays the breakdown between external and domestic public debt from 2005 to 2013 (when most countries had exited the HIPC policy).

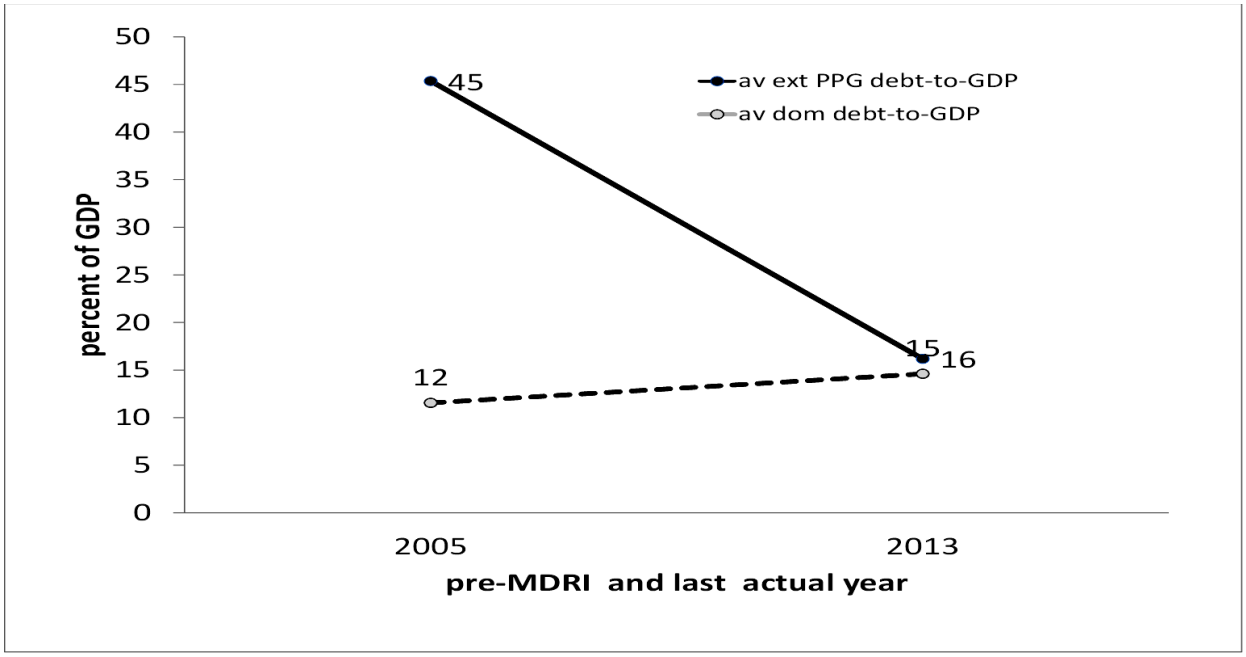


Figure 2. 2: External versus Internal Source Borrowing: IMF/World Bank Debt Sustainability Analysis ***Source:*** **IMF/World Bank DSF**

Although the data does not explain much on the substitutability between external and domestic sources of borrowing, it can be deduced that domestic borrowing (shown by dotted lines) is rising while external debt is declining on the average. The continuous rise in domestic debt might not be a strict substitute for external financing, but it tells how governments are contemporarily funding public expenditures through internal borrowing.

2.4.1 Domestic Debt Build-up

The IMF (2001) proposes three major criteria to consider debt as domestic. Firstly, when the debt is owed by domestic residents (Creditor residency basis), secondly when it is issued in and denominated in domestic currency (Currency basis), and lastly when it is issued in the local financial market subject to the authority of a local court (Jurisdiction basis). These criteria are mostly useful when compiling statistical data on government debt to analyse mismatch connected with the currency composition of the fiscal debt portfolio and restructuring procedures. Other studies have defined Domestic Debt as "the gross securitized government debt composed of treasury bills, development stocks, and bonds but excludes arrears, advances from the central bank, and commercial bank loans" (see Helleiner, 1994; Christensen, 2005; Agbemavor, 2015)

Mostly, economies in SSA secure the foreign loans at a very low interest even below the market-clearing rate with a very long term maturity from the international market. Though this may seem more lucrative than internal loans which relatively come with higher interest rate and shorter maturity, external borrowing posits currency risk. Since it is issued in foreign currency, it increases proportionately with foreign indebtedness; given that matured debt servicing increases the demand for foreign exchange. Consequently, governments in low-income countries consider the internal source of borrowing for some of reasons. Firstly, the supply of external loan depends on the donors' budget and their assessment of the economic performance of the recipient economy. Secondly, such loans are earmarked to finance capital projects and hence cannot cater for recurrent public expenditures. As such governments with huge recurrent fiscal deficits are forced to enter into the domestic market through the issuance of an internal bond to fill their budget gaps.

Domestic debt is not a recent phenomenon in Sub-Sahara Africa as most countries in the region have resorted to domestic borrowing since 1980. Although it saw a marginal increase in the early 1980s, on average, domestic debt-to-GDP ratio galloped from 11% to 15 percentage points in the 1990s with a median rise from 4% to 10% the same period (Christensen, 2005; Bua & Presbitero, 2014). In 2000, most countries in SSA became heavily indebted internally with those of domestic debt-to-GDP ratio exceeding twenty percent rising from 3% in 1980 to 9% in 2000. This was due to the higher deficit on the recurrent budget and huge accumulation of external debt which made most of these countries vulnerable for investors. Such countries included Angola, Democratic Republic of Congo, and Mozambique. Also, some country group namely Ethiopia, Kenya, Ghana, Mauritius, Nigeria, South Africa, Tanzania, Zambia and Zimbabwe relied heavily on internal borrowing during the debt relief period and hence accumulated larger domestic debt.

Domestic debt in recent times is gradually increasing its share of overall debt stock for most economies in SSA (Battaile *et al*, 2015). A recent report by the IMF indicates that on average, domestic debt covers about one-third of the entire debt burden representing 14 percent of GDP across 31 SSA economies. This statistic emanates from the recent global financial crisis which forced most economies into domestic borrowing. In all, 11 countries had their domestic liability exceeding 40% of the public sector debt (see Figures; 2.3 & 2.4).

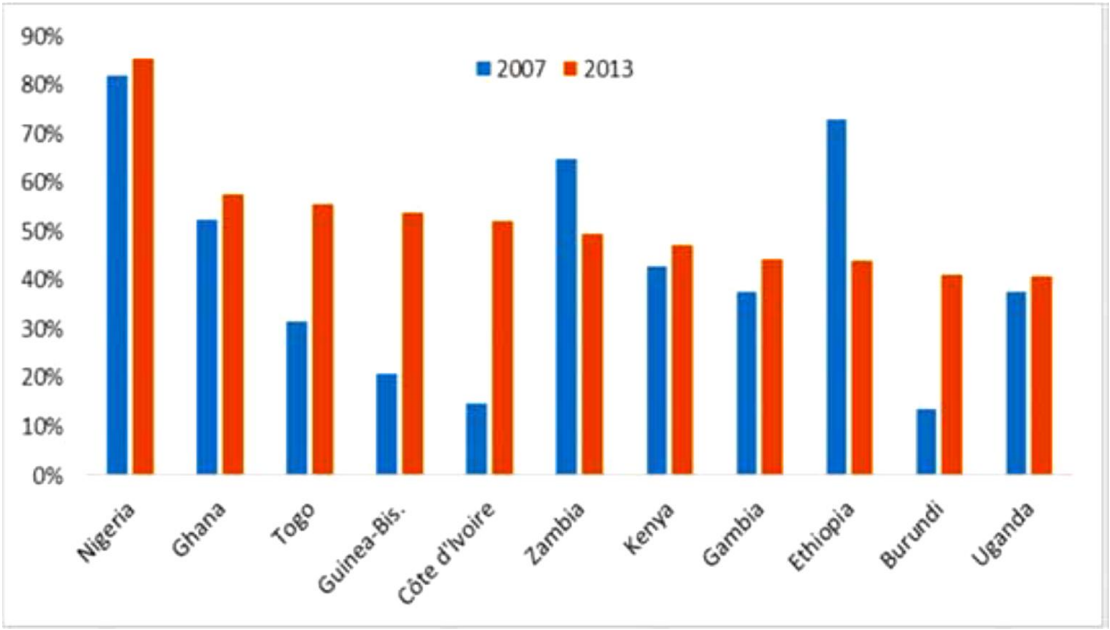


Figure 2. 3: Domestic Debt as a percentage of total debt stock in selected SSA countries

Source: IMF DSA database

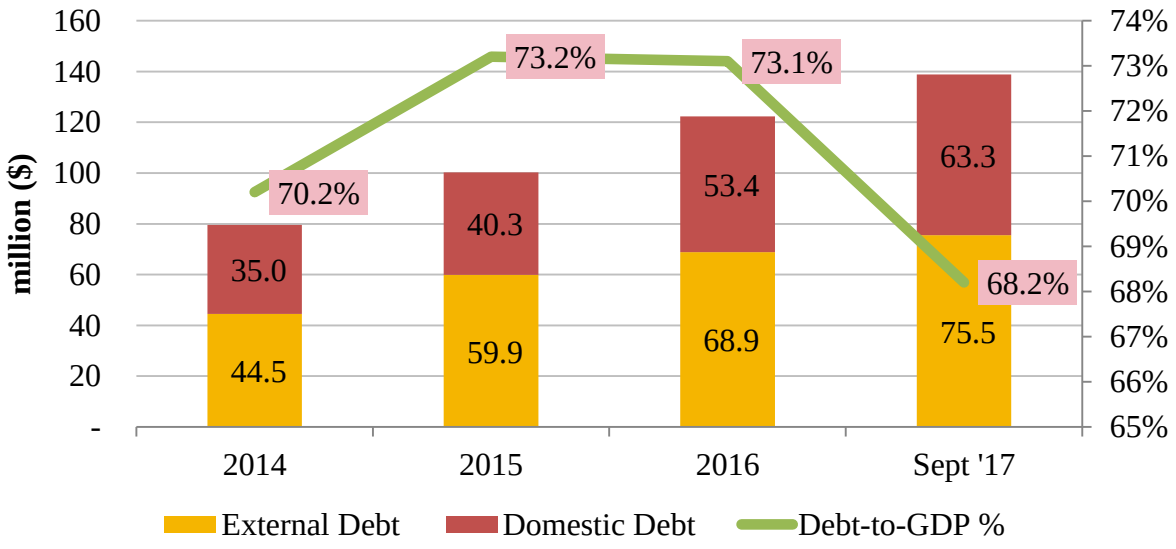


Figure 2. 4: Trends in Domestic Debt Burden for Emerging Countries in SSA

Source: Author's Compilation using data from IMF / WEO

Domestic financing leads to increase in market depth, broadening of the investor base as well as reduce exposure of fiscal debt portfolios to currency threat especially when it is denominated in the local currency (Mehrotra, 2012). Other advantages include triggering down the rate of vulnerability to capital flow reversals, mitigating the effect of external

shocks through pursuing counter-cyclical monetary policy, and the improvement in the institutional functions of local financial markets (Hausmann et al, 2006; Bacchocchi & Missale, 2012; Calvo, 2005). Although domestic borrowing is necessary, it comes with a higher rate of interest leading to a decline in national investment demand and eventually results in a debt crisis in the long run. When lenders control the interest rate, governments borrowing internally may end up creating credit rationing and hence reduce the supply of resources for private investment.

2.4.2 The External Debt Build-up

External debt is a global phenomenon considered to be the main hub of the government debt burden. According to the World Bank, total external debt is the debts owed to non-residents repayable in currency, goods, or services. It is the sum of public, publicly guaranteed, and private non-guaranteed long-term debt, short-term debt, and use of IMF credit. The 1980s debt crisis saw a sharp rise in external borrowing but relatively stabilized for decades before declining in the 2000s after the debt relief initiatives implementation. Figure 2.5 shows the overall distribution of external debt by income groups in nominal values in recent years.

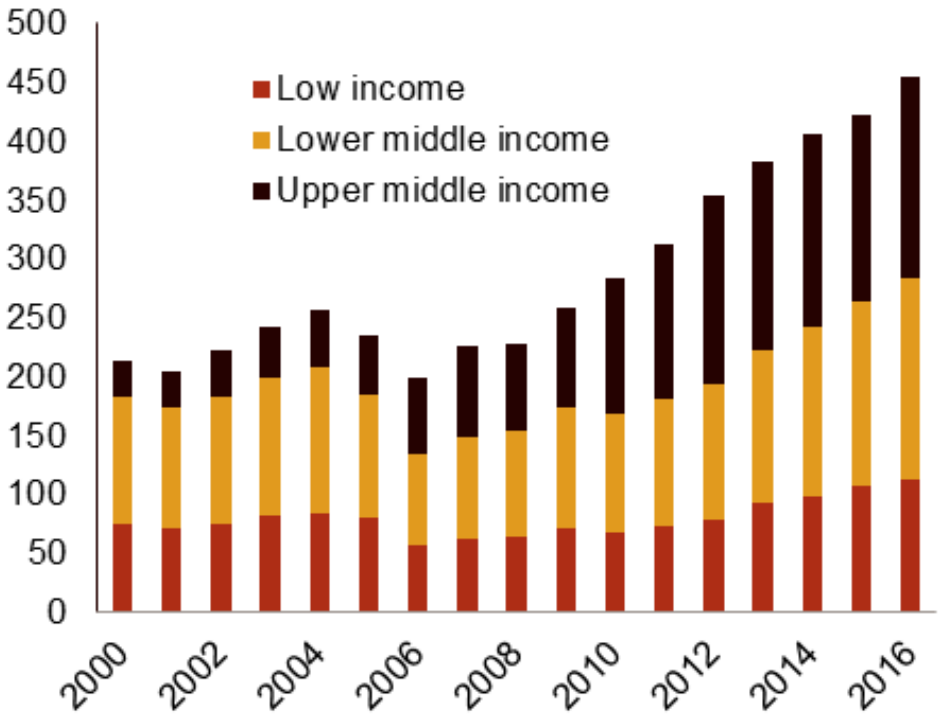


Figure 2. 5: Total External Debt by Income Group ***Source*: World Bank IDS, 2017.**

Figure 2.5 displays a fall in external borrowing between 2004 and 2006, before taking a rising trend for all economies in all income groups. This reversing trend is attributed to the reduction in the number of countries benefitting from debt relief policies since 2007, worsening fiscal stance, and continuous depreciation in the exchange rate especially for commodity export-dependent economies (IMF, 2018). This pattern is seen in the upper middle-income countries and to some extent the lower middle-income economies. Even though the magnitude of external debt accumulated has not reverted to their pre-HIPC and MDRI levels, the percentage growth to GDP is higher than they were before 2007. Thus for 2006, the external debt-to-GDP ratio on average took a heavy rise from 22.8 percent in 2007 to 41.2 percentage points by the end of 2016 (see Figure 2.6).

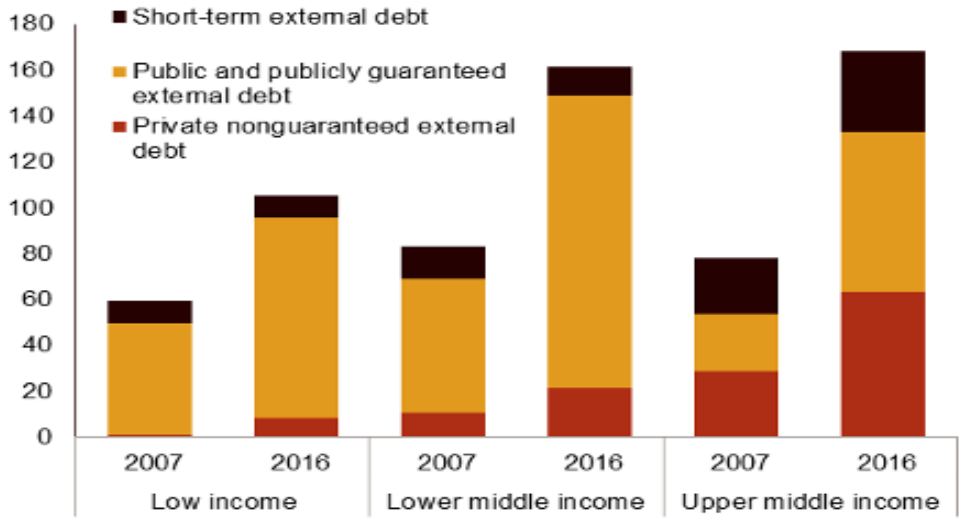


Figure 2. 6: Sub-Sahara African External Debt Decomposition

Source: World Bank IDS, 2017.

It must be emphasised that the country groupings have an impact on the ability to access international loans. Thus as an economy moves into the higher income bracket, access to grants and concessional loans is limited and as such would have to borrow from the international financial market at the existing interest rate. Therefore an increase in foreign interest rate results in a rise in the cost of external borrowing as well as the debt burden to service on debtor countries.

2.5 The Effect of Sovereign Bond Issuance on Emerging Economies in SSA

After the global financial crisis in 2008, most economies in sub-Saharan Africa resorted to the issuance of sovereign bond[1]in the international financial market as an additional source of finance. Since 2009, there has been a tremendous increase in international sovereign bond trading. As of 2014, six SSA economies had raised USD 6.2billion from the international

[1] A sovereign bond is a debt security issued by the government of a country, denominated either by foreign or domestic currency.

capital market (Tyson, 2015). Recent data from the World Bank indicate that the region's corporate and sovereign bond issuance has more than doubled; amounting to USD 14.4billion in 2017. Countries notable for the issuance of large bonds include Cote d'Ivoire, Kenya, Ghana, Nigeria, and Senegal (see Table D in Appendix). Most of these countries have been able to raise enough revenues to supplement low domestic savings and declining access to concessional financing.

However, sovereign bond issuance comes with some significant risks which mostly vary from country to country, but the most common is exchange rate deterioration. Due to the large size of the bond mostly greater than USD 500million (such as the USD 3billion issued by Ghana in 2019), the foreign exchange rate of the economies debt portfolio may increase leaving a higher risk of impending depreciation. Clear evidence is the recent depreciation of the Ghanaian and Nigerian currencies in 2014. Another major risk associated with an international sovereign bond is the ability for these SSA economies to meet the very large bullet repayments[2]which accounts for about two-thirds of SSA bond issued. This mostly happens when these countries are required to settle one-time larger repayment obligation rather than long term (preferably 10 years) which is easily manageable.

To mitigate this, some economies set up a sinking fund (example, Gabon) to mobilize adequate fund to meet bullet repayments. Others also roll-over the bond which also comes with extra cost over the yields accrued at issuance. Figure 2.7A-D displays the bullet repayments obligations for Ghana, Zambia, Cote d'Ivoire, Rwanda, and Senegal according to the level of risk.

[2] Bullet repayment refers to the amount of outstanding debt to be repaid by the issued country. Only Ghana and Cote d'Ivoire have been able to distribute amortization across two to three years at maturity of the bond. For majority of these emerging economies in SSA, debt servicing remains a significant liquidity risk.

High Risk

Ghana

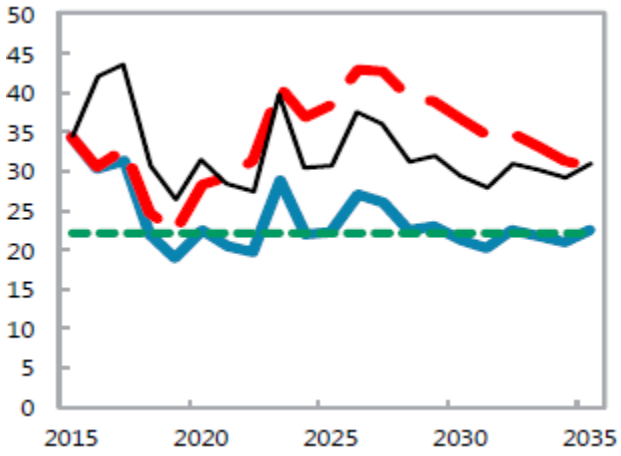


Figure 2. 7A: Bullet Bond Repayments and Debt service for Ghana

Source: Joint WB/IMF DSAs, 2015

Moderate Risk

Zambia

Cote d'Ivoire

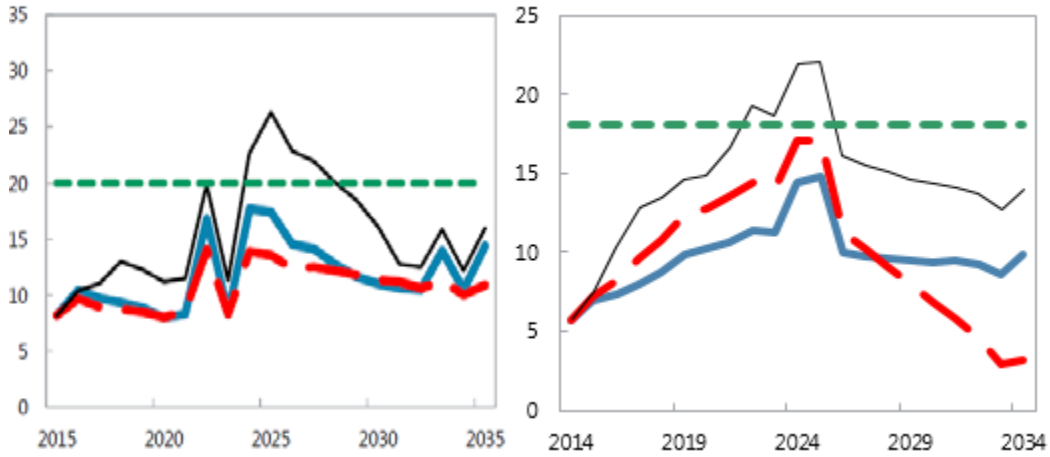
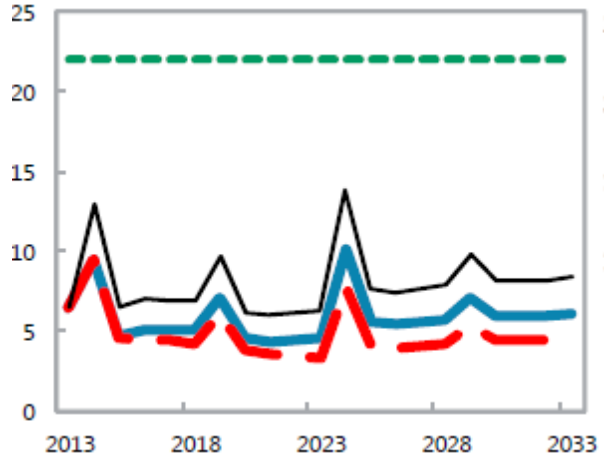


Figure 2.7B: Bullet Bond Repayments and Debt service for Zambia and Cote d'Ivoire
Source: Joint WB/IMF DSAs, 2015.

Low Risk (but increased recently)

Rwanda



Senegal

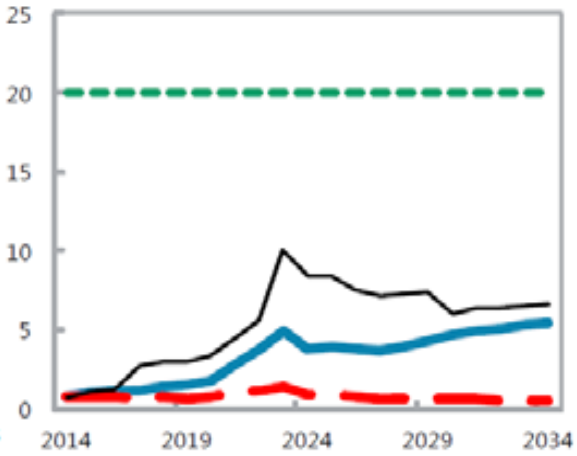
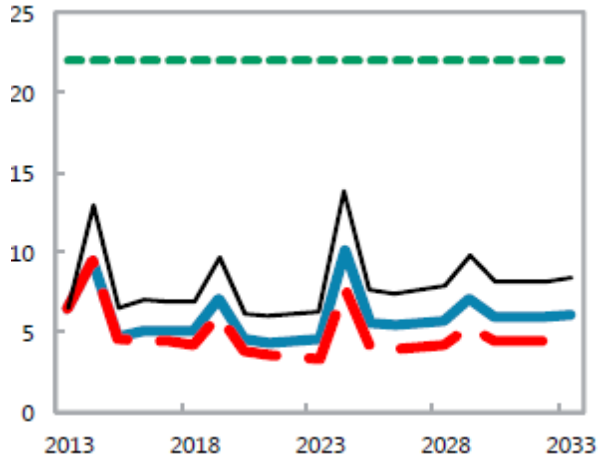


Figure 2.7C: Bullet Bond Repayments and Debt service for Rwanda and Senegal
Source: Joint WB/IMF DSAs, 2015

Low Risk

Kenya



Nigeria

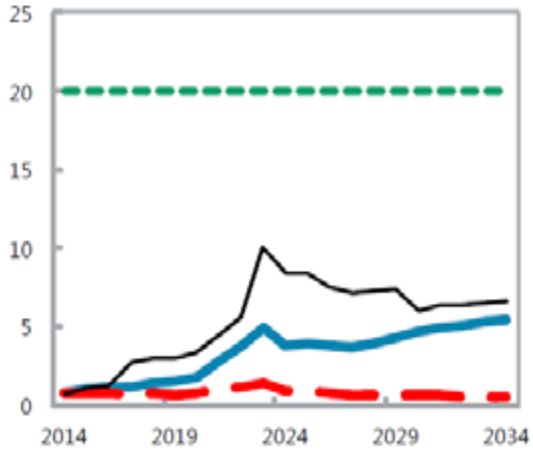
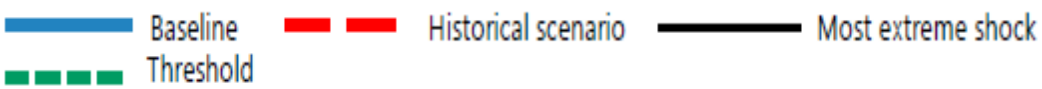


Figure 2.7D: Bullet Bond Repayments and Debt service for Kenya and Nigeria
Source: Joint WB/IMF DSAs, 2015.

Legend



In the case of Ghana, bond settlement beyond 2023 for current bond adds up to a long-term breach of the standard projected for the international debt service-to-revenue ratio henceforward, increasing the liquidity risk related to sovereign bond. That is why their risk rating of distress worsens from moderate to high. The ranks of Zambia and Cote d'Ivoire indicate whether higher debt repayments are associated with the issue of recent sovereign bond. The levels cause shock scenarios to breach thresholds and move the risk of debt distress to moderate. Even though, Rwanda and Senegal maintained a low-risk rating in their repayment ability, the recent level of bond issuances demands they manage huge debt spikes in the future. Distinctively, debt service-to-revenue indicators for Kenya and Nigeria are well lesser than their policy-dependent benchmarks.

In summary, the issuances of sovereign bond flow large resources into the issuing countries and foster financial instability. However, the continuous incorporation into international private capital markets, coupled with financial liberalization can mix with sharp volatility in capital flows. Also, the immature but emerging internal financial systems can end up in financial crisis and macroeconomic instability (Tyson, 2015).

2.6 Major Challenges Associated with High Government Borrowing

Financing public investment projects through borrowing result in higher production, exports growth and revenue generation at a relatively lower debt-to-GDP ratio over time (Pritchett, 2000; Buffie, 2012,). Nonetheless, the relationship between debt, investment, and growth should not be taken for granted, especially in SSA, where fiscal expenditure efficiency is unfavourable compared to other regions (Barhoumi, 2018). Rapid and excessive borrowing by countries can result in higher interest payments on debt, rise in taxes, crowding out the

private sector, and above all increase inflationary pressure. This is conceptualised in the framework below.

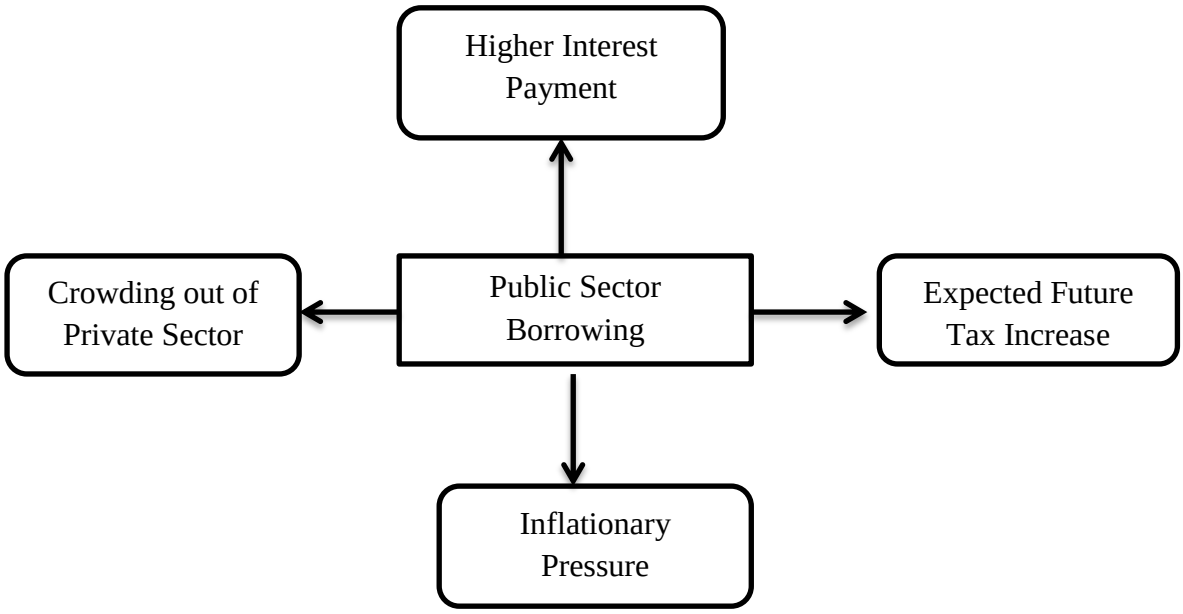


Figure 2. 8: Potential Challenges Associated with High Public Sector Borrowing

Source: Authors Compilation from the World Economic Outlook, 2018

As borrowing increases without corresponding payments at maturity, interest rate accumulates. In circumstances where the borrowing becomes excessive, the interest rate is forced up due to anxiety in the market about governments' ability to repay debts. This may lead to higher interest payments. The continuous rise in interest payments is seen in SSA as most countries (such as Ghana, Nigeria) spend more than 15% of the overall government revenue on interest payments. Figure 2.9 illustrates the trend of interest payment among emerging countries in SSA. It depicts that interest payment has been rising since the year 2010. The average interest-payments-to-revenue ratio almost doubled from 5% to 10 percentage points between 2013 and 2016 due to the rising debt accumulation (WEO, 2018).

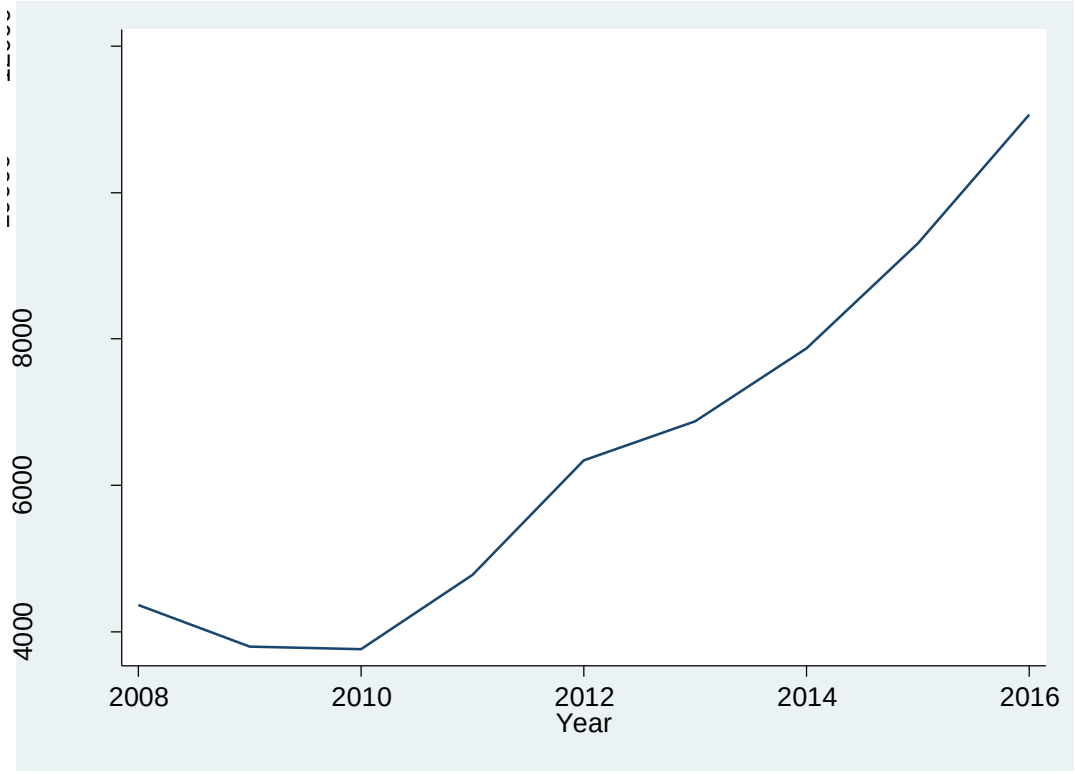


Figure 2. 9: Interest Payment for emerging sub-Saharan Africa Economies

Source: Author's compilation based on WEO data

The persistent rise in the debt-to-GDP ratio may require the government to reduce debt levels in future. One major way to do so is to reduce public sector spending or increase tax revenue. Increasing the tax rate may result in a fall in demand due to a reduction in disposable income. It also results in a high cost of production which may force producers to shift the tax burden to consumers. As such most economies rather reduce capital expenditure as a way to cut down government expenditures. Figure 2.10 explains the current situation of capital expenditure and its effect on interest payments.

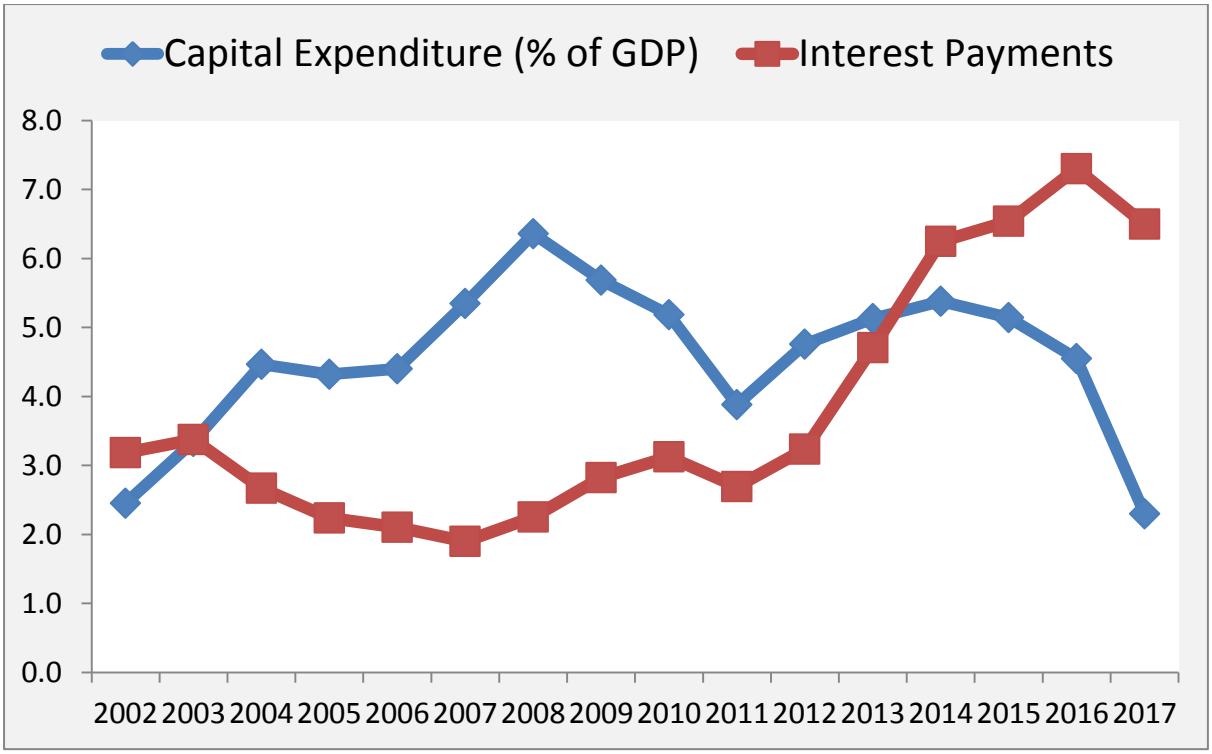


Figure 2. 10: Relationship between Capital Expenditure and Interest Payments

Source: Author's computation based on World Bank data

As the level of capital expenditure declines, the interest payment falls as well signifying that capital expenditure takes a major share of government expenditure. Clearly it shows that most economies in Sub-Sahara Africa borrow to finance capital expenditure. Therefore interest payments continue to be a major challenge among SSA economies. This is because these economies depend heavily on the governments to provide capital resources such as roads, schools, hospitals among others. The challenge here is not the capital investment but the misplaced priorities which runs the economies into revenue losses. Although it is evident from Figure 2.10 that there is a sharp decline in capital expenditures in recent times, it is expected to increase in subsequent years especially in election periods. This gives the implication of more borrowing and therefore more interest payments.

Moreover, close to 40% of emerging economies who benefited from the IMF's Poverty Reduction and Growth Trust (PRGT) are currently battling with high debt distress. As of the year ending 2017, the average public debt was more than fifty percent of GDP in sub-Saharan

Africa. The debt-to-GDP ratio worsens by the same period as a result of higher primary deficit and interest bills due (WEO, 2018). Countries such as Chad, Republic of Congo, and Equatorial Guinea suffered negative growth while The Gambia and Sierra Leone smarted with persistent currency depreciation.

Another major challenge associated with larger government borrowing is the increasing reliance on the external currency. Over the period from 2010 to 2017, public debts denominated in international currency increased averagely by about forty (40) percent. This accounted for sixty (60) percent of the total public debt burden of SSA countries (IMF /WEO, 2018). The rapid rise in recent public debt emanates from the rebound in Eurobond issuance by SSA frontier markets. The proportion of external-currency-denominated debt ranges from 10% of overall debt stock in South Africa to absolute certainty in Comoros Island and Zimbabwe (Mustapha & Prizzon, 2018).

2.7 Measures to Mitigate Debt Crisis

To ensure that the accumulated level of public debt and its growth rate are sustainable demands the anchoring of debt management in a sound macroeconomic environment. This coupled with the efficient allocation of the borrowed funds may ensure productive use for economic growth. Improvement in debt management although is not a panacea to mitigate debt overhang problems, it positions the economy very well from a higher risk of distress and unsustainability. Some countries (such as South Africa, Ghana, and Angola, among others) that put in place control measures to avoid debt overhang can marginally sustain their debt stock. In their study on rising debt in Africa, Mustapha & Prizzon (2018) put together three effective measures of managing debt crisis. Firstly, African economies need to strengthen their fiscal choice to secure debt burdens from becoming unsustainable. They should be done in such a way that it improves domestically generated revenue and reduce public expenditure.

Ideally, there are no clear cut rules concerning how public expenditure should be reduced, however, trimming down public sector wage bill and capital expenditures may generate much savings and promote economic growth.

Secondly, governments' tax policy must target the wider development objective by imposing tax rate moderate enough to widen the existing tax base. This is because, exerting much pressure on the prevailing tax base to shoulder the debt repayment burden via new or increased taxes may lead to counterproductive in pursuit of breaching the income inequality gap and impede domestic investment (Miller, 2017). Thirdly, governments must focus on improving the efficiency of public investment to enhance economic growth and development.

2.8 Chapter Summary

Borrowing either externally or internally to finance fiscal investment projects is good especially when the rate of borrowing is low enough to avoid debt distress. However, the fundamental responsibility of preventing unsustainable debt accumulation depends on the sovereign borrower. Excessive borrowing even at a lower rate can contribute to unsustainable debt burdens leading to "illegitimate debt" (Ellmers, 2016). Therefore sub-Saharan Africa governments are encouraged to put into effective use the borrowed funds and manage the debt stock very well to avoid the risk of default. This chapter explicitly showed that domestic borrowing also contributes immensely to debts stock accumulation. It further unravelled the major challenges associated with borrowing from both markets. Borrowing to finance public debt especially through the issuances of the sovereign bond was seen to be the mutual cause of huge interest payment. It concluded by providing some mitigation measures to debts crisis.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter reviews the theoretical and empirical literature underpinning debt structure and debt sustainability for emerging market economies.

3.2 Theoretical Literature Review

This section presents already existing theories showing the relationships between and among debt accumulation, primary balances and debt sustainability. It further probes the extent to which the existing models have been investigated to help form new hypotheses. The section begins with some basic definitions and concepts and ends with basic indicators that theoretically explain debt build-up and the capacity to sustain it.

3.2.1 The Debt Overhang Concept

This model explains that if there is any likelihood of a country to default their accumulated debt; then expected debt-service costs will discourage additional investment from both domestic and external sources. The reason is that the anticipated rate of return from the investment projects will be inadequate to support the debtor country. As such, any other economic progress will accrue to the creditor country (Krugman, 1988, Sachs, 1989). A major implication will be a reduction in investments (both domestic and foreign) by the debtor country and eventually downsize economic growth. The theory of debt overhang became useful when economists were advising countries on debt rescheduling in the early

1980s. It was until then that Sachs (1989) argued that debt rescheduling is an inadequate response to situations in which debt will eventually have to be forgiven. He was of the opinion that both creditors and debtors were conversant with the need for debt forgiveness or relief which led him to the development of the famous debt overhang model.

Contemporary economists have broadened the theory to include the liquidity effect. For instance, Claessens and Diwan (1990) define debt overhang as any situation in which the illiquidity effect, the disincentive effect, or both effects are strong enough to discourage growth in the absence of concessions by creditors. Although their definition took into consideration tax disincentives, Hjertholm (2001) believe it narrowly defines debt overhang. He argued on the basis that where any success in indebted country's economic performance is taxed away by creditors, very little will be left for investment and subsequent growth. He, therefore, expanded the definition beyond physical capital investment to include any activity that involves incurring costs up-front for the sake of increased output in the future. These activities may include human capital development (through education and health), acquisition and advancement in modern technology, and any other activity with a stronger influence on economic growth over time.

Johansson (2010) maintains that the existence of debt overhang reduces public and private investments. The reason is that investors are discouraged when the greater portion of the debt returns is paid to the creditors, on the other hand, where a high future debt service demands implicit tax to finance the debt, the incentive for private investment is discouraged. This gives a clear indication that huge debt stock makes economic reforms less advantageous due to the presence of debt overhang problems. Excessive debt accumulation may intensify the pressure to repay creditors than stimulating economic growth. It can, therefore, be concluded that debt overhang hampers economic growth by increasing private investors' ambiguity of governments' ability to meet their debt service obligations.

3.2.2 The Debt Laffer Curve

The debt Laffer curve shows the relationship between the magnitude of a country's debt and the value of repayment. The theory which was first introduced by Sachs (1988) and expanded by Krugman (1989) is derived following the premises of the tax Laffer curve hypothesis originated by the American economist Arthur Laffer (1981). According to Krugman (1989), when a country accumulates too much debt such that it exceeds its ability to repay, then the debt acts as an increased marginal tax rate on the country. If on the contrary, it succeeds in meeting the debt obligation than expected then the main benefits will accrue to the creditors and not the country itself. The long-run effect will be shifting the debt financing burden to domestic taxpayers mostly through a capital tax which may discourage investment. Figure 3.1 shows the logic underlying the debt Laffer curve as postulated by Krugman.

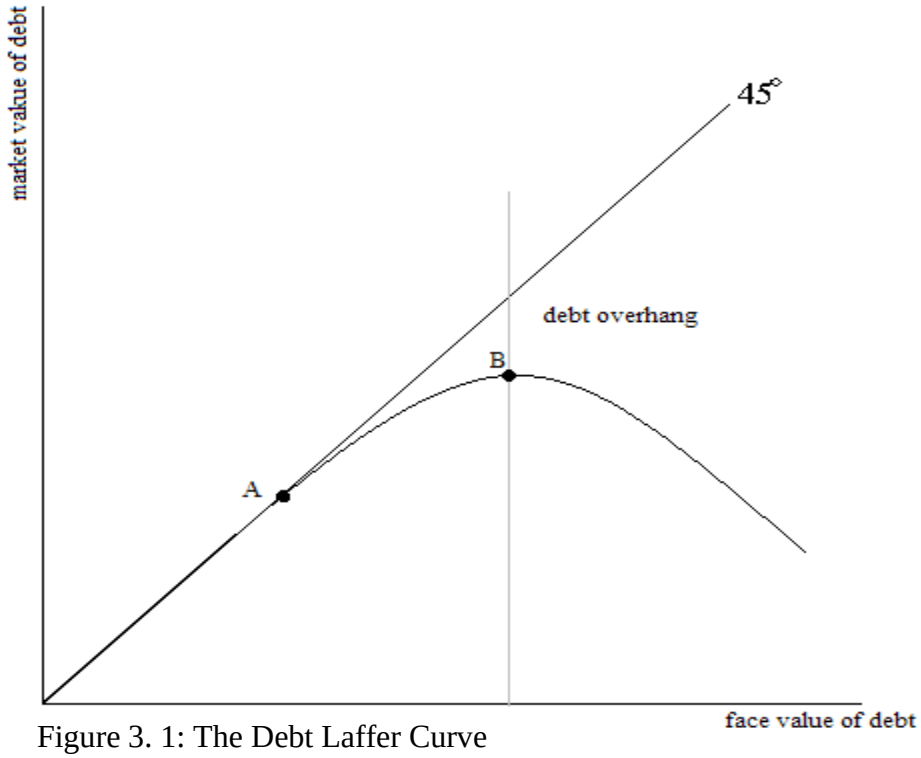


Figure 3. 1: The Debt Laffer Curve
Source: Sachs 1998, Debt Laffer Analysis

It can be seen that there is a one-to-one connection between the market value[3]of the debt and face value of the debt along the 45^0 line of equality until point 'A'. A rise in the face value of the debt beyond this point (A) will lead to a slow rise in the market value along the curve. According to Krugman, this happens because as a country consistently accumulate debt it becomes very difficult to finance it due to the rise in the debt servicing obligation that acts as investment tax.

Moreover, excessive build-up of debt results in a decrease in the face value but the overall market value will still be rising and the marginal return on the debt begins to diminish as you move rightwards beyond point (A). Point (B) shows the optimal market value of debt. Conversely, if the rate of accumulation exceeds this threshold (point B), the absolute increase in the face value will not be enough to compensate for the marginal reduction in the market value. When this happens, the country is said to be suffering from debts overhang problem. The theory assumes that if a country's debt level corresponds to points between A and B on the debt Laffer curve, then that country is on the "right" side and their debt stock is sustainable.

3.2.3 The Debt Burden Phenomenon

Accumulating huge debt puts the future generation into a difficult situation to either retire or refinance the debt stock. Each circumstance requires the transfer of funds from future taxpayers to creditors either through servicing the debt or interest payment. There is, therefore, the need to care about fluctuations in national debt burden to prevent over-burden of the future generation. Several economists have shared their thoughts about the debt burden and accumulation some of which are discussed below:

[3] Market Value of Debt refers to the market price at which an investor will be willing to purchase a country's interest bearing debt. Whiles Face Value of Debt is the nominal value of the debt instrument as at the time of issuance.

a. Lerner's View on Domestic and External Debt

According to Barro (1979), owing to domestic creditors leave no debt burden to future generation because financing the debt requires the transfer of income from non-bond bearing citizens to bond-bearers leaving consumption levels unchanged. On the other hand, if the debt to be financed is external, then the future generation has a debt burden to bear. In this case, there will be a reduction in future consumption by an amount equal to the debt value in addition to the interest due to foreign bondholders making them worse off.

b. Neoclassical View

The neoclassical are of the view that debt financing imposes a burden on the future generation through its negative effect on capital formation. They believe that anytime the government finances capital expenditure projects either through taxation or borrowing, resources are moved from the private sector of the economy. Where the project is financed through tax impositions, it results in the reduction in both disposable income and future generations' consumption. However, if the government finances the project through borrowing from the financial markets, it competes for funds with the investing public (that is; firms and individuals who want the funds for private investment). This, therefore, leaves future generation with a smaller capital stock (holding public sector capital stock and other factors constant) and makes them less productive with lower income levels than would have otherwise been.

3.3 Basic Indicators of Debt Sustainability

Debt Sustainability Analysis is a tool that is used as part of a framework developed by the World Bank and the International Monetary Fund to help guide countries and donors in mobilizing critical financing for low-income countries while reducing the chances of an

excessive build-up of debt (IMF / World Bank, 2018). The indicators of debt sustainability in the literature have been augmented with models that specify explicitly the inter-temporal relationship between primary balances, public debt, and interest payment as:

$$D_{t-1} = D_t(1 + r_t) + PB_t \qquad (1.0)$$

Where $\boldsymbol{D_t}$ is public debt as at period **t,** $\boldsymbol{r}$ depicts the interest rate on debt, and $\mathbf{PB}_t$ is the primary balance. Debt sustainability emerges out of this expression by establishing a consistent relationship among debt growth, GDP growth, and primary deficit at a given interest rate. Most studies in the area of debt sustainability have employed this fundamental model to propose various indicators deemed sufficient with debt sustainability principle.

Missale & Blanchard (1990) for instance proposed an indicator that accounts for the reliability of the current tax policy while maintaining the debt-to-GDP ratio. Blanchard called this indicator the "taxation gap"; which measures the difference in existing fiscal burden and sustainable fiscal burden. The indicator expresses tax level necessary to stabilize the debt-to-GDP ratio in terms of continuous GDP path and the initial debt stock at a given expense level defined by;

$$t_n - t = \sum_1^n g + (r - q)d^* - t \qquad (2.0)$$

Where $\boldsymbol{t_n}$ represents fiscal burden assumed to be fixed over time $\boldsymbol{n}$ years; $\boldsymbol{t_n - t}$ is the tax level necessary to stabilize the debt ratio; $\boldsymbol{d^*}$ is the debt-to-GDP ratio while **g** represents the overall government expenditure, **r** is the interest rate, and **q**, the growth rate of GDP. A negative tax gap indicates that the taxation pressure in the economy is very low to stabilize the debt-to-GDP ratio. On the other hand, a positive tax gap shows that there is enough pressure on taxation to stabilize the debt ratio.

Another indicator proposed by Buiter (1985) involves estimation of the gap between sustainable primary balance and the primary effective balance. In this case, the sustainability condition is defined basically from a broader net worth relative to the one implicitly included in the debt-to-GDP ratio. Buiter's gap indicator is expressed as:

$$b^* - b_t = (r - q)w_t - b_t \qquad (3.0)$$

With $\boldsymbol{b^*}$ representing the ratio of debt to sustainable GDP, $\boldsymbol{b_t}$ measures the debt-to-GDP ratio, $\boldsymbol{w_t}$ is the net government wealth value as a percentage of GDP, $\boldsymbol{r}$ is the interest rate, and $\mathbf{q}$ shows the GDP growth rate. According to Buiter (1985), a positive indicator value gives a clear signal that the current primary balance is not adequate to stabilize the net-wealth-value to GDP ratio. It can only be sustained by holding stagnant the government wealth in an ex-ante sense. Although Buiter's indicator is very simple and practically useful it does not take into consideration some crucial variables in the methodological measurement. For instance, it only considers financial and real capital assets when measuring net government wealth, but neglects assets such as lands, mineral resource and present value future tax such as social security.

Talvi and Végh (2000) therefore proposed the macro-adjusted primary deficit indicator which allows for the volatility of macroeconomic variables that causes the primary deficit to vary around the expected macro variables. They estimated the primary balance by considering the long term potential values and allowing for fluctuations in all the required macro variables (net wealth) in a normal economy condition. The indicator is expressed as follows:

$$b^* = \frac{(r-g)}{(1+g)} - b_{t-1} + d_t^m \qquad (4.0)$$

Where all variables are defined as before and $\boldsymbol{d_t^m}$ represents the primary macro adjusted balance which allows for changes in macroeconomic variables. The rationale behind their

indicator is to relate the macro-adjusted balance with the current estimated values. The key setback to this indicator lies within the difficulty to establish what they term "a normal economy condition"

In order to evaluate the fiscal authority's reactions when variables linked to debt sustainability changes over time, Croce and Juan-Ramon (2003) derived the "Sustainable Fiscal Position (PFS)" which explicitly includes a reaction function whose variation over time allows to evaluate the outcome of fiscal policy when these variables (e.g. interest rate, growth rate etc.) change. The PFS shows the "ratio between the primary effective balance gap and the primary sustainable balance to the debt-to-GDP ratio." That is;

$$I_t^{PFS} = (\beta_t - \gamma_t) = \frac{(1+r_t)}{(1+g_t)} - \frac{(BP_t - BP^*)}{(b_{t-1} - b^*)}, \text{ and } |\beta_t - \gamma_t| \leq 1 \qquad (5.0)$$

Where β_t represents the fraction between the real interest rate (1+r) and the growth rate of GDP (1+g). γ represents the fiscal policy reaction function which expresses the difference between the primary effective balance (BP) and the primary sustainable balance (BP*) as a proportion to the gap between the debt-to-GDP from the previous period (b_{t-1}) and the sustainable debt / GDP (b*)". A PFS ≥ 1 means the fiscal policy is inconsistent with the conditions of debt sustainability while PFS < 1, shows fiscal policy is consistent with the pre-requisite conditions for debt sustainability.

The PFS may vary from time to time mainly because of the variations in the growth rate, interest rate or debt balance which are key determinants of debt sustainability. The model assumes those variables are exogenous to fiscal authority and can only affect the primary balance through variations in the fiscal gap. To determine the effect on the primary balance, the reaction function is compared to the conditions necessary to ensure the stability of the debt-to-GDP ratio. That is the relationship between long term interest rate and long term

GDP growth rate. In the sense that, the higher the long term interest rate relative to growth rate, the greater the primary surplus needed to stabilize the debt ratio in time and vice versa.

3.4 Empirical Literature Review

The macroeconomic literature has stocked several empirical works on debt sustainability and the likelihood of governments meeting their intertemporal budget constraint. All these studies vary in their sample area, methodology and findings. For instance, Chalk (2000) used the general equilibrium framework to incorporate stable fiscal deficits into an overlapping generation's model and find out that, if the steady-state interest rate is less than the GDP growth rate, then permanent deficits are indeed sustainable for some selected advanced economies. In relation to this, Neaime (2014) uses time-series properties of fiscal data to test the sustainability of debt and deficit for some selected European countries and find the possibility of some heading into debt and fiscal crisis if corrective measures are not taken. Also, in analysing the debt limit of OECD[4] countries, Fournier & Fall (2017) argue that the current debt limit is relatively high, making governments (of most OECD countries) vulnerable to changes in macroeconomic conditions as well as to the market reactions. Apart from the fact that these research works were conducted among the advanced economies, they could not specify a benchmark beyond which debt is not sustainable.

In the area of emerging economies[5], Elbadawi, Ndulu, & Ndungu (1997) established the effect of debt overhang economic growth using ninety-nine nations across four developing regions namely; Latin America, Sub-Sahara Africa, Asia, and the Middle East. The study

[4] "Organisation for Economic Co-operation and Development (OECD) is an inter-governmental economic organisation with high income and human capital indices established to stimulate economic progress among member countries".

[5] Emerging economies also called emerging markets or developing economies are countries that are characterised by rapid growth and diverging from the traditional agrarian and export of raw materials to industrialization and investments in more productive capacities.

presented a nonlinear fixed and random effects panel estimate to relate debt on growth in a growth model where the debt-to-GDP ratio is captured as both direct and exponent. The study revealed three undeviating routes through which indebtedness functions against growth among these regions. They include "current debt inflows as a proportion of GDP (which motivate growth), past debt accumulation (covering debt overhang), and debt service ratio". The results demonstrated a 97% rise in debt-to-GDP ratio way above the regions' average of 70%.

In connecting debt with growth, Calvo (1998) argued that high debt results in low growth. This is because a higher distortionary tax burden on capital will be needed to defray the debt which may result in a lower rate of return on capital, investment and eventually economic growth. Also, Mendoza and Ostry (2008) conducted a cross-country study on both emerging and industrialised economies using fiscal solvency as a baseline on a dynamic stochastic general equilibrium model. The results showed a robust direct restrictive reaction of the primary balance to changes in public debt. Neaime (2010; 2012) on the other hand confirmed that borrowing is not a problem but the ability to sustain the accumulated debt. He made this accession when his empirical results show different levels of sustainability of fiscal policies for some selected economies based on their fiscal discipline. For instance, the results revealed a strong sustainability level for Tunisia, weak for Egypt, and completely unsustainable for Jordan and Turkey whilst Morocco was uncertainty. The study attributed the case of Egypt to the unsuccessful privatization plan introduced during the 1990s. Morocco's mixed results are explicated by the introduction of fiscal recovery reforms. However, the unsustainability for Jordan and Turkey were clarified by the greater fiscal imbalances on the side of Jordan's economy, and the poor performances of financial and banking sectors in Turkey.

Similarly, Chandia K & Javid A (2013) conducted a detailed analysis of debt sustainability in Pakistan using time-series properties and found the existence of long-run relationship

between primary surplus-to-GDP ratio and debt-to-GDP ratio. Ghosh et at., (2013) postulates that risk-neutral investors will only loan to government at a short fiscal space making it difficult to increase primary surplus without increasing current debt. As a result, the government faces an endogenous debt limit beyond which debt becomes unsustainable. Moreover, Eberhardt & Presbtero (2014) employed novel methods of linear and non-linear panel model to investigate the public debt-growth nexus for some emerging countries. They found an indirect connection between fiscal debt and long-run growth across countries but different within countries. As a result, Baharumshah (2016) propose a Markov-Switch model to examine the fiscal sustainability in the emerging market economy from 1980 – 2014. It was realised that but for the short period of economic difficulty, policymakers would have been following a sustainable fiscal path. Therefore if the public debt stock exceeds a threshold of 55% of GDP, it will result in a negative correlation with general economic activities since there is a unidirectional causal relationship between debt and growth.

Paret (2017) applied probability theorem and conducted a simulation for the intermediate-term public debt trajectories for emerging economies. The study recommended that going forward; governments of emerging countries should redesign their policies to limit currency risk exposition. This can be done through stronger fiscal tightening to enhance sustainability whenever debt increases. Above all, countries with the easiest likelihood of defaulting debt due to poor fiscal consolidation track record must be very circumspect with countercyclical fiscal policies. This is because such policies may initiate an unsustainable debt route along the economic cycle.

Ngan (2018) estimated a benchmark to determine the brink of debt for 14 developing countries from 1999 – 2016. The research showed that Non-Latin American economies are capable of sustaining their debt stock in the short run once the debt burden remains in or below the benchmark range of forty to fifty percent of GDP. On the other hand, the debt will

be unsustainable when there is a persistence rise in the debt burden in the long run which may require rebuilding of fiscal buffers.

Specifically to Sub-Saharan Africa, Osei (1995) employed the probabilistic method to conduct simulation debt trajectories on Ghana and point out that, debt repayment undeniably evokes restrictions on the growth prospect of debtor country because of the transfer of resources to creditor countries. In minimizing the problem of indebtedness, he argued that debtor countries associate debt with its repayment of some income resources generated. This according to Amoating and Amoaku-Adu (1996) can be done through assigning a greater percentage of export revenue to service the debt burden, especially external debt. They further explain that investment and growth may not greatly decline due to the existence of foreign exchange. Their findings may be applicable but only in the short run. A major challenge is the insufficiency of the foreign exchange to sustain investment and growth in the long run.

In other jurisdictions, Adepoju, Salau & Obayelu (2007) use time-series data to examine the influence of international debt on growth in Nigeria. They find external debt to be a major impediment on the growth trajectory of Nigeria. Late on, Georgiev (2012) employed a different approach both linear and nonlinear models to the same study for Nigeria and confirmed a significant decline in growth for a proportional increase in the debt stock. National savings is however crowded out due to huge debt accumulation. The findings of these literature contradict earlier work by Edwards and Tabellini (1992) who identified for the Nigerian economy that, a percentage rise in the debt stock; measured by debt service to GDP ratio results in about 18.5 percentage points rise in growth. Nonetheless, their methodology was subjected to various criticisms including the fact that it considered only the public sector debt and neglected the Balance of Payments (BoP) stance. Again the model

assumed that government expenditures, revenues, exchange rate, and interest rate are constant which not the case is most times.

Battaile, Hernandez, and Norambuena (2015) consequently maintain that the main drivers of foreign debt are; current account deficit and foreign direct investment inflows. However, they argue that disequilibrium in the balance of payment is mostly due to rapid external debt accumulation, swelling vulnerabilities of debt financing profiles and the debt burden sensitivities. As such policymakers in SSA needing to find antidotes must pay attention to declining commodity prices, especially oil. Also, they must resolve the impact of the economic downturn from China and the sluggish recovery in Europe accounting for contingent liabilities.

3.5 Chapter Summary

A key controversy in the literature centres on the inconsistencies associated with finding a unison threshold value for several economies. Some studies suggest that the debt limit is specific to countries and cannot be measured collectively (see, Kraay & Nehru, 2006; Ghosh et al, 2013). However, recent studies (Bick, 2010; Kidochukwu, 2015; Ngan, 2018) have found that a common threshold is adequate for comparison and a good determinant of debt default especially among economies within the same development bracket. A pertinent question regarding similarities in debt sustainability among these economies remains a puzzle. i.e., are the regression estimates identical across all samples or do they fall into discrete classes? This question is better addressed using a unison threshold model (Hansen, 1999).

The International Monetary Fund and World Bank's Debt Sustainability Analysis (DSA) framework is widely regarded as the fundamental model for debt trajectories analysis and

threshold specification for emerging economies (Paret, 2017; Kidochukwu, 2015). Developing economies within the categories of low income, lower middle income and middle income have tried to sustain or contract below their proposed threshold by the DSA to ensure they do not default in payment (Kidochukwu, 2015). Yet these countries faces worse economic crisis such as high poverty, unemployment and low growth rate. As such the framework is touted by many as growth constraint to these economies (Nwankwo, 2014; Kidochukwu, 2015). This is because the framework has two major drawbacks: a) it neglects the uncertainty of macroeconomic forecast in the volatile environment facing emerging economies and b) the DSA assumes that countries react identically to shocks in their macroeconomic environment especially variations in fiscal response to changes in output gap and debt ratios (see Akyüz 2007; Paret, 2017).

The literature documents stochastic framework to address this caveat (see Burger et al., 2011; Beti, 2013; Neaime 2015). Notable among them is the fan-chart approach proposed by Celasun et al., (2006) and later expanded by Medeiros, (2012) and Paret, (2017). This framework hinges on two pillars: panel VAR estimation for simulating the impact of macroeconomic variables on debt and a fiscal reaction function to describe budgetary response to changes in debt levels. However, it does not determine the nature of the threshold (i.e. single or multiple) and the threshold confidence interval for measuring sustainability. This is the superiority of the Hansen's (1999) threshold model over the existing frameworks (Bick, 2010; Seo & Shin, 2014; Ngan, 2018).

The stochastic framework of this study follows the Hansen's threshold model but introduces two new features to account for specificities regarding debt dynamics of emerging economies in sub Saharan Africa. First, estimate a fiscal reaction function to describe the reaction of primary balances to changes in debt ratio and output gap while taking into consideration the exposure to currency risk. Second, introduce sovereign risk of default to measure and provide

a signal for debt default in SSA. The study follows the least squares minimization procedure to obtain the threshold value and regime parameters using the bootstrap critical values to test for the significance of the threshold.

CHAPTER FOUR

METHODOLOGY, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the research methodology, analyses the results and discusses the findings of the study. Sections discussed here include the theoretical framework underpinning the subject matter, empirical models specification, estimation technique, variable descriptions, data source, diagnostic tests, findings presentations, and discussion of results.

4.2 The Theoretical Framework

This section presents the theoretical framework underpinning the research methodology. It comprises of the fiscal reaction function obtained from the government intertemporal budget constraint. The section also provides a detailed model to determine the debt threshold estimator.

4.2.1 Intertemporal Budget Constraint

The analyses of public debt trajectories require the estimation of a fiscal reaction function which relates to the intertemporal budget constraint of the government. A fiscal reaction function provides public sector assistance in forecasting to prepare against some macroeconomic shocks. To estimate the government fiscal reaction function, we need to understand the budget constraint facing the government. The government's intertemporal budget constraint shows that the present value of all its expenditures must be less than or

equal to the sum of its initial wealth and the present value tax revenue (net of transfer payments).

To express the constraint, let $\mathbf{G_t}$ denotes overall government expenditure, $\mathbf{T_t}$ be total revenue (including tax), $\mathbf{D_t}$ represents total public sector debt, and $\mathbf{r_t}$, the real interest rate in period **t.** To address the effect of interest rate variation over time, the interest rate is defined as the continuously compounded interest (that is, $\boldsymbol{r_t = e^{Rt}}$). However, since the value of a product at time **t** in terms of the initial period is discounted as $\boldsymbol{e^{-t}}$, $\boldsymbol{r_t = e^{-Rt}}$. The government's Intertemporal Budget Constraint is therefore defined as

$$\int_{t=0}^{\infty} e^{-R_t} G_t dt \leq -D(0) + \int_{t=0}^{\infty} e^{-R_t} T_t dt \qquad (1)$$

Where D(0) represents government's initial wealth in debt; as such treated as negative in the constraint under the restriction that the limit of the present value cannot be positive. Other variables follow similar definitions above.

Solving for debt in period **t** from equation 1 yields:

$$D(t) \leq \int_{t=0}^{\infty} e^{-R_t}[T_t - G_t]dt \qquad (2)$$

The simplest definition of a deficit from equation (2) is to express the rate of change in the debt stock as the sum of the difference between the government's expenditures and revenues and the real interest paid on debt (Bohn 1998). That is the time path of the constraint is given as,

$$\dot{D}_t = [G_t - T_t] + (1 + r_t)D_{t-1} \qquad (3)$$

Equation (3) indicates that the growth rate of debt is equal to the primary balance[6] $(G_t - T_t)$ and outstanding debt $(1 + r_t)D_{t-1}$. Augmenting equation (3) in discrete form and expressing as a ratio of GDP to eliminate nominal effect defines primary balances as:

$$\frac{Pb_t}{Y_t} = (1 + r)\frac{D_{t-1}}{Y_t} - \frac{D_t}{Y_t} \qquad (4)^{7}$$

Where; $\mathbf{Pb_t}$ stands for primary balance at the end of period ***t***. Ideally, current GDP (Y_t) is equal to previous years GDP (Y_{t-1}) plus its growth value (g). That is:

$$Y_t = (1+g)\, Y_{t-1} \qquad (5)$$

Hence by substituting Eqn(5) into Eqn (4) and taking into consideration the lag terms yields:

$$\frac{Pb_t}{Y_t} = \frac{(1+r)}{(1+g)}\frac{D_{t-1}}{Y_{t-1}} - \frac{D_t}{Y_t} \qquad (6)$$

Eqn(8) represent debt function to GDP ratio at a given time. Rewriting in a reduced form we obtain:

$$pb_t = \frac{(1+r)}{(1+g)}d_{t-1} - d_t \qquad (7)$$

Where; lower case letters represent the ratios of the corresponding variables to GDP. Now for equation (7) to depict the government's fiscal constraint, it must satisfy the transversality condition of no Ponzi scheme. The condition states that the government cannot persistently adjourn debt and interest payments but must fulfil its debt obligations periodically. Therefore we restate equation (7) forward for several (***n)*** periods so that the limit of the future debt ratio (i.e. $\lim_{n\to\infty}\left(\frac{1+r}{1+g}\right)^n d_n$) approaches zero. At this level, the rate of growth of the debt stock

[6] Primary Balance (also called fiscal balance) is the sum of non-interest government outlays less government revenue for a period. It can be surplus (+) or deficit (-)

[7]. If the government runs a primary balance equal to zero ($pb_t = 0$), the debt stock will grow at a rate equal to the interest rate: (i.e. $\Delta D_t = rD_{t-1}$). If the government runs a primary deficit ($Pb_t > 0$), the debt stock will grow at a rate exceeding the interest rate.

will be slower than that of interest rate ***r***, this is because the government is not expected to pay interest on the debt by regularly issuing new debt (that is, no Ponzi scheme).

A critical question here is how debt can be stabilized within the framework specified above. Now to ensure stability debt must not grow over time. This means that $d_{t-1} = d_t$. Restating equation (7) to reflect this condition,

$$pb_t = \frac{(r-g)}{(1+g)} d_{t-1} \qquad (8)$$

Eqn(8) shows that the primary balance is determined by the outstanding debt but the relation is regulated by the relationship between the real interest rate (r) and the GDP growth rate (g). Thus, there is debt stability when;

a. r < g even if the economy runs a budget deficit.

b. r = g since the budget is balanced.

On the other hand, if r > g, then debt continuous to grow over time even when there is budget surplus. In that case, sustainability becomes a problem.

4.2.2 Empirical Model Specification

A fiscal reaction function in economic theory specifies the reactions of the primary balance to changes in variables that are assumed to be key determinants of debt dynamics. To specify a model for several countries in multiple periods requires the estimation of a panel regression model. Therefore from equation (8), a fiscal reaction function showing the relationship between primary balance and government's debt ratio is specified empirically as follows:

$$pb_{it} = \beta_0 + \beta_1 d_{it-1} + \mu_{it} \qquad (9)$$

Where; pb_{it} is the primary balance to GDP ratio, d_{it-1} is the public debt-to-GDP ratio, and μ_{it} is the random error term. Equation (9) is very parsimonious because it does not include

other key variable determinants of primary balance. The literature documents other state variable determinants of primary balances (see Galí and Perotti 2003; De Mello 2008; Celasun, 2006; Mendoza and Ostry 2008; Jooste *et at*., 2011; Burger and Marinkov 2012 and Medeiros 2012). These variables are necessary because at a higher debt level, fiscal fatigue sets in such that governments are unable to increase their primary balance to limit debt accumulation (Ghosh *et al.,* 2013). To meet the first two objectives of this study, a panel regression function relating primary balance to lag primary balances, output gap, sovereign debt-to-GDP ratio, and other control variables is specified as follows:

$$pb_{it} = \beta_0 + \beta_1 pb_{it-1} + \beta_2 OG_{it} + \beta_3 d_{it-1} + \beta_t z_{it} + \mu_{it} \quad (10)$$

Where pb_{it} is the primary balance, d_{it-1} is the lagged debt to GDP ratio, OG_{it} is the output or fiscal gap, and z_{it} is a vector of control variables. The indices ***i*** and ***t*** refer to countries and time respectively and $\mu_{it}$is the random error term. Some studies augment the reaction function to include country-specific determinants of primary balance such as election dummy and HIPC dummy (see Asiama et al., 2014; Turrini, 2008) especially in time series analysis. However, these variables may correlate with other explanatory variables posing unobservable heterogeneity problem when applied to dynamic panel regression function (see Solomon and Wet, 2004). As such the study introduces a stochastic component to control for these country-specific and time-invariant determinants to ensure consistency in the results. Also to avoid omitted variable bias, the study uses inflation, exchange rate, and trade openness as control variables to correct for price movement effect, persistent depreciation on primary balances, and instability in government revenues respectively (see Edwards and Tabellini, 1991; Schuknecht, 1999; Combes & Saadi-Sedik, 2002). Equation (10) therefore becomes:

$$pb_{it} = \beta_0 + \beta_1 pb_{it-1} + \beta_2 OG_{it} + \beta_3 d_{it-1} + \beta_4 Inf_{it} + \beta_5 Exrate_{it} + \beta_6 Open_{it} + f_i + \mu_{it} \quad (11)$$

Where; f_i refers to the unobserved country fixed effects, Inf_{it} is inflation, $Exrate_{it}$ is the exchange rate, and $Open_{it}$ shows trade openness for country ***i*** in period ***t***.

4.2.3 Estimation Procedure of Fiscal Reaction Function

Equation (11) is likely to encounter strong correlation problems arising from lagged primary balance and the debt ratio sharing common unobserved country-specific characters captured by $\boldsymbol{f_i}$. The study, therefore, conducts an augmented residual test for endogeneity also called Durbin–Wu–Hausman (1978) test to correct for correlation among regressors. In performing this test, the residuals of the endogenous explanatory variable are expressed as a function of the regressors of the primary model. The Hausman specification test examines whether the country specifics stochastic variable is uncorrelated with other independent variables in the model. The existence of correlation means a rejection of the null hypothesis and a violation of the Gauss-Markov OLS assumption of Best Linear Unbiased Estimate (BLUE).

Also, the primary balance could render lagged debt endogenous since primary deficit could be financed through borrowing. Continuous borrowing also increases the debt stock hence creating simultaneity bias for the model specified in equation 11. The study addresses this by employing the standard fixed and random effects mostly appropriate for static models and the Generalised Method of Moment (GMM) technique; best known for dynamic[8] models. Their differences emanate from their respective abilities to solve endogeneity problems. For instance, the fixed effect model examines heterogeneity with the assumption that the individual effects correlate with other regressors. Random effect, on the other hand, assumes individual heterogeneity does not correlate with other independent variables in the model. To choose between fixed effects or random effects require conducting a Hausman test of no correlation between explanatory variables and the individual heterogeneity against the

[8] A model is dynamic when it includes among the regressors the lag of the respondent variable on the other hand is called a static model.

alternate hypothesis of the existence of correlation. A rejection of the null means choosing fixed effect over random effect and vice versa. Base on the results of the Hausman test, other diagnostic tests (such as F test for fixed-effect model or Breush-Pagan test for random effect model) of heterogeneity bias is conducted.

Equation (11) is dynamic due to the inclusion of the lagged dependent variable among the regressors. This characteristic renders both fixed and random effects inconsistent estimators. This is because of their inability to fully solve the endogeneity problem between primary balance and its' lag. Even though the fixed effect model can control for the country-specific and time-invariant determinants of primary balances (f_i) for within transformation, the endogeneity bias will persist once a lagged dependent variable is an explanatory variable as shown below:

From $pb_{it} = \beta_1 pb_{it-1} + \beta_2 OG_{it} + \beta_3 d_{it-1} + f_i + \mu_{it}$

Letting X_{it} represent state variables (such as output gap and debt ratio) and post-subtracting the first difference of the respective variables yields:

$$pb_{it} - pb_{it-1} = \beta_1(pb_{it-1} - pb_{it-2}) + \beta_t(X_{it} - X_{it-1}) + (f_i - f_i) + (\mu_{it} - \mu_{it-1}) \quad (12)$$

For simplicity, equation (12) can be rewritten as;

$$\Delta pb_{it} = \beta_1 \Delta pb_{it-1} + \beta_t \Delta X_{it} + \Delta\mu_{it} \quad (13)$$

Clearly, the within endogeneity has been eliminated by the fixed effects transformation, but the error term remains correlated with the lagged respondent variable. That is;

$\Delta\mu_{it} = \Delta\mu_{it} - \Delta\mu_{it-1}$ and $\Delta pb_{it-1} = pb_{it-1} - pb_{it-2}$ Hence corr$(\Delta\mu_{it}, \Delta pb_{it-1}) \neq 0$

It can be verified clearly that a new endogeneity problem emanating from the correlation between the lagged regressor (Δpb_{it-1}) and the stochastic error term($\Delta\mu_{it}$) is created.

To address this issue, the study employs the Generalised Method of Moment (GMM) proposed by Arellano and Bond (1991). This technique is capable of correcting for both endogeneity biases and ensures the randomness of the disturbance term to obtain consistent estimates. GMM maintains that additional instruments can be obtained upon the utilization of the orthogonality conditions (validity of instruments) that exist between the lagged dependent variable and the disturbance. A key property of the GMM is the assumption that the preferred instruments required to ensure consistent estimator are 'internal'. Thus the model generates the instruments from the lagged dependent variable. This quality makes it more efficient estimator than the Anderson-Hsiao Instrumental Variable estimator (Baum 2013). This is illustrated below:

From $\Delta pb_{it} = \beta_1 \Delta pb_{it-1} + \beta_t \Delta X_{it} + \Delta\mu_{it}$

We introduce higher lags as instruments for the lagged dependent variable. i.e.

$$pb_{it} - pb_{it-1} = \beta_1(pb_{it-2} - pb_{it-3}) + \beta_t(X_{it} - X_{it-1}) + (f_i - f_i) + (\mu_{it} - \mu_{it-1})$$

Simplifying and rearranging gives;

$$\Delta pb_{it} = \beta_1 \Delta pb_{it-2} + \beta_t \Delta X_{it} + \Delta\mu_{it} \qquad (14)$$

Where, $\Delta\mu_{it} = \Delta\mu_{it} - \Delta\mu_{it-1}$ and $\Delta pb_{it-2} = (pb_{it-2} - pb_{it-3})$ Hence Corr($\Delta\mu_{it}$, Δpb_{it-2}) = 0 showing zero correlation between the random component and the lagged dependent regressor and stochastic term is completely random.

Unit Root Test

A potential weakness associated with the Arellano-Bond (1991) GMM estimator is the possible correlation between the endogenous variable and the instrument especially if it has a unit root and follows a random walk with a stochastic trend (Arellano and Bover, 1995). In other words, as the variables get farther apart in time, the correlation between them becomes smaller and smaller rendering higher lags inappropriate instrument. To investigate the existence of unit roots, the study adopts the Im, Pesaran and Shin (IPS) (2003) unit root test for panel data which follows the Augmented Dickey-Fuller test procedure. The IPS is chosen because it does not require a strongly balanced panel data or impose finite restrictions on panel unlike the Levin-Lin-Chiu and the Fisher-type panel unit root tests respectively.

The presence of unit roots signifies weak instruments. To correct these problems, the system GMM recommended by Blundell and Bond (2000) which is an improved technique capable of avoiding finite sample bias due to weak instruments is estimated. With this model, levelled and differenced equations are specified simultaneously using lagged first differences as instruments for the level equation (original model) and lagged levels as instruments for the differenced equation. This transformation procedure can perform a decomposition technique for both the 'within-group' and 'between-group' variation necessary to implement moment conditions implied by the model to ensure the free random of the stochastic term.

Test for Validity of Instruments

System GMM requires the use of instrumental variables, it is particularly vital to test for the validity of these instruments for identification purpose. The study uses the Sargan Test for over-identification to investigate the validity of the instruments. The null hypothesis of valid over-identifying restrictions is tested against the alternative of invalidity. Failure to reject the null hypothesis indicates the validity of all instruments employed. The underlying reasons for using the over-identification test technique are due to the following;

i. To ensure there exist at least as many instruments as endogenous explanatory variables. When there are many instruments as endogenous variables, the model is said to be justified. If the number of instruments exceeds the endogenous variables, the model is classified as over-identified. On the other hand, where they are less than the endogenous variables; the model becomes under-identified.

ii. To make use of multiple lags especially in the GMM estimator.

iii. To specify the appropriate instruments necessary for the differenced and level equations in the System GMM estimator.

Serial Correlation Test

The use of higher lags of the respondent variable as instruments hinges critically on the assumption of no autocorrelation in the initial disturbance term. However, if the assumption of serial dependence in the random term is unwarranted then the residuals of the differenced equation should not depict significant second-order Auto-regression [AR(2)] behaviour. This is because obtaining a significant AR(2) statistics will suggest that the second lags of the endogenous variables cannot be used as instruments for their present values.

As such to investigate serial correlation in the random component, the study makes use of the Arellano and Bond test (1991) for serial correlation in the original error terms. This test is chosen because it takes into consideration the stochastic error term of the first-difference model. An important feature of this test is its ability to specify the lag limits to be included in the system GMM. Windmeijer (2005) suggests that for dynamic panel data with finite samples, it is advisable to apply what he called “a finite sample correction” to the standard errors obtained through a two-step dynamic analysis. In line with this, the study estimates the model using the two-step system GMM with “finite sample corrected” robust standard errors.

Heteroscedasticity Test

A key assumption of the classical linear regression is constant variance. To check for variance equality, the study performed the Breusch-Pagan / Cook-Weisberg Test for Heteroscedasticity. This technique tests the null hypothesis of equality in the variances of the error against the alternative that they are a multiplicative function of one or several variables. A significant chi-square indicates that the variances of the error terms are not homoscedastic. Where heteroscedasticity exist, the model will be estimated using robust standard errors.

4.3 The Debt Sustainability Threshold Estimator

The sustainability position of the fiscal reaction function depends on the existence of a threshold to serve as a base for debt-to-GDP ratio comparison. The literature accommodates different approaches in estimating the debt threshold. The most widely used is the signalling method which estimates the threshold level to segregate between debt stability and debt distress period (see, Reinhart et at., 2003; Siddique et al., 2016; Baharumshah et al., 2017). However, this approach faces setbacks with regards to inappropriate variables interactions and lack of robustness tests (Baldacci et al., 2011). To address the issue of debt sustainability, the study follows Hansen (2000) to estimates a debt threshold. The uniqueness of this approach is its ability to test the hypothesis of whether there exists a non-linear correlation between the public debt-to-GDP ratio and the sovereign risk premium (Belhocine & DellErbra, 2013).

The estimated benchmark provides a cautioning signal to policymakers in SSA regarding the degree of risk sustainability while necessitating the need to undertake robust fiscal

consolidation and debt stabilisation (Ngan, 2018). Following Hansen (1999), we specify a multiple panel threshold estimator[9] as follows:

$$y_{it} = f_i + \beta'_1 X_{it} I(q_{it} \leq \gamma_1) + \beta'_2 X_{it} I(\gamma_1 < q_{it} \leq \gamma_2) + \beta'_3 X_{it} I(\gamma_2 < q_{it}) + \varepsilon_{it} \quad (15)$$

Where: $I(.)$ Is the indicator function; $\boldsymbol{y_{it}}$ is the dependent variable; f_i is the country specific effect; q_{it} is the threshold variable; $\boldsymbol{\gamma}$ is the threshold value ordered such that $\boldsymbol{\gamma_1 < \gamma_2}$; $\boldsymbol{X_{it}}$ is a (k x 1) vector of exogenous variables; $\boldsymbol{\beta = (\beta_1, \beta_2 \beta_3)'}$is the regime parameters[10] and ε_{it} the random error component assumed to be independently and identically distributed (iid) with zero mean and finite variance $\boldsymbol{(0, \sigma^2)}$.

4.3.1 Estimation of the Threshold

The threshold value $\boldsymbol{\gamma}$ is estimated over a subset of the threshold variable $\boldsymbol{q_{it}}$ rather searching over the entire sample size by restricting the range within the intervals $(\boldsymbol{\gamma, \overline{\gamma}})$ which are quantiles of $\boldsymbol{q_{it}}$ (Wang, 2015). $\boldsymbol{\gamma's}$ value is therefore the least square minimization of the concentrated sum of squared residuals (SSR) [11] i.e.;

$$\hat{\gamma} = argmin\, S_i(\gamma) \quad (16)$$

Hansen (1999) showed that $\boldsymbol{\hat{\gamma}}$ is a consistent estimator for the true value $\boldsymbol{\gamma}$ and that the best way to test their equality is to construct a confidence interval with the "no rejection region" approach using the likelihood-ratio test statistic. However, the presence of extreme values in the data may render the threshold value unreliable; as such to implement the minimization process, we sort distinct values of the observations on the threshold variable using the bootstrapping outlier detection process (see Hansen, 1999; Martin & Robert, 2006; Wang,

[9] Where there exist a single threshold eqn (8) becomes: $\boldsymbol{y_{it} = f_i + \beta'_1 X_{it} I(q_{it} \leq \gamma) + \beta'_2 X_{it} I(q_{it} > \gamma_2)}$

[10] For identification of the regime parameters, the regressors must not be time invariant. The threshold variable is also assumed to be time invariant.

[11] If the threshold value(s) is/are known, the slope parameters $(\beta_1, \beta_2 \beta_3)$ of equation (8) can be estimated using the least squares estimator. However if (γ_1, γ_2) are unknown, the estimation of $(\beta_1, \beta_2 \beta_3)$ becomes nuisance. See Hansen (1999): http://www.ssc.wisc.edu/&bhansen/ for the functional forms.

2015). The extreme values are eliminated with the remaining N samples constituting the values from which the $\hat{\gamma}$ is estimated.

4.3.2 Identifying the Number of Thresholds

Testing for threshold effect is the same as testing for equality in coefficients for each regime (Wang, 2015) and level of linearity (Hansen 1999; Wang, 2015). Once the sequential estimator is consistent, the threshold is estimated as follows (Bai, 1997; Bai and Perron, 1998; Wang, 2015):

Step 1: Fit the single-threshold model to obtain the threshold value $\boldsymbol{\gamma_1}$ and the SSR $\boldsymbol{S_1(\hat{\gamma}_1)}$

Step 2: The null hypothesis of no threshold is test against the alternative of a single threshold using the F test. If F_1 rejects the null of a zero threshold, a further test of a multiple threshold must be estimated.

Step 3: Given $\boldsymbol{\hat{\gamma}_1}$, fit the second threshold $\boldsymbol{\hat{\gamma}_2}$ model and its confidence interval to obtain $\boldsymbol{\gamma_2}$ and the SSR $\boldsymbol{S_2(\hat{\gamma}_2)}$. At this stage, the hypothesis of a single versus double thresholds is determined. The null hypothesis of a single threshold if rejected favours that of double thresholds if F_2 is significant. The F-statistic is constructed as:

$$\boldsymbol{F_2 = \frac{\{S_1(\hat{\gamma}_1) - S_2(\hat{\gamma}_2)\}}{\hat{\sigma}^2_{22}}}$$

Step 4: Use the bootstrap on the critical values of the F statistic to test the significance of the threshold effect approximate to the asymptotic p-values. To do this, obtain the residuals under the alternative hypothesis by holding the regressors and threshold variable fixed in repeated samples.

4.3.3 The Bootstrap Procedure

Hansen (1996; 1999) showed that the bootstrap process attains the first-order asymptotic distribution such that p-values and confidence interval constructed are asymptotically valid. Given the panel nature of the data, the following bootstrap procedures are recommended:

A. Fit the model under H_a of threshold present and obtain the residual $\widehat{\varepsilon_{it}}$.

B. Make a cluster resampling $\widehat{\varepsilon_{it}}$ with replacement to obtain the new residual $\widehat{\mu_{it}}$

C. Generate a new series under the H_a data generating process where the parameters can take arbitrary values

D. Fit a new model under the H_0 and H_a and compute the likelihood ratio statistic F

E. Repeat this procedure a large number of times and calculate the percentage of draws for which the simulated statistic exceeds the actual.

From equation (15), we model the sustainability position by establishing the functional relationship between sovereign risk of default (SRD_{it}) defined as stock of government obligation in default and the debt ratio ($Debt_{it-1}$) (Blanchard, 2004; Ngan, 2018) given threshold values ($\boldsymbol{\gamma_1}, \boldsymbol{\gamma_2}$), as follows:

$$SRD_{it} = f_i + \emptyset_1 Inf_{it} + \emptyset_2 Exrate_{it} + \emptyset_3 OG_{it} + \beta_1 L.GrosDebt_{it} I(Debt_{it-1} \leq \gamma_1) + \beta_2 L.GrosDebt_{it} I(\gamma_1 < Debt_{it-1} \leq \gamma_2) + \beta_3 L.GrosDebt_{it} I(\gamma_2 < Debt_{it-1}) + \varepsilon_{it} \quad (17)$$

Where inflation (Inf_{it}); exchange rate ($Exrate_{it}$); output gap (OG_{it}) and lag gross-debt ($L.GrosDebt_{it}$) are additional regressors included to avoid the possibility of spurious correlations resulting from omitted variable biases. The slope parameters of major interest are those on $L.GrosDebt_{it}$ switched between each regime.

4.4 Variable Description

This section provides a detailed explanation of the variables employed in both the fiscal reaction function and the threshold model. Their various expected interactions with the respondent variables are clearly stated to give some preliminary relationship between the dependent variables and the various regressors. It begins with the explanation of the variables in the fiscal reaction function followed by the threshold estimator model.

4.4.1 Dependent Variable

Primary Balance

The IMF (2014) defines primary balance as the sum of net lending / borrowing [surplus (+) or deficit (-)] and net interest payable (interest expense less interest revenue). Specifically, it is the difference between overall governments' expenditures and revenues per period. Primary balance is chosen as a respondent variable because of its ability to evaluate; automatic stabilizers, policy discretions, the effect of debt services over a business cycle, and the fact that governments control public expenditures (Shijaku, 2012; Asiama et al., 2014). To avoid any computational errors regarding cyclically-adjusted primary balance[12], the study employed the unadjusted primary balance scaled by nominal GDP. The lagged primary balance in the model accounts for consistency and countries reaction to variation in their debt stock overtime and the adverse effect on fiscal policy (Paret, 2017). A positive sign is expected for consistency in the primary balances. This will signify that countries react marginally to increase in their debt stock by pursuing contractionary fiscal policy.

[12] Cyclical – adjusted primary balance is extracted from actual primary balance using the estimation of output gap and the categories of revenues and expenditures that are sensitive to change in GDP.

4.4.2 Independent Variables

Government Debt –to-GDP ratio

Debt ratio used in the model is simply defined as the sum of domestic and external debt (including government-guaranteed debt). It is measured as the general gross government debt expressed as a percentage of GDP. It comprises of all liabilities such as currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes. It also takes into account payables that demand payment or principal plus interest payments by the debtor to the creditor except for equity. Besides, it also documents investment fund shares and financial derivatives as well as employee stock options at a stipulated date (IMF WEO, 2018). It is the major variable of interest which shows how countries react to their debt stock. It coefficient sign depicts how primary balances react to changes in government debts. Paret (2017) postulates that governments tighten their budgets when debts ratios increases resulting in contractionary fiscal policy. The study expects a significant positive coefficient of primary debt in relation to primary balance. This is because, debts enter the government intertemporal budget constraint as revenue, however, it value increases the primary deficit and require the government to run primary surpluses large enough in present values to offset its initial debt. As such an increase in the debt value must concurrently coincide with significantly increasing the primary surplus to ensure that the solvency condition[13] is met (Bond, 1998).

Output Gap

It is defined as actual GDP minus potential GDP, expressed as a percentage of potential GDP. That is;

$$OG = \frac{(GDP - GDP^*)}{GDP^*} \times 100$$

[13] The solvency condition is met when the initial debt in addition to future streams of primary expenditures are less or equal to the streams of revenue accumulated over the period.

Where; GDP^{*} represents potential GDP defined as the output level of the economy when it operates at full capacity. Output gap explains the effect of pro-cyclical and countercyclical fiscal decisions on the primary balances (IMF, 2012). Pro-cyclical occurs in situations where the government increases spending holding taxes constant or reduced. In this instance, government expenditures exceed revenues, widen the output gap and eventually lead to a primary deficit. Conversely, when the government cut down expenditures and increases or hold constant the tax revenues collected, the output gap narrows resulting in favourable primary balances (primary surplus). The study is unable to predict the expected relationship with the respondent variable mainly because of differences in business cycles among the sampled countries. As such a direct coefficient will create the indication that fiscal policy is pro-cyclical whiles an inverse relationship will mean countercyclical. In computing the potential GDP, the study employs the de-trended GDP approach calculated using the Hodrick-Prescott (1997) high-pass filter, widely called the HP filter (Celasun Debrun, and Ostry, 2006; Paret, 2017). The HP filter separates GDP into the trend and cyclical components by filtering the time series. The trend component may be deterministic or stochastic. The HP filter incorporates the Ravn-Uhlig rule to set a smoothing parameter. The Ravn-Uhlig rule sets the smoothing parameter to 1600p^4, where p is the number of periods. According to the rule, the smoothing parameter must be greater than 0. This parameter determines the stochastic cycle periods and derives the stationary cyclical components collected as the output gap.

Trade Openness

Trade openness measures the aggregate of exports and imports of goods and services expressed as a percent of GDP. There is a mixed effect of trade openness on primary balances (Combes and Saadi-Sedik, 2006). Some studies have shown a significant direct connection between trade openness and primary balances (see Edwards and Tabellini, 1991; Schuknecht,

1999) while others have demonstrated a negative relationship (Alesina et al., 1998). Nevertheless, the effect of trade openness on primary balances transmits firstly through increase income inequalities which decline governments' tax collection abilities (Alesina and Perotti, 1996; Savvides, 1998) and secondly through the reduction of government revenue in the short-run (Bevan, 1999). This arises through upsurges in openness emanating from a fall in trade tariffs. Conversely, because government revenues from trade taxes are increasing function of trade openness, a given level of tariffs may lead to primary surpluses (Lindbeck, 1976). On the other hand, if the injection of foreign supply and the resulting revenues from external payments leads to a budget surplus, trade openness correlate negatively with primary balances. Therefore there is an uncertain relationship between primary balances and trade openness.

Inflation

It is measured as the average consumer price per period (WEO, 2018). Inflation is used to control for price movement effects on debts (Asiama et al., 2014). The primary balance – inflation relationship works through the inter-temporal budget constraint, which implies that a government with primary deficit must run, in present value-terms, future budget surpluses (Hutchison & Walsh 1998). A probable mean of realising surpluses is to adjust the revenues from seignorage upwards, to boost public expectations of future money growth (Solomon and Wet, 2004). In this instance, inflation will have a direct effect on outstanding debts, tax revenues and expenditures. The major challenge associated lies in the fact that the time of tax obligations' accrual and the time of actual payment do not coincide with payment usually made at a later date (Lane, 1997). Therefore, high inflation during such a time lag reduces the real tax revenues and increases the primary deficit (Solomon and Wet, 2004). Inflation is expected to have a negative relationship with primary balances. Thus, an increase in tax revenue through seignorage will result in a reduction in the primary deficit.

Exchange Rate

The exchange rate here refers to the rate of a domestic currency in terms of foreign country's currency. It is measured in National Currency per U.S. Dollars of all countries under study (IMF WEO, 2018). Exchange rate controls for persistent depreciation on the fiscal position regarding external debt services and the pass-through effect on primary balances (De Mello, 2008). Studies on debts sustainability analysis have shown that inconsistency may arise in the findings due to external shocks and currency fluctuations (Asiama et al., 2014; Baharumshah et al., 2017). As such to account for external shocks affecting all the countries in the sample and robustness in the threshold model, the study treated the exchange rate as an explanatory control variable.

Sovereign Risk of Default (SRD)

This takes into account stocks of government obligations in default, including bonds and other marketable securities, bank loans, and official loans in default (CRAG database). It is treated as a respondent variable in the non-linear threshold model for each regime Ngan (2018). It is anticipated to marginally rise with the debt stock until the debt-to-GDP ratio attains a maximum threshold level. According to Reinhart et al., (2003) because developing economies are more likely to default their debt servicing obligations, sovereign risk of default respond significantly positive and strong to the debt ratio. Table 4.1 below summarises these variable with their prior expectations.

Table 4. 1: Summary of Variables And Their Expected Signs

Variable Name	Indicator	A priori sign	Source
Fiscal Reaction Function:			
Dependent variable:			
Primary balance (pb)	Primary balance per GDP		IMF / WEO
Independent Variables:			
Debt (%GDP)	Debt-to-GDP ratio	Positive	IMF / WEO
Output Gap (OG)	$\frac{(GDP-GDP^*)}{GDP^*} \times 100$	Uncertain	IMF / WEO
Trade Openness	Net Trade as a % GDP	Uncertain	IMF / WEO
Inflation	Average Consumer Price As a % GDP	Negative	IMF/ WEO
Exchange Rate	National Currency per GDP	Uncertain	IFS
Threshold Function			
Sovereign Risk of Default	SRD per GDP		CRAG

Source: Compiled by the author

4.5 DATA SOURCE

The analysis of the study is based on a balanced panel of 26 emerging economies across a 19 year period spanning from 2000 – 2018. The thesis uses data from the World Economic Outlook (WEO) database which presents the IMF analysis and projections of economic developments at the global level, in major country groups and individual countries. Sub-Sahara Africa countries are grouped into low-income, lower-middle and upper-middle-income, and high-income countries based on the World Bank's estimation of per capita income. Data are available for a broad sample of countries from 1990 to 2018. However, most Sub-Saharan economies do not have data on certain key variables prerequisite for this study prior to the year 2000, as such the data set for the study spans from 2000 – 2018. All

variables except the sovereign risk of default and exchange rate were obtained from the WEO database.

Data on the risk of default are drawn from the Bank of Canada's Credit Rating Assessment Group (CRAG) database. The group has developed a comprehensive database of sovereign risk of default. The data combine previously published data set with the current information to estimate stocks of government obligations in default, including bonds and other marketable securities, bank loans, and official loans in default. Fortunately, data on all participating economies were available and within the targeted period. Finally, the exchange rate values were obtained from the International Financial Statistics (IFS) database computed in national currency per U.S. Dollars.

4.6 RESEARCH FINDINGS

This section presents the final results of the empirical models specified above after data application. Appropriate hypotheses test are conducted using the required test techniques. The results are presented in tabular forms. Also, the findings are discussed fully and comparisons made with the existing literature to conclude.

4.6.1 Descriptive Exploration

Table 4.2 reports the univariate summary statistics of all variables specified in both the fiscal reaction function and the debt threshold function. Information provided includes the sample observations, mean, standard deviation, and the ranges of the variables for all the 27 emerging economies in Sub-Sahara Africa. The differences in observations emanate from non-availability of data points for some countries in some periods. The numbers of missing values are greatly insignificant to have a major impact on the results.

Primary balance averaged -0.96 ranging from -26.35 to 40.597. This means that on average, emerging economies in SSA run primary deficits on their domestic fiscal balances. The deviation value of 6.029 confirms that primary balance values do not disperse greatly away from their mean values within the specified period.

Table 4. 2: Descriptive Statistics of Variables Employed

Variable Name	Observations	Mean	Std. Dev.	Min.	Max.
Fiscal Reaction Function:					
Dependent variable:					
Primary balance (pb)	491	-0.9647	6.0951	-26.35	40.579
Independent Variables:					
Debt (%GDP)	488	57.6223	59.5621	0.488	513.872
Output Gap (OG)	494	-2.0608	49.9186	-389.344	393.038
Trade Openness	494	5.3055	33.5311	-87.3717	681.46
Inflation	494	187.566	468.728	2.707	5918.45
Exchange Rate	447	520.6876	936.3631	0.7048	7536.96
Threshold Function					
Sovereign Risk of Default	419	871.690	2381.647	0	30096

Source: Author's Compilation

Debt-to-GDP ratio averaged 56.52 over the range 0.488 to 513.873, deviating marginally from their mean. The wider range gives an unblemished picture that emerging economies within SSA are excessively borrowing recently than before and if debt level continues to accumulate without any proper regulation, unsustainability is possible (Kumhof, & Yakadina, 2007). Output gap shares similarities in signs with primary balance and are only distinguished by their respective values. For instance, the average value is 1.97% higher than that of primary balance. Although they both deviate from their mean, output gap diverges greatly with a wider interval from -389.34 to 393.04, giving it more room for improvement than the

primary balance in current periods. Similar to the debt ratio, trade openness, inflation, and exchange rate all have a positive mean. However, they deviate much greater from their respective averages compared to the debt ratio. Nonetheless, they all have large intervals for improvement. Sovereign risk, on the other hand, disperses greatly away from its average over a wide range. The mean value of 871.69 shows the greater likelihood of defaulting risk over the specified period.

4.6.2 Diagnostic Test Results

To ensure validity and suitability of the data used in the model, unit root, endogeneity, heteroscedasticity, autocorrelation, over-identification and other tests are conducted. Also a Hausman test which influences the choice of fixed or random effect as a base evaluation for further estimation is also conducted. This section presents the analysis of the various diagnostic tests.

Unit Root Test

Table 4.3 presents the results of the unit root test at levels following the IPS test. The null hypothesis of all panels contains unit roots is tested against the alternative of some panel being stationery. Since the p-values are not significant for the lagged primary balances, the study fails to reject the null hypothesis with or without a trend. It concludes that primary balance has unit roots and non-stationary with or without time trend. The presence of non-stationarity in the data indicates possible weaknesses in some instruments used by the differenced GMM hence require the need for the System GMM

Table 4. 3: Panel Unit Root Test Using Im, Pesaran and Shin (IPS) Test

Variable	Statistic (No Trend)	(No Trend) P-Value	Statistic (With Trend)	(Trend) P-Value
Lagged Prim. Bal	-0.1817 (-2.8741)	0.4279	-0.1194 (-3.1496)	0.4525
Debt-to-GDP	-0.7091 (-1.6833)	0.2391	1.2039 (-1.4256)	0.8857
Output gap	-2.7493 (-2.0483)	0.0030	-2.1744 (-2.0407)	0.0148
Trade Openness	-9.4225 (-4.1284)	0.0000	-11.2682 (-5.0830)	0.0000
Exchange Rate	6.4235 (-0.4524)	1.0000	0.2801 (-1.4513)	0.6103
Inflation	16.9825 (1.8352)	1.0000	5.3017 (-0.4772)	1.0000
Observations	478		478	
Number of Panel	26		26	
Number of Period	19		19	

Source: author's computation based on data from WEO, CRAG and IFS
Note: t-statistic in parentheses

Endogeneity Test

Table 4.4 presents the result of the Durbin Wu-Hausman test for endogeneity.

Table 4. 4: Durbin Wu-Hausman (DWH) Test for Endogeneity

Variable	Durbin-Wu-Hausman test	
	F – Statistic / S.E of Residuals	Prob > F
Debt / GDP	1.1e+15	0.0000
Output gap	8.7e+14	0.0000
Residual 1	8.17e-06	0.0000
Residual 2	8.66e-06	0.0000

Source: Author's compilation using data from IMF/WEO

It is deduced from Table 4.4 that the p-values of the residuals are highly significant. Therefore, reject the null hypothesis of no endogeneity and conclude that OLS is not a consistent estimator of the model.

Test for Heteroscedasticity

The result of the heteroscedasticity test is presented in Table 4.5.

Table 4. 5: Test for Heteroscedasticity using the Breusch-Pagan / Cook-Weisberg Test

Ho: Constant Variance
Ha: Multiplicative Variance
Chi2 (1) 3.66
Prob > chi2 0.0558

Source: Author's compilation using data from IMF/WEO

The outcome shows that the variance of the error term is homoscedastic at the 5% critical level as such we fail to reject the null hypothesis. This means that standard errors are unbiased predictors of the probability values and confidence intervals. Therefore the estimated sample regression model best fits the population regression line.

Reliability Test

Table 4.6 reports the variables significance, validity of instruments, and the serial correlation test for the system GMM. The success of these claims reflects the reliability of the results

Table 4. 6: Wald, Sargan and Arellano-Bond Test for System GMM

Test statistic	Null Hypothesis	Test Score	Prob value
Wald test	Explanatory variables insignificant	2797.24	0.0000
Sargan test	Over identifying restrictions are valid	20.936	1.0000
Arellano–Bond test:	No autocorrelation		
Order 1		-2.371	0.0177
Order 2		1.697	0.089

Source: Author's compilation using data from IMF/WEO.

The study rejects the null hypothesis of the Wald test and concludes that, all explanatory variables are significant with good predictive content. The Sargan over-identification test shows a probability value of certainty, clearly indicating that all instruments are valid. Also, the Arellano-Bond test shows no autocorrelation at the 5% significance level in order 1 and 10% at order 2.

4.6.3 Panel Results of the Fiscal Reaction Function

Table 4.7 reports the final results of the fiscal reaction function estimated using the system GMM. The findings are fully discussed with the necessary comparison made with the literature

Table 4. 7: Panel Results of the Fiscal Reaction Function

Regressand: Primary Balances	Coefficient	P-Value
Regressors:		
L.Primar Balance	0.4393 (0.0134)	0.000***
Debt(%GDP)	0.0255 (0.0052)	0.000***
Output gap	0.0073 (0.0019)	0.000***
Inflation	-0.0024 (0.0016)	0.988
Exchange Rate	-0.00096 (0.0001)	0.379
Trade Openness	-0.0033 (0.0003)	0.000***
Constant	-1.9399 (0.2124)	0.000***
Time Dummies: Yes	*Obs.: 464*	

Source: Authors' estimations using data from WEO and CRAG database; standard error in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The coefficient of lagged primary balance means that previous government net borrowing in addition to net interest payable directly increase current primary balance by 43.93% all things

being equal. This is akin to the works of Paret (2017), Cevik & Teksoz (2014), and Jooste *et al*., (2011) who found a similar average persistent relationship for emerging markets economies. Similar to those obtained in other studies for emerging economies' fiscal reaction function (see Celasun et al., 2006; Cevik & Teksoz, 2014; Paret, 2017).

The debt-to-GDP ratio, a major variable of interest showed a positive relationship with the respondent variable. The statistically significance of the degree of responsiveness indicates that, countries' fiscal policy is sensitive to debt changes and that governments pursues fiscal contraction when the debt ratio increases (Bohn, 1998; Paret 2017). The magnitude of the coefficient indicates that a percentage increase in the debt ratio increases primary deficit by 2.55 percentage points. Alternatively, a percentage fall in the debt ratio will cause the primary deficit to decrease by 2.55%. Intuitively, this means that the government must run primary surpluses of 2.55% or more in the present value to offset the initial wealth in debt. This is so because governments end up paying huge interest expenditures accumulating from the large debt burden suggesting mandatory actions to either reduce expenditure or raise revenue to counteract the rise in debt.

The results also display a significant direct relationship between the output gap and primary balances. Therefore, with 90% confidence, the study found that fiscal policy is pro-cyclical. Intuitively, as the gap between actual and potential GDP narrows fiscal policy becomes favourable. Conversely, where the gap widens fiscal policy becomes unfavourable. The results contradict the works of Budina and Wijnbergen (2008); Bergman and Hutchison (2015); and Ilzetzki and Végh (2008) who used similar definition for primary balances but found a negative relationship between primary balance and output gap for some selected emerging economies. The difference in the relationship is because majority of the developing economies in SSA run deficits on their primary balances (Celasun et al., 2006). However, a

percentage increase in trade openness brings about a marginal decline of 0.33% in primary deficits. Thus, the injection of supply and revenues from foreign payments leads to a temporal budget surplus, causing trade openness to correlate negatively with primary balances (Combes & Saadi-Sedik, 2006). The results relate to the findings of Alesina and Perotti, (1996); Savvides, (1998) but parallel to Edwards and Tabellini, (1991); Schuknecht, (1999).

4.6.4 Results and Discussion of the Debt Threshold Regression

To achieve the third objective of this study, the threshold model specified in equation (17) was subjected to sequential multiple threshold test using the least square estimate. This section parades the estimated results and discussion in detail.

Test for Threshold Effect and Linearity

To determine the number of thresholds and nature of the threshold model, a bootstrap test effect was conducted. The resultant F test statistics along with their bootstrap p-values are presented in Table 4.8.

Table 4. 8: Test for Threshold Effect

Test Type	F-Statistic	P-value
Single Threshold	31.40	0.0767*
(RSS/critical values)	(1.16)	(10%)
Double Threshold	50.89	0.0300**
(RSS/critical values)	(1.04)	(5%, 10%)
Triple Threshold	19.75	0.3933
(RSS/critical values)	9.95	(Not Sig)

Source: Authors' computations; bootstrap of 300 replications were used to ascertain the p-values in order to test for the number of thresholds and linearity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; *RSS is the Residual Sum of Squares*

We reject the null hypothesis of no threshold at 10% significance level with a bootstrap p-value of 0.0767 for the alternative of a single threshold. Also, the F-test for a double

threshold is highly significant at 5% indicating a non-linearity with p-value of 0.0300. However, the triple threshold test was not statistically significant at all levels. We therefore conclude that there exist a threshold and the regression model is non-linear.

Threshold Estimate

Table 4.9 reports the respective threshold value and confidence interval necessary to predict the risk of defaulting public debt burden among emerging economies in SSA.

Table 4. 9: Threshold Value and Confidence Interval Estimate

Estimate	Threshold Value	Confidence Interval
Linear Threshold	18.94	(18.892 – 19.1430)
Non-linear Threshold	17.95	(17.5335 – 19.4820)
F (25, 434) = 4.89	*Prob > F= 0.0000*	

In constructing the confidence interval for the threshold estimate, the errors are assumed to be independent and identically distributed.

Table 4.9 reports the results of the threshold values for the two statistically significant point estimates shown in Table 4.8 along with their 95% confidence interval. The linear threshold estimate revealed a threshold value of 18.94 which is larger than the non-threshold value of 17.95. But the non-linear threshold estimate gives a higher statistically significant p-value with larger confidence interval which makes the threshold value a consistent estimator and best predictor of the true value (see Hansen 1999; Wang 2015; Seo and Shin 2016). Hence our subsequent analysis will base strongly on the double threshold effect. The threshold value disintegrates the sovereign risk of defaulting debt into low and high regimes as shown in Table 4.10. By comparison the threshold's value and range are smaller than the 35 to 55 percent proposed by the IMF / World Bank debt sustainability framework which has been proven by Kidochukwu (2015) to be not growth supportive but rather act as a binding growth constraint which leaves the economy with growth gaps. In relation to sustainable development, Kidochukwu (2015) re-defined a sustainability threshold range of 13 to 29

percent for developing economies and 14.5% specifically for Nigeria which is consistent with the current study.

4.6.5 Threshold Regression Results

Table 4.10 reports the estimate of the threshold regression model. Substituting the threshold value into the sovereign risk model puts the debt limit into two main regimes namely; high and low debt regimes. At the low regime, there is less likelihood of debt default and sustainability is possible. The high regime on the other hand, is characterised by a high risk of default and unsustainability.

Table 4. 10: Threshold Regression Estimates

Regressand: Risk of Default	Coefficient	P-Value
Regressors:		
Inflation	-0.8878 (0.2634)	0.001***
Exchange Rate	-0.0323 (0.1704)	0.847
Output gap	-0.5922 (1.3988)	0.672
Debt Regime:		
$L.GrosDebt_{it} I(Debt_{it-1} \leq 17.95)$	36.7709 (5.6902)	0.000***
$L.GrosDebt_{it} I(17.95 < Debt_{it-1})$	14.3213 (3.7045)	0.000***
F (25, 434) = 4.89	*Prob > F= 0.0000*	

Source: Authors' estimations using data from WEO and CRAG database; bootstrap standard errors in parentheses adjust for outliers. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Akin to Hansen (1999) and Bick (2010), each regime contains at least 5% of all observations.

Inflation has a highly significant inverse relationship with the risk of debt default. Intuitively, a decline is inflation (i.e. cost of borrowing) motivates economies to secure more loans leading to debt growth with interest accruals, piling up the debt burden and increasing the risk of default. Nonetheless, coefficients of primary interest are those on the debt regimes. The estimates suggest direct and highly significant relationship between sovereign risk of default

and the total debt ratio in each regime. Similar to Wang (2015) and Seo & Shin (2015) economies with the highest debt levels have the least coefficient magnitude (of 14.3213) as against those with lowest debt levels (of 36.7709) but the economic intuition is clear. Since the ability to borrow among these developing economies is low, very few mostly the oil exporting economies that are capable of honouring their current and future debt services obligations in full, without recourse to further debt relief or rescheduling their debt burden with the associated interest secure huge sum of loans with less risk averse of defaulting payments. Donors on the other hand prefer contracting loan agreements with these countries because they believe that their probability of default is quite lower than the non-oil exporting developing economies.

Countries with their average debt ratio below the threshold value can continue to finance fiscal expenditure through borrowing since they have lesser rate of default. On the other hand, those with average debt ratio greater than the threshold value have a greater risk of debt default and must regulate their debt stock very well to avoid overhang problems. Table 4.11 below shows the average debt ratio for each emerging economy in SSA compared to their risk of defaulting threshold over the sampled period.

Table 4. 11: Risk of Default Threshold Value and Debt-to-GDP ratio Comparison

Threshold Value	**17.95**
Country	Average Debt/GDP(%)
Angola	51.17
Benin	35.30
Botswana	13.18
Burkina Faso	30.83
Cabo Verde	90.94
Chad	39.08
DR Congo	70.45
Congo Rep	105.28
Equatorial Guinea	16.64
Ethiopia	64.02
Ghana	59.91
Kenya	49.49
Lesotho	48.79
Liberia	201.77
Malawi	56.47
Mali	36.26
Mauritius	51.92
Mozambique	70.48
Niger	50.26
Nigeria	22.64
Rwanda	48.19
Sierra Leon	75.49
Sount Africa	39.56
Tanzania	33.43
Uganda	40.45
Zambia	78.01

Source: Authors Computation Using Data from IMF/ WEO

Only Botswana and Equatorial Guinea have their average debt ratio below the threshold valu and thus have the least probability of debt default. Nonetheless, the remaining nineteen (19) countries face a high probability of default and unsustainability. Countries such as Cabo Verde, Congo Republic, Liberia and others with average debt ratio over 50 percentage points may have to find other alternative means of financing fiscal expenditures other than debt financing.

Figure 4.1 provides a clear picture for the distribution of average debt-to-GDP around the respective threshold value.

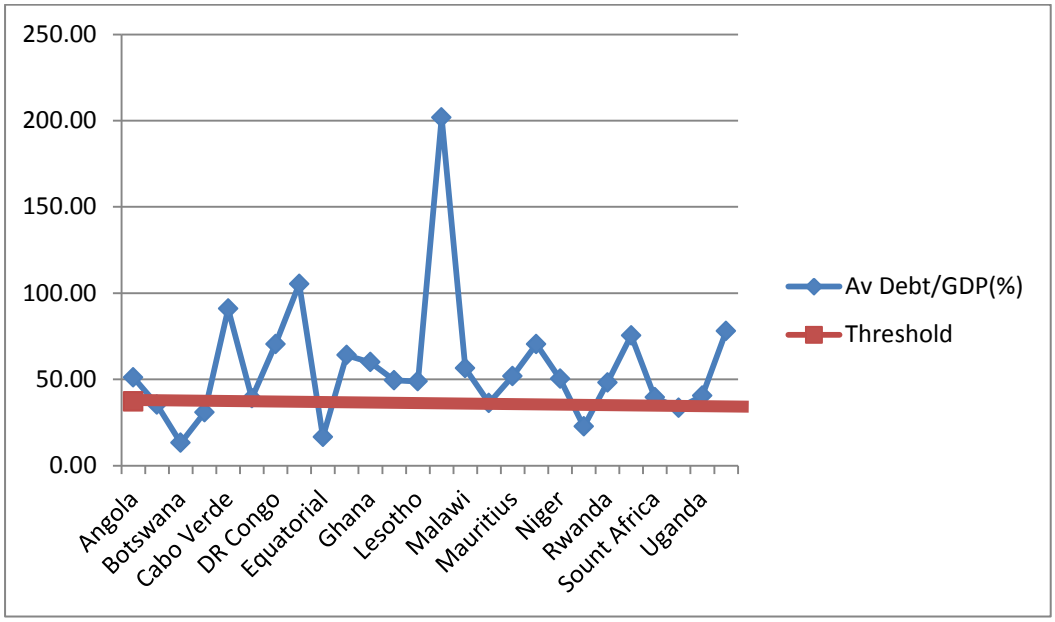


Figure 4. 1: Average Debt-to-GDP Ratio with Threshold value

Source: Authors Compilation Using Data from IMF/ WEO

As displayed by Figure 4.1, the majority of these economies have their debt ratio far exceeding the threshold value. Obviously, debt ratio peaking over 200% for Liberia gives enough evidence to suggest that Liberia should desist from borrowing to finance fiscal expenditures going forward. Figure 4.2 shows the sub-regional distribution of average debt and the threshold. It can be seen that, on average West African economies have huge average debt-to-GDP which are less sustainable, followed by Central African Economies compared to other sub-regions. This is mainly as a result of the huge accumulated debt burden by Liberia and the Democratic Republic of Congo respectively.

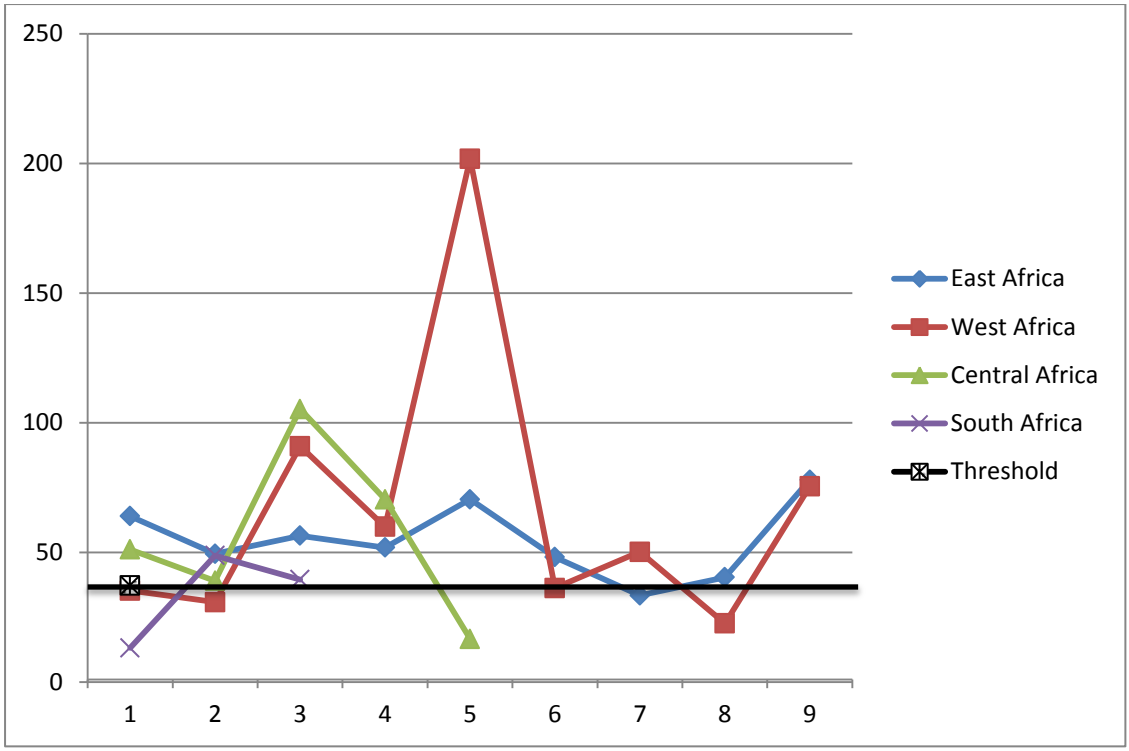


Figure 4. 2: Sub-Regional Breakdown of Average Debt-to-GDP Ratio

Source: Authors Compilation Using Data from IMF/ WEO

It must be emphasised that not all economies with average debt ratio exceeding the threshold range will default their debt payments. However, excessive accumulation and improper management of debt will cause unsustainability in the next millennium.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 Summary and Conclusion

This thesis examines the risk associated with debt accumulation for emerging economies in Sub-Saharan Africa during the pre and posts debt relief initiative eras. The debt-to-GDP trends in the early 1980s are studied to analyse the long-term perspective whiles current period situations (post-HIPC and MDRI initiatives) are greatly assessed in detail. The long-run analysis provides enough evidence to conclude that on aggregate, the debt growth in SSA has improved significantly in recent times compared to the circumstances prevailing since the mid-1980s till early 2000s. These improvements are highly attributed to the debt relief programmes (which ended in 2009) as well as the significant growth of most countries within the region into emerging market economies (Battaile, Hernandez, & Norambuena, 2015).

Ex-post the debt relief initiative (HIPC and MDRI), most emerging economies in SSA started accumulating high debt especially after the 2008 financial crises and hence increased the risk of unsustainability in future. This comes as a result of most SSA countries running huge fiscal deficit due to unfavourable current account balances. This posed a major defect to the financing and attainment of state and global development objectives such as the Sustainable Development Goals (SDGs). In comparison to recent developments, some emerging economies in SSA took advantage of the improved financial conditions prevailing in the international capital markets as well as the commodity price surge to issue interest-bearing bonds to raise revenue from the foreign market. However, due to the rate of volatility in the

global economy coupled with loose monetary positions in most advanced economies, it resulted in huge debt build-up which may not be sustainable.

This study examines the debt sustainability of emerging economies in Sub-Saharan Africa. The scope of the study spans a period of nineteen (19) years from 2000 to 2018. It employed a sample of all twenty-six (26) emerging countries within the region as opined by the International Monetary Fund (IMF). The combination of the time series (19years) and cross-section of 28 cross-country require a longitudinal analysis. In line with the stated objectives, the study estimated a panel regression model to examine debt-related risks for these emerging countries using two distinct approaches namely; fiscal reaction function and a debt threshold estimator. To achieve the foremost two objectives, first, a fiscal reaction function to ascertain the effectiveness of fiscal policy to avert unwarranted debt accumulation is estimated. Whiles the third objective required a threshold estimator to investigate the ability to sustain the debt burden.

The fiscal reaction function relates primary balance to its lag, debt-to-GDP ratio, output gap, and a plethora of control variables. The model was underpinned in the famous government intertemporal budget constraint theory. The dynamic nature of the model required the estimation of a Generalised Method of Moment (GMM). System GMM rather than difference GMM was examined due to the presence of Weak Instruments in the difference GMM estimator. The findings show that lagged primary balances have a significant direct effect on current primary balances. This means that past borrowings and their adverse interest payments either domestic or international can influence the stance of the fundamental fiscal balances. More importantly, the results indicate a positive and statistically significant relationship between the primary balance and the debt ratio. This suggests that as governments continue to finance fiscal budget through borrowing, they worsen their debt-to-GDP ratio and persistently run primary deficits leading to debt overhang problems.

Moreover, the outcome also demonstrates countercyclical repercussions of fiscal policy emanating from the positive relation between primary balance and the output gap. As suggested by previous studies, developing countries mostly run primary deficits. This makes it possible for the ambiguity surrounding output gap and primary balance be broken. Thus, any percentage rise in output gap reduces the primary deficit by the resultant coefficient, all things being equal.

Further, the study modifies the Hanson's threshold estimator to predict sovereign risk of debt default. As a result, we test for unison threshold and the nature of the threshold variable using the bootstrapping critical values. The results showed a direct relationship between primary deficit and the debt ratio. Output gap on the other hand directly determined primary balances and was shown to follow pro-cyclical fiscal policy for emerging economies in SSA. Also, it indicated the presence of non-linear threshold effect with a threshold value of 17.95% of GDP. This means that if the average threshold value of these emerging economies exceeds 17.95%, there is the greater likelihood of default. Both the low and high regimes showed direct t relationship between sovereign risk premium and the debt ratio. This means that huge debt accumulation highly increases the probability of default.

5.2 Policy Recommendation

In most cases, it is the fundamental responsibility of sovereign borrowers to maintain debt stock on a sustainable path, yet both debtor countries and donors should formulate plans to mitigate debt crisis and make the financial systems more resilient. The following recommendations will be very useful to policymakers in achieving debt sustainability.

Firstly, the study revealed that previous government net borrowing in addition to net interest payable has a direct effect on the current primary deficit. As such, emerging countries in Sub-

Saharan Africa must exhibit fiscal discipline in public spending to reduce primary deficits. Borrowed funds must not be only channelled into recurrent expenditures such as consumables, salary and emoluments payments, loan servicing and other unproductive projects but invested in long-term projects aimed at raising enough revenue for governments. Such projects should not only compete with the private sector but also create the enabling environment for them to thrive. In this sense, they (emerging economies in SSA) can solicit for enough funds from their major donors such as IMF and the World Bank and pursue reforms aimed at solving structural imbalances in their respective economies.

Secondly, it was also found from the study that governments pay huge interest expenditures accumulating from debt financing. Therefore to avert the occurrence of any short term insolvency resulting from current interest payments developments and the wage bill, emerging economies' governments particularly those in SSA, should emphasize on securing more concessional loans such as that from the World Bank than resorting to non-concessional borrowing from the capital and money markets which come with serious debt dynamics implications.

Thirdly, the study unravelled the currency risk and high interest associated with securing loans from both external and internal sources respectively. Hence, governments must improve their domestic revenue mobilization to reduce the rate of borrowing. Low to moderate tax rate enough to broaden the tax base is highly encouraged rather than a continuous increase in the rate. The focus should be on targeting those employed in the underground economy but are not paying corporate and other taxes. All loopholes emanating from the tax administrators or payers must be identified and sealed to avoid over-reliance on debt financing budget. One easy way to follow is to develop the domestic market and help create awareness for internally manufactured goods and services. In this case, local employers will boost their faith in the government and be willing to pay taxes. Alternatively,

governments can engage the services of cooperatives and associations to directly reach out to these informal sector workers.

In addition, the research attained a pro-cyclical fiscal policy for emerging economies in SSA. As a result, policy makers must do their best to ensure macro-stability strong enough to spur investor confidence. Policies should gear towards favourable fiscal stance, independence of the central bank, stability in the exchange and inflationary rates, political tolerance, guaranteeing press freedom and terrorism, and among others. This will motivate and encourage both domestic and foreign investment, create employment, relax the burden of excess borrowing, and narrow the output gap.

Finally, to ensure fiscal sustainability in the long term, policymakers must introduce fiscal anchors like the Fiscal Responsibility Act (FRA) aimed at ensuring fiscal discipline, maintaining prudence in management and sustainable levels of public debt in the economy. The Act should outline public expenditure rules to prevent budget overruns most especially in the election periods. Currently, Ghana is the only SSA economy to pass FRA for the establishment of both the Fiscal Council and Financial Stability Council. The study recommends other emerging economies in SSA to follow suit. Meanwhile, the effectiveness of this hinges on ensuring proper coherence between the fiscal and monetary authorities.

5.3 Limitation to the Study Requiring Further Research

The ultimate goal of most developing economies is to achieve the Sustainable Development Goals (SDGs) in the shortest possible time; however, due to non-availability of data, this study could not connect the potential implication of debt sustainability and debt servicing on the achievement of SDGs. Therefore future studies can analyse the SDGs and debt

sustainability nexus by looking at the effect of the recent rise in non-concessional loans on industrialisation (SDG, 9).

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Appendix

A Test for time

Ho: No time effect

(1)	**_IYear_2001 = 0**	**(10)**	**_IYear_2011 = 0**
(2)	**_IYear_2002 = 0**	**(11)**	**_IYear_2012 = 0**
(3)	**_IYear_2003 = 0**	**(12)**	**_IYear_2013 = 0**
(4)	**_IYear_2004 = 0**	**(13)**	**_IYear_2014 = 0**
(5)	**_IYear_2005 = 0**	**(14)**	**_IYear_2015 = 0**
(6)	**_IYear_2006 = 0**	**(15)**	**_IYear_2016 = 0**
(7)	**_IYear_2008 = 0**	**(16)**	**_IYear_2017 = 0**
(8)	**_IYear_2009 = 0**	**(17)**	**_IYear_2018 = 0**
(9)	**_IYear_2010 = 0**		

F(17, 457) = 5.01 Prob > F = 0.0000

We reject null hypothesis of no time effect

B Hausman Test

	Coefficients (fe) (b)	(B)	(b – B) Difference	S.E
Primarybalance	0.44297	0.5531	-0.11011	0.016674
grossdebt (%GDP)	0.01483	0.00914	0.00569	0.003002
Outputgap	0.0036	0.0022	0.00141	-

b = consistent under Ho and Ha; obtained from the panel regression

B = inconsistent under Ha, efficient under Ho, obtained from the panel regression

Test: Ho: difference in coefficients not systematic

Chi2 test = 45.14

Prob > chi2 = 0.0000

Hence reject Ho, since difference in coefficients is systematic therefore fixed effect is more appropriate than random effect.

C Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Prim balance	1.000					
(2) Debt(%GDP)	0.028	1.000				
(3) Output gap	-0.003	-0.048	1.000			
(4)tradeopenness	0.017	0.341	-0.008	1.000		
(5) Inflation	-0.012	-0.059	-0.004	-0.027	1.000	
(6) Ex. rate	0.039	-0.132	-0.008	0.010	0.088	1.000

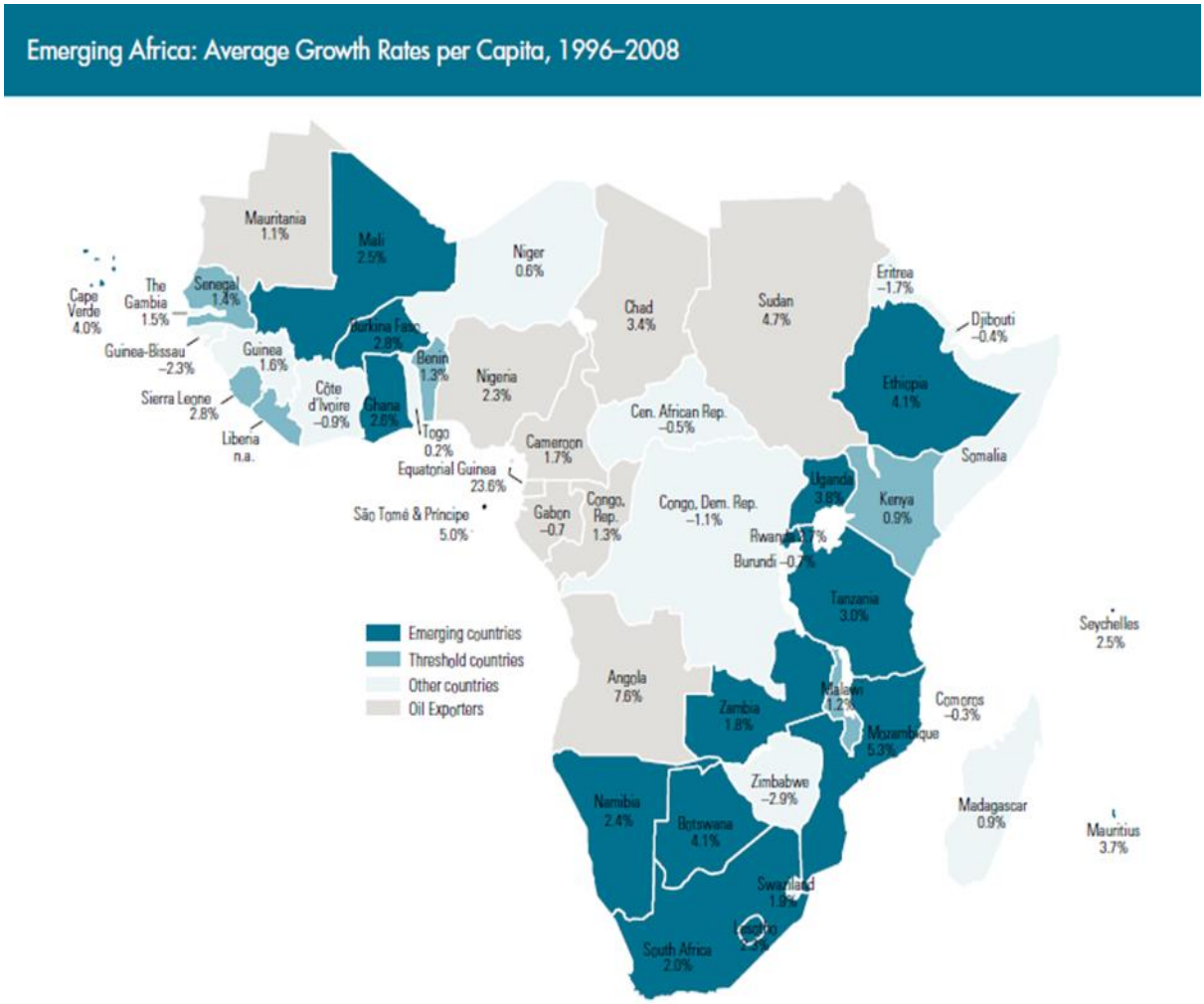
Source: Authors Computation

D Revenue Generated from Sovereign Bond

Funds Raised By Some Selected SSA Economies From The Issuance Of Sovereign Bond From The Global Capital Market ($Million)

Country	2009	2010	2011	2012	2013	2014	Total
Angola				1000			1000
Cote d'Ivoire		2330				750	3080
Ethiopia						1000	1000
Gabon					1500		1500
Ghana					750	1000	1750
Kenya						2000	2000
Mozambique					850		850
Namibia			500				500
Nigeria			500		1000		1500
Rwanda					400		400
Senegal	200		500			500	1200
Tanzania					600		600
Zambia				750		1000	1750
Total	200	2330	1500		5100	6250	17130
Source: Tyson (2015)							

E Emerging Countries in SSA



Source: World Bank, World Development Indicators; data for South African Reserve Bank.