Fiscal Rules, Fiscal Space and Debt Sustainability for Macroeconomic Stability in Sub-Saharan Africa

By

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Abstract

This dissertation investigates the role of fiscal rules for fiscal space, debt sustainability dynamics, and macroeconomic stability in economies of Sub-Saharan Africa (SSA). It is motivated on the premise that fiscal policy plays a primary role in a country's policy undercurrents, and that fiscal rules can enhance fiscal effectiveness and sustainability.

Chapter one introduces fiscal rules, fiscal space, and debt sustainability in SSA and examines the macroeconomic effects of fiscal rules on fiscal policy and their contribution to macroeconomic stability. The debate on the size of budget deficits and lack of fiscal space has shifted the focus of major macroeconomic adjustments in developed and developing economies to the fiscal sector. The experiences of debt distress and debt relief in SSA in the 1990s and recently in Euro area (Greece), offer a painful reminder of the dangers of a surging debt. The chapter argues that developing countries, particularly in Africa, have had their share of unsustainable budget deficits that have developed into major debt crises, which required subsequent debt relief packages. The concepts of fiscal rules and the space in which they operate, is fundamental for sound debt management and growth outcomes.

Chapter two offers both theoretical and empirical literature and lays the foundation for analysis undertaken in the subsequent chapters. The theoretical literature includes the deficit bias, signalling theory, common pool hypothesis, Ricardian Equivalence, time inconsistency preference, debt sustainability and compliance theory on enforcement and management.

Chapter three assesses fiscal space in SSA and further develops Aizenman's (2010) approach to fiscal space measurement. This chapter provides a simple but efficient way to measure fiscal space. The chapter estimates fiscal space as a proportion of debt to tax revenue; a measure that gives a significant channel to checking a country's capacity to meet future debt obligations.

Chapter four establishes the extent to which the economies of SSA have complied with fiscal rules. A logit model and instrumental variable probit model are used to test compliance rates over the sample period. The results show that both fiscal rules and macroeconomic factors exhibit significant effects on compliance rates.

Chapter five uses two stage least squares (2SLS) and a fixed effect model to investigate the effects of fiscal rules on fiscal space in the presence of institutions. The findings suggest that fiscal rules significantly affect fiscal space and the smoothness of fiscal adjustments. It

concludes that fiscal space is expanded by enhanced fiscal governance and a reduction of corruption.

Chapter six investigates fiscal policy and debt sustainability via a suite of techniques including: the stationarity tests, cointegration tests, Bohn's sustainability test and a Markov-switching regime test for selected SSA economies. The central finding is that fiscal policy has generally been sustainable in SSA for the period 1980-2016, but the results were sensitive to the test used. The debt and fiscal sustainability analysis are heterogeneous across countries. In particular, stationarity tests show that debt is sustainable except for Kenya and Equatorial Guinea. Applying a cointegration framework we find debt to be sustainable across countries. However, the Bohn's sustainability test returns heterogeneous results as Kenya and Nigeria debt is found to be unsustainable. Moreover, we find that Nigeria and Burkina Faso show evidence of fiscal fatigue. Under the Markov-switching framework we also find that debt and fiscal sustainability varies across countries. Nevertheless, the results suggested that the use of fiscal rules improves debt and fiscal sustainability.

Declaration

I, Martin Nandelenga, certify that this thesis I present for a Ph.D. in Economics degree at the Doctoral Degrees Board Office through the School of Economics, University of Cape Town is my own original work other than where I have cited that it is the work of others. Further, it has not been previously presented for a degree at any university.

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1. Nandelenga M. and Ellyne M. (2020). *Fiscal Rules and the Compliance debate: Why do Countries adopt Rules and fail to comply?* Economic Research Southern Africa. ERSA working paper. No. 815.

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Chapter One

Introduction

1.1 Background

The world economy for years now has experienced severe economic difficulties and financial crisis coupled with debt distress in the last few years. Fiscal responses in constrained macroeconomic environments have often brought more problems than solutions. The recent events of debt distress in Sub-Sahara Africa (SSA) and in the Euro area; particularly Greece, has reminded policy makers and academics that fiscal policy is a key instrument for fiscal prudence. In turn, the credibility of a country's fiscal policy can be called question if numerous fiscal management mechanisms are not robust. In fact, after an upward trend in debt accompanied with episodes of debt distress and debt reliefs, economists argue that these events become increasingly common and necessitate the surrender some of the policy discretions and breaking of policy rules by which fiscal policy authorities are subjected.

This thesis offers an analysis of fiscal rules (FRs) for the enhancement of fiscal space (FS) and debt sustainability. The increasing appeal of fiscal rules is reflected not only in the increased number of countries adopting fiscal rules, but also improved institutional fiscal frameworks to mitigate against deficit bias. This is reflected by numerous reforms of fiscal management undertaken by countries. In recent years, enthusiasm and activism in fiscal policy has increased, with the understanding that in most countries there is no political will to serve public interest. In monetary policy rules, like the inflation targeting, the mandate has always been precise and so far, results have been impressive. In fact, Central Banks credibility has increased and made them more transparent and accountable (Wyplosz, 2005). As with fiscal rules, they have also been made flexible and stringent with specified numeric targets. However, following various financial and debt crisis episodes in countries, questions regarding the effect and compliance of FRs have resurfaced.

In this thesis, both positive and normative evaluation of fiscal rules for fiscal sustainability using a quantitative approach are presented. We first describe fiscal rules that are applied in

literature and show their relevance to fiscal space and fiscal sustainability. We later examine the various fiscal rules that can provide possible institutional improvement to fiscal management. The thesis advances a qualified argument in favour of fiscal rules for enhanced fiscal space and fiscal and debt sustainability. There is no coincidence that fiscal policy, and specifically fiscal policy changes in form of fiscal rules and public debt sustainability, have become a research agenda in macroeconomics in the present policy debate. Generally, regarding policy making and economic debate, public debt and fiscal policy are both morally and politically influenced. The increase in public debt are often seen as dangerous which lead policy makers to constrain themselves through adoption of fiscal rules. Therefore, this thesis is premised on the understanding that the success of fiscal rules relies on the institutional framework and political conditions. The potential contribution of fiscal rules is enormous and should be accompanied by a sound institutional structure.

The creation of 'fiscal space' to help them enhance fiscal sustainability and achieve macroeconomic stability has long been a goal of modern policy makers. The theoretical framework of fiscal policy shows that there is a correlation between fiscal rules and fiscal space, that is, a reduction in public current spending creates room to finance capital investments; setting debt targets through the use of fiscal rules enhances growth; and the utilization of fiscal rules supported by fiscal institutions reduce and enhance countercyclical policy (see Ferreira and Nascimento (2005); Manasse (2006)). Despite the increasing prominence of 'fiscal space', the literature has struggled to provide a concrete definition. This is a reflection, in part, of the diversity of fiscal space landscape and the various channels and a myriad of fiscal space objectives, including but not limited to macroeconomic stabilization, investment and funding for economic development. We therefore improve on Aizenman and Jinjarak (2010) and define fiscal space as the difference between the group mean of public debt to tax revenue and actual debt to tax revenue.

The adoption and the utilisation of fiscal rules has expanded over the past three decades, however, compliance of these rules and their effectiveness in the enhancement of fiscal space and debt sustainability has received limited attention. Against this backdrop, this thesis undertakes a precise examination of fiscal rules and their effect on both fiscal space and debt and fiscal sustainability. The main interest is on fiscal rules introduced in SSA that are essentially self-imposed by governments. The context of SSA is especially appropriate as it joins the presence of indistinguishable supranational rules and national or individual country

rules. As such, we focus on SSA economies that have adopted fiscal rules in their fiscal policy management. The countries used in this study are part of the larger SSA and represents a potential experimental laboratory for fiscal rules analysis. The evaluation in this thesis may help in the understanding of fiscal rules dynamics especially in developing economies. In fact, it is now more than two decades since fiscal rules were adopted in SSA, however, there is no clear and explicit information on the compliance of the adopted fiscal rules. Similarly, the events of debt distress and the subsequent debt reliefs that followed the adoption of fiscal rules significantly affected the region's fiscal space. Moreover, several of SSA countries perform poorly on institutional ranking in comparison to their peers. As a result, this thesis, will help to shed light on the effectiveness of fiscal rules on enhancement of fiscal space and for fiscal and debt sustainability. The chronology of the current use of fiscal rules follows numerous years of efforts by the IMF and the World Bank to improve fiscal policy management for various countries.

The theoretical framework for debt sustainability is characterised by a government's response to rising debt represented by a budget constraint. In this regard, the concept of intertemporal budget constraint and No-Ponzi Game (NPG) are central to the analysis of debt sustainability. Both terms guarantee that the current amount of public debt must be compensated by the sum of discounted future primary balance to ensure that the current public debt converges asymptotically to zero. Empirical evidence and the events of the last three decades in the world economy have shown the role of government and particularly, government's ability and efficacy to counter a debt build-up is relevant. Indeed, Bohn (1998) implements the idea that explicitly studies the reaction of primary balance to arise in public debt. Accordingly, a positive relationship between primary balance and public debt signals debt sustainability. This thesis, therefore, resorts to use of several approaches to clearly provide insights to debt sustainability. Firstly, stationarity and cointegration tests are conducted and as such, the stationarity tests by Trehan and Walsh (1991) has been chosen to help address the stationarity properties of the budget deficit series. Secondly, cointegration tests by Hakkio and Rush (1991) between government revenue and spending are conducted.

Thirdly, Bohn (1998) sustainability test is implemented - to show the response of government primary balance on a rise in public debt. The above analysis is based on assumptions: stationarity of data over time, the long-run relationship between variables and a positive

response of primary balance to public debt. At the same time, country specific characteristics of the data shape the outcomes.

Fourthly, the Markov-switching regimes changes following Hamilton (1989) is conducted to identify regime shifts over time. Accordingly, the investigation in this study gives a general impression of debt sustainability conditions in SSA and argues that a sustainable public debt or fiscal policy enhances fiscal space as the costs to debt thereof are reduced. The study reveals information that might be deciphered from an economic point of view for policy purposes. Therefore, the thesis gives a clear demarcation of public debt sustainability and how the literature contributes to classify this approach into an expansive scope of sustainability viewpoint and economic perspective. Hypothetically, it is contemplated that a single debt sustainability approach may not provide enough evidence to indicate sustainability. Empirically, this thesis goes beyond the response of primary balance to public debt by introducing fiscal rules into the Bohn's sustainability tests and Markov-switching set-ups to account for fiscal policy changes over time. The outcome permits insights in government's fiscal policy decisions overtime to identify periods with emphasis on debt stabilisation and fiscal sustainability. More importantly, it allows allocation of changes in government behaviour over time.

This thesis is built as an iterative work where each step leads to the next. Each chapter is designed to be a self-sustained paper with a strong coherence between the chapters. Chapter 2 provides an exploratory analysis of the compliance of fiscal rules in SSA overtime. Chapter 3 provides the measurement of fiscal space used in this thesis and employed in the analytical approach in Chapter 4 which investigates the effect of fiscal rules on fiscal space in SSA and gives a clear explanation of the methodology and data used. Chapter 5 investigates fiscal and debt sustainability by employing techniques and gives explicit link of fiscal sustainability and fiscal space. Chapter 6 provides the conclusion and policy implications for the thesis and areas for future research.

Overall, the thesis addresses fiscal policy questions regarding fiscal rules, fiscal space, and fiscal and debt sustainability. Therefore, the thesis provides a detailed analysis of SSA's fiscal policy framework that is useful for policy makers, academics, and the research community.

1.2 Statement of the problem

Macroeconomic stability remains central to policy debates surrounding debt relief programmes such as the Highly Indebted Poor Countries (HIPC) initiative of the 1990s, the Asian crisis and the European debt overhang in which several countries received bailouts to resuscitate their economies. These episodes of fiscal distress across countries have led to countries to adopt fiscal rules to mitigate against increasing public debt. Further, the International Monetary Fund and the World Bank have continued to support country's fiscal policy initiatives in member countries with advice for use of fiscal rules to instil fiscal prudence. This has resulted in increase in the number of countries with fiscal rules from 7 in 1990 to 96 in 2016 (IMF 2018). However, despite several countries having utilized fiscal rules in their fiscal management a lot of questions have been raised about the effectiveness of these rules for the enhancement of fiscal space.

The issue of fiscal space has been the subject of policy makers and academics for years and to date the concept remains unresolved in empirical literature. Several measurements have been advanced in empirical literature. For example, Heller (2005) and Ley (2009) define fiscal space as the budgetary room for funds to enhance development and reduce business cycles, Ghosh et al. (2013) see it as the difference between debt limit and actual debt while Botev et al. (2016) opines that inadequate fiscal space results in loss of market access and fiscal unsustainability, among others. The above empirical findings affirm the lack of consensus on the measurement of fiscal space thus, suggesting that there is room for further investigation of this thematic area to improve and complement the existing literature. Further, the lack of a clear-cut measure of fiscal space has put policy makers in dilemma with regard to the choice of definition and measure to be used in determining fiscal space.

Alongside the adoption and use of fiscal rules especially in developing countries and SSA, in particular, there is no empirical evidence on the compliance of these rules and their determinants. In addition, countries have continued to undertake reforms on fiscal rules due to fiscal policy dynamics. These reforms are geared towards improvement of the fiscal rule's performance, however, without empirical evidence on rules compliance, it renders future adoption and reforms ineffective. Further, the raising public debt and fiscal distress in developing countries has constrained the fiscal space of the continent's commodity dependent economies. In fact, the limited fiscal space has led to countries inability to respond to shocks,

resulting in widening of fiscal deficits and further accumulation of public debts. The challenges associated with these are largely attributable to limited knowledge by policy makers and academics on the effectiveness of fiscal rules in presence of institutions to enhance fiscal space. The subject of fiscal sustainability in presence of fiscal rules remains limited in empirical literature especially in accounting for regime shifts. Therefore, an understanding of the efficacy of fiscal rules for fiscal sustainability and/or lack thereof under different fiscal policy regimes will be important to devise policy interventions for each particular period.

In this study we focus on sub-Saharan Africa as it serves as an interesting case study due to the relevance of this region in the global map. From the empirical literature, not much has been investigated to advance the understanding of the relationship between fiscal rules, the space required for their successful operation, and the fundamental policy questions surrounding debt accumulation and its sustainability. To the best of our knowledge, no study has been undertaken to assess fiscal rules compliance and their determinants, the effect of fiscal rules on fiscal space, and fiscal sustainability under different regimes in SSA context. The scantiness of published academic work and the limited range of empirical strategies can be confirmed by a quick check of existing literature. Therefore, the limited empirical evidence implies that fiscal policy and macroeconomic stability frameworks in SSA and other developing countries have not benefited from scientific knowledge on adoption and efficacy of fiscal rules. This has left significant gaps in both empirical and theoretical literature that merits attention. Moreover, this study seeks to fill these important gaps in literature by offering a path to examine these themes.

1.3 Motivation and purpose of the thesis

This thesis focuses on the extent of compliance of rules and their effectiveness to enhance fiscal space and debt sustainability in selected sub-Saharan Africa countries. The thesis investigates the adoption of fiscal rules and their implications for the creation of fiscal space, and the attainment of fiscal sustainability. The present study endeavours to unzip knowledge on the important features for the compliance of fiscal rules and their efficacy to advance sustainable fiscal policies and fiscal space that has remained elusive for many years to policy makers and academics in developing countries that include SSA. Specifically, the thesis attempts to address the following objectives:

1. To evaluate the definitions of fiscal space and develop a simple and easy measure for utilization in empirical literature. These objectives explore different measures of fiscal

rules in extant literature and improve on the Aizenman and Jinjarak (2010) measure of fiscal space, especially for developing countries.

2. To examine the determinants of fiscal rules compliance in sub-Saharan Africa. This objective seeks to explore the features of fiscal rules that enhance compliance.
3. To investigate the effect of fiscal rules on fiscal space among selected sub-Saharan Africa countries. This objective evaluates the efficacy of fiscal rules in enhancing fiscal space in presence of institutions.
4. To examine the effectiveness of fiscal rules on debt and fiscal sustainability in different fiscal regimes. The study shall consider different empirical frameworks to assess the ability of fiscal rules to advance fiscal sustainability in selected SSA countries.

The specific objectives examined in this thesis are provided for in chapters three, four, five and six. The readers are therefore requested to refer to the main chapters mentioned above for the specific objectives.

1.4 Focus and Structure

The thesis firstly focuses on the compliance of fiscal rules among the selected Sub-Saharan African economies. Although there has been a surge of research to investigate the effect of fiscal rules on various fiscal outcomes, the issue of fiscal rules compliance received limited attention. As noted in chapter two, few papers have investigated the compliance of fiscal rules and few have focused on an individual country while most have focused on developed countries only. In the same vein, most have focused on individual fiscal rules, such as the expenditure rule, or balanced budget or debt rule, but not on all rules or combinations or rules. As such, there exist a gap on the investigation of compliance of fiscal rules especially on developing countries like SSA who are vulnerable and have had long period of debt distress and debt reliefs compared to developing countries. Secondly, individual rules could have differing compliance rates that could also vary across countries. Thirdly, the role of institutions on their effect on fiscal space is studied and interacted with fiscal rules to establish their enhancement effect on fiscal space. Given this, the effectiveness of institutions in presence of rules is considered to establish whether governance effectiveness and low corruption enhances fiscal space. This thesis provides an avenue to test institution role in fiscal policy management.

The thesis is structured as follows: Chapter one considers the background, focus and structure of the thesis. Chapter two considers the compliance of fiscal rules and reviews the various rules and their characteristics that are adopted and employed in Sub-Sahara Africa. In Chapter three, the thesis assesses fiscal space in Sub-Sahara African economies. Fiscal space has had numerous definitions, and this thesis provides a simplified measurement of fiscal space that can be used to gauge a country's fiscal response ability in the face of limited resources in their quest for economic growth. In Chapter four, the effect of fiscal rules on fiscal space is investigated. This allows us check how effective the rules have been for fiscal management and the role of institutions to enhance fiscal rules' effectiveness for enhancement of fiscal space. Chapter five estimates fiscal policy regime shifts and debt sustainability by employing various techniques among them: the unit roots tests, the cointegration test, the Bohn's sustainability test and the Markov-switching sustainability tests. This four-step approach helps us to test debt sustainability in SSA economies as well as capture fiscal (un)sustainability as a result of changes in policy regimes. The Bohn's sustainability tests help to capture the government's response to rising debt in the economy overtime. The Markov-switching approach allows us to capture the various regime changes in the economy and policy responses during the regime shifts both with fiscal rules and without and provide clear policy implications on how to respond at any given policy environment. The final chapter concludes with a summary of the thesis themes and provides direction for future research.

Chapter Two

Literature review

2.1 Introduction

This chapter offers a brief review of literature on fiscal rules, fiscal space, and debt sustainability. As such, both theoretical and empirical literature of the thesis thematic focus are presented. The chapter briefly combines the literature on the theme covered in chapters three, four, five and six. In doing so, the theoretical and empirical literature related to fiscal rules, fiscal space, fiscal and debt sustainability are elucidated in brief. The theoretical literature reviewed in this chapter can be considered as support for the theoretical frameworks of the four main chapters, where we focus on deficit bias, policy compliance and fiscal sustainability. In this regard, section 2.2 examines the theoretical framework related to the thesis thematic area and as such, the deficit bias, Ricardian hypothesis, signaling hypothesis and time inconsistency preference theories are explained. The empirical literature is examined in section 2.3.

2.2 Theoretical literature

This subsection explains the theoretical and empirical aspects of fiscal space and their relationship with fiscal rules and debt sustainability. The theoretical literature encompasses the deficit bias, among others.

2.2.1 Deficit bias

The deficit bias has been found to be common in fiscal policy via several channels. It is argued that it arises due to presence of political distortions in a country and according to Von Hagen and Harden (1995) it can be mitigated through delegation of fiscal policy decisions to the finance minister. Accordingly, Von Hagen and Harden (1995) posit that deficit bias arises as a result of *common pool problem* in society. The *common pool problem* is present when there are several decision makers involved in budget formulation. In particular, the presence of the expending line ministries, civil society and advocacy groups, political representatives, among others. The different groups involved in the budget process agitate for funding to different interest groups and in the end, fail to internalize the cost of higher deficit that result to higher taxes in the long run leading to deficit bias. Furthermore, the time inconsistency theory posits that governments anticipating being voted out in an upcoming election may resort to higher deficits and increased borrowing because of reduced taxes thus, fail to internalize the costs of higher debt. This will arise because of no contractual enforcement mechanisms between the

current voters or government and future government. In this case the present government will offer suboptimal fiscal policy with increased debt to be repaid by a future government.

Furthermore, Chari and Kehoe (2008) argue that time inconsistency can result to free rider problem in a monetary union. In particular, the authors argue that monetary union may favour higher public debt as they will respond with increased inflation rate which reduces the real value of the nominal debt in return reducing the distortionary taxes that could be used to pay for debt obligations. In effect, each fiscal authority issues higher public debt as a result the monetary authorities increases the inflation rate thus, reducing output levels. However, when the monetary authority commits to the policy, the fiscal authorities will have no incentive to increase public debt thus, curing the free rider problem. The important instrument is to impose debt limits for which monetary union members can issue.

Additionally, deficit bias can be due to *governments' shortsightedness* that overlook long-term consequences of budget imbalances (Debrun & Kumar, 2007). Moreover, (Larch et al., 2021) posit that presence of short-sightedness in government results to higher present expenditure to attract voters or accumulate higher public debt to reduce a country's future fiscal space. To this end, the increased deficit bias or public debt is a *'strategic'* effort to constraint future fiscal space of governments.

2.2.2 Ricardian Equivalence Hypothesis

Further, the Ricardian Equivalence hypothesis postulates that using present or future tax revenue to finance government spending possesses compensating effects. In other words, financing government spending via debt shall not be effective as households and investors understand that the present debt will be financed by increased future taxes. Therefore, it does not make a difference whether government consumptions financed by current taxation or issuing bonds. If Ricardian equivalence does not hold then increased private savings shall not make up for high deficits. Relatedly, Marinheiro (2008) opines that in presence of the Ricardian equivalence, the substitution of debt with taxes has no effect on aggregate demand. Consequently, a tax increase will result to lower deficits. It is important to note that the application of Ricardian Equivalence resonates with the use of fiscal rules via the deficit channel. Badinger et al. (2017) posits that increase in government spending will result to higher taxes in future and households will respond by increasing their savings as they expect changes in future fiscal policy.

2.2.3 Signalling hypothesis

At the same time, the signalling hypothesis, as proposed by Akerlof (1970) and Spence (1971), has gained momentum in policy environment. Indeed, based on the signalling hypothesis voters, markets and other development partners perceive the adoption of fiscal rules as a source of information on the government's commitment to fiscal prudence. When this framework is applied to public finance, the basic premise is that policy makers are motivated to adopt fiscal rules to signal the government's commitment in conducting prudent fiscal policy.

2.2.4 Time inconsistency preference

The literature also offers evidence that countries are motivated to adopt fiscal rules to meet the monetary union objectives. This reasoning is premised on the time inconsistency theory that results to a free rider problem in the monetary union. Chari and Kehoe (2007) opine that time inconsistency arises due to desire of the monetary union incentive to increase inflation in presence of high debt levels. As such, the cost of inflation because of high public debt is borne by all residents of all monetary union member states.

2.2.5 Enforcement and management

The enforcement and management theory on policy shows that efficacy in public finance can be attained through monitoring, capacity building and use of sanctions. According to Tallberg (2002), the enforcement and management hypothesis is based on use of a coercive strategy for enhancement of policy in society. Further, improvement in public policy can be achieved through improved monitoring and use of sanctions for probability of policy compliance. Similarly, under the management hypothesis a problem-solving approach is utilized to improve on human capacity and enhance transparency. The implementation of the enforcement strategy is aligned to political economy as countries are rational actors that weigh costs and benefits of alternative choices when faced with a compliance decision. As noted by Elliott and Bayard (1994) and Dorn and Fulton (1997) countries are sources of noncompliance thus, they focus on determining the incentive structure to embolden their compliance rate.

2.2.6 Debt sustainability

The theoretical underpinnings of debt sustainability are addressed by various authors. In general, the primary test of debt sustainability is by evaluating the probability that governments fail to comply with the intertemporal budget constraint by testing whether fiscal policy data

meets the time series properties to support the theory of expected primary balance being equal to public debt. Another strand of literature tests debt sustainability following Bohn (1998) by checking the reaction of primary balance to a rise in public debt. In this case, sustainable fiscal policy is achieved when primary balance responds positively to a rise in public debt indicating debt sustainability. A number of studies by Hamilton (1989) have tested fiscal sustainability by characterising different fiscal regime shifts for which fiscal policy is either sustainable or unsustainable.

2.3 Empirical literature

This subsection offers a brief review of the empirical literature from the extant literature that covers (i) fiscal space measurement, (ii) fiscal rules compliance, (iii) fiscal rules and fiscal space, and (iv) fiscal rules and fiscal and debt sustainability.

2.3.1 Fiscal space measurement

Fiscal space has received several definitions in empirical literature. For example, Heller (2005) and Ley (2009) define fiscal space as the government's ability to allocated resource via the budget to meet spending needs that enhance growth. On the other hand, Aizenman and Jinjarak (2010) measurement of fiscal space is given as the share of public debt to tax revenue. Further, fiscal space is determined by the difference between present tax revenue and potential tax revenue (Park, 2012). Additionally, Ghosh *et al.* (2013) defines fiscal space as the difference between debt limit and actual debt of a country.

2.3.2 Fiscal rules compliance

Analysis of the effects of fiscal rule compliance are limited in past empirical studies, although they have recently gained traction. Cordes et al. (2015) examines the effectiveness of expenditure rules by considering 35 expenditure rules between 1985 to 2013. They find that expenditure rules can foster better spending and they have a higher compliance rate compared to balanced budget rules, particularly, when expenditure rules are under the control of government and enshrined in law or political coalition. Reuter (2018) investigates the compliance of fiscal rules in 10 EU countries. The author employs a logistics estimation strategy and finds that the average compliance rate across all rules is 50 percent. The findings

also show that independent institutions, monitoring, and enforcement play an important role in rules compliance.

2.3.3 Fiscal rules and fiscal space

The links between fiscal frameworks and budgetary outcomes have also been investigated. In particular, Nerlich and Reuter (2013) finds that fiscal rules improve primary balance and their impact is strengthened when the rules are supported by independent fiscal councils. Nerlich and Reuter (2016) examined the efficacy of fiscal rules and fiscal space in the European union countries. They find that fiscal rules are associated with higher fiscal space and the efficacy of fiscal rules depends on the type of the rule employed. In their analysis, they find that expenditure rule is associated with higher fiscal space among the countries under investigation. The effect of fiscal rules on fiscal outcomes has also been examined at the sub-national or federal governments. Dirk Foremny (2014) investigates the effect of rules and tax autonomy in subnational or federal governments in 15 European countries by employing an IV model. They find that the effect of fiscal rules depends on their constitutional structure. Such that, fiscal rules decrease budget deficits in a unitary country compared to a sub-national state.

2.3.4 Fiscal rules and debt sustainability

Various empirical studies on debt sustainability have been undertaken in the literature. Using several techniques that include ordinary least square, Threshold Auto-regressive model, state space and vector error correction models Burger et al. (2012) estimates a fiscal reaction function to test for debt sustainability. They find that fiscal policy was sustainable during the sample period and the South African government tightened fiscal policies during periods of negative shocks. Ko and Morita (2015) investigate regime changes in Japan and employ the regime changing Structural Vector Autoregressive model on public debt. Their findings show presence of three regimes in Japan spread between 1970 to 2011. Baharumshah et al. (2017) investigates fiscal sustainability in Malaysia using a Markov Switching intercept autoregressive heteroscedasticity error correction model (MSIAH-ECM). They find that fiscal policy has been sustainable in Malaysia and the government should cut deficits when it exceeds a certain level. Moreover, the authors establish that public debt above 55 percent is negatively correlated with economic activity.

2.4 Conclusion

This chapter offers a quick presentation of the theoretical and empirical underpinnings of the thematic area of this thesis from the existing literature. The literatures pertaining to four main areas are explored: (i) fiscal space measurement, (ii) fiscal rules compliance, (iii) rules and fiscal space and (iv) fiscal rules and debt sustainability. For fiscal space measurement, it becomes explicitly clear that there is lack of consensus in empirical literature on the definition of fiscal space. Further, it is obvious that while the adoption of fiscal rules has increased over time, analysis on the compliance of this rules has not been exhaustively examined. Moreover, the review in this subsection and in chapters three and four reveals that compliance of fiscal rules has only been assessed in developed countries such as the European Union.

Furthermore, the review reveals that the question of the efficacy of fiscal rules on fiscal space remains inconclusive in the empirical literature. As such, given the prominence of fiscal policy in economies a re-examination of this subject may shed light to inform policy in developing countries. Similarly, the reviewed literature shows that the effect of fiscal rules on debt and fiscal sustainability remains unanswered in literature. Additionally, from the inception on the usage of fiscal rules, they have not been tested in different regime frameworks.

The four areas identified and reviewed in this chapter illustrate the necessity for this study to unearth the elusive measurement of fiscal space and the role of fiscal rules on both fiscal space and debt sustainability. Furthermore, the analysis is undertaken for developing countries in SSA that still face significant fiscal policy challenges.

The detailed literature review is undertaken in: Chapter three, Chapter four, Chapter five and Chapter six. Hence the readers can refer to more literature review in the main chapters mentioned above.

Chapter Three

Hybrid Fiscal Space in Sub-Sahara African Countries: Definition and Assessment

3.0 Introduction

The debt crisis and the subsequent debt relief to developing countries presents a painful reminder of the importance of government's fiscal policy that enhance fiscal sustainability[1]. As such, government policies should provide policymakers with leeway and ability to undertake spending and taxation without causing distortions to the economy. Indeed, this ability is predicated on the availability of fiscal space. Fiscal space provides government with necessary resources for development activities as well as to implement countercyclical fiscal policy. Of recent, fiscal space has dominated policy debates on the adequacy of fiscal policy response to accelerated growth and development in the world economy. This chapter therefore, aims to complement the existing measurement of fiscal space in the literature by improving on (Aizenman & Jinjarak, 2010).

This chapter examines the measurement of fiscal space, a concept that remains relevant in policy debate, notwithstanding the elusiveness and complexity of its measurement and definition. The complexity of the fiscal space concept is evidenced by the different definitions used over time. Some of these definitions have been aligned to specific sectors while others were set for specific types of economies. The objective of this chapter is to construct a basic measure and definition of fiscal space. The theoretical framework of fiscal space emanates from the fiscal deficit hypothesis, that is, an economy with increasing deficit shall have little resources for maneuver in case of negative shocks to the economy. From the Ricardian hypothesis, tax revenue can help smooth out government spending. This theoretical set-up has been supported by Barro and Blanchard who argue that tax revenue to cover a tax gap will enhance the presence of resources for government spending. From an empirical side, several studies have elucidated the various sources of fiscal space and underpinned the fact that it can

[1] Heller (2006) argues that the fiscal space and fiscal sustainability nexus is important. As the later refers to the capacity of governments to meet their future expenditures including debt service obligations and that fiscal sustainability is closely related to debt sustainability. Therefore, it means that the use of fiscal space requires prudence as current and future expenditures shall be financed from tax revenues.

be used to cushion a country in presence of negative shocks and mitigate against debt distress. More importantly, some studies opine that priority spending and improved tax reforms as well as increased tax revenue result in enhancement of fiscal space (for details see Heller (2006); Asher and Bali (2017); Gnangnon and Brun (2019). Similarly, several studies indicate that debt sustainability is a determining factor for fiscal space. On the other hand, a growing number of empirical findings indicate that market access is a key element to fiscal space.

This chapter makes four contributions to the literature by focusing on the measurement of fiscal space. First, from an empirical standpoint, there exist measurements and definitions of fiscal space without explicit convergence. Indeed, varied measurements abound. For example, Brun et al. (2006a) and Park (2012) elucidate that fiscal space is the difference between potential tax revenue and actual tax revenue. Aizenman and Jinjarak (2010) opine that fiscal space is a ratio of public debt to base tax revenue. On the other hand, Ghosh *et al.* (2013) measures fiscal space as the difference between the debt limit and the actual debt level. From the work of Schick (2010), they explain fiscal space for developing countries with reference to undertaking growth enhancing investments in physical and human capital using borrowed funds without government prejudice to long-run fiscal sustainability. Heller (2005) and Ley (2009) define fiscal space as the budgetary room to create and allocate funds to enhance growth and mitigate business cycles without jeopardising liquidity and fiscal sustainability. On the other hand, Romer and Romer (2019) defines fiscal space as the negative ratio of public debt to GDP. Therefore, the above different empirical measurements of fiscal space attests to the increasing ambivalence of this thematic area and the lack of consensus on the definition and measurement of fiscal space, suggesting the need for further investigation to determine a measure for fiscal space.

Second, we improve on the Aizenman and Jinjarak (2010) measure of fiscal space. We measure fiscal space by taking the difference of group mean of public debt to tax revenue ratio and actual public debt to tax revenue ratio. By doing so, our approach links public debt directly to tax revenue which is an important and stable source of revenue to meet future spending obligations. We argue that despite country resource endowments, efforts have been channelled to improve diversification of economies to enhance the stability of revenues. Additionally, most resource-based economies have experienced reduced revenues because of global uncertainties in commodity prices. In the end, this has led to increased fiscal deficits, thus, constraining fiscal space. Importantly, domestic resource mobilization via tax revenue is a key channel for enhanced economic development especially in developing countries as they can

easily realize their economic potential (IMF 2011; Morrissey et al. (2016)). Empirical evidence shows that countries with a narrow tax base and, with reliance on commodity revenues are vulnerable to increased revenue uncertainty due to volatility in global commodity prices. The significance of tax revenue was buttressed by the G-20 leaders in 2010 when they tasked the International Monetary Fund and other development institutions to increase surveillance on resource mobilization in developing countries (IMF, 2011). Indeed, the IMF has been at the forefront of improving tax capacity as a source of revenue.

Taking a similar approach, member countries to the Addis Tax Initiative (ATI) during a meeting in 2015, pledged to increase domestic resource mobilization efforts via the tax revenue channel. Of recent, several multilateral development organisations, including the International Monetary Fund (IMF), the World Bank, Africa Development Bank (AfDB) and the United Nations (UN), have stepped up efforts to improve tax capacity. In particular, the United Nations has realised the need for enhanced tax revenue with inclusion of domestic resource mobilization in target 17.1 of the Sustainable Development Goals (SDGs). Further, Akitoby et al. (2020) opines that tax revenue is essential for improved fiscal space to finance domestic investment and service delivery. On the other hand, IMF (2016) argues that due the potential depletion of oil reserves, new sectors should be developed for posterity whenever oil and gas productivity are exhausted. In addition, dependence on oil revenue exacerbates macroeconomic uncertainty as a decline in global oil prices reduces fiscal revenue resulting to a decline in public spending.

Third, we employ the group mean approach in our measurement of fiscal space. Cronbach and Webb (1975) opines that group mean is vital in decomposing a variable to between group and within group to account for individual performance and group structure in the model. Relatedly, Paccagnella (2006) affirms that group mean is vital in analytical work to reveal individual attributes in a group. Further, Manski (1995) hypothesises that group mean (centring) offers a distinctive assessment of individual behaviour of a variable[2]. The author argues that the surrounding plays a vital role of influencing the character of individuals in society. In addition, Manski (1995) posits that there is correlation of behaviour due to possession of similar characters in society. It is important to note that the Manski hypothesis

[2] Manski (1995) hypothesis is based on endogenous effects, contextual effects, and correlation effects. The endogenous effects arise when individual behaviour varies with the usual behaviour in a group while the contextual effects will result from individual attributes varying with the spread of the surrounding behaviour in the group. Finally, the correlated effects will result from individuals behaving in a similar way due to possession of same attributes.

applies to the global economy and the sub-Saharan Africa context. This is because developing countries possess similar attributes, for example, the level of poverty and income inequality is high in SSA compared to other regions. According to the UNDP (2017) 10 out of 19 most unequal countries globally come from SSA. This group of countries also experience the highest unemployment rates and many of them have high fiscal deficits. Furthermore, despite certain countries having large resource endowments, others rely on the agricultural sector as a source for revenue and employment creation. In fact, even those with large resource envelop, have developed mechanisms to enhance diversification to cushion their economies from external shocks. From an institutional set-up, many SSA countries possess weak institutions[3] that negatively affects fiscal policy management resulting to a decline in fiscal space. We thus, argue that the application of the group mean to measure fiscal space is vital as it captures the attributes of SSA countries. Moreover, several features of group mean technique are exhibited and they include: (i) simple to implement, (ii) flexibility, and (iii) can be applied to countries with similar attributes, for example, our group of countries have all utilized fiscal rules to foster fiscal management. It is important to illustrate that flexibility of the group mean is vital as it allows for decomposition of total variation to individual and group components as well as between group and within group components, therefore, unequivocally describing the group pattern in the model. Owing to the important features of group mean as outlined above, its use has over the years gained momentum (see for example, Raudenbush and Bryk (2002); Paccagnella (2006); O'Connor and Fischer (2012))

Fourth, as noted earlier, fiscal space is associated with fiscal sustainability and availability of resources like tax revenue to meet public outlays when need arises. Indeed, our link of fiscal space to tax and public debt offers room for governments to: (i) use the tax channel to increase their revenue sources, and (ii) utilize our measure to examine a country's exposure to debt and fiscal distress. In this regard, we draw from the IMF debt sustainability framework (DSF) for Low Income Countries (LIC) that links the measures of sustainability of debt via the likelihood of debt distress. We thus, argue that our fiscal space can be used to signal policy makers of the potential presence of debt distress when fiscal space shrinks. To the best of our knowledge this is the first study to link a measure of fiscal space to fiscal distress. The presumption is that a

[3] Transparency International 2019 report shows that sub-Saharan Africa countries performed dismally compared to other regions. Indeed, SSA scored 32 out of 100 compared to Middle East and North Africa, Americas, Asia Pacific and Western Europe and European Union that scored 39, 43, 45 and 66, respectively.

country with fiscal space shall not experience debt distress as the resources shall be available to meet debt obligations as they fall due.

Fifth, we experiment our measure of fiscal space on a group of sub-Saharan Africa countries that utilize fiscal rules in their public financial management. It is important to note that SSA possesses important attributes that makes our study viable and an important testing ground. For example, the region had the highest number of countries that benefited from the Highly Indebted Poor Countries (HIPC) initiative, because out of 39 countries that benefited from the initiative, 36 came from the region. In addition, and as earlier indicated, the region performs poor on quality of institutions Bertocchi and Guerzoni (2012) while Ouedraogo and Sourouema (2018) infers that the current institutions arrangement are deleterious to fiscal policy in SSA thus, negatively influencing public finance and fiscal space. Further, the region has the highest poverty and income inequality levels relative to their comparator regions like the Latin America and Asia Pacific. We, therefore, argue that a measure of fiscal space that is simple to implement, flexible in measurement, and links a stable resource revenue like tax to public debt may help mitigate on effects of unsustainable debt and trigger policy intervention measures in case of increasing signals of debt distress.

Therefore, given the various definitions of fiscal space provided in the literature, an assessment requires an in-depth understanding of the many aspects of the concept. Consequently, the measurement of fiscal space faces challenges especially in developing economies which include missing observations over time and inadequate consistent fiscal data. Most fundamentally, issues arise on how broadly or narrowly fiscal space should be defined. Ideally, fiscal space analysis should be broad to cover aspects of the public-sector operations and activities that enhance room for more resources. In this thesis, we thus, define fiscal space as the difference between group mean debt to tax revenue and actual debt to tax revenue. As noted earlier, this measure of fiscal space is an improvement to (Aizenman & Jinjarak, 2010).

3.1 Assessment of fiscal space for the period 1997-2016 and cross-country variations.

Following the previous definitions, we can trace fiscal space for various developing countries under investigation. In addition, Heller (2006) argues that governments have several ways to create fiscal space. Therefore, as mentioned by Heller, fiscal space can be created through improved tax measures and reduction or avoidance of low priority expenditures to create room for more desirable ones, public debt, and external grants. Interestingly, tax revenue is the

reliable and most obvious option available to developing countries. Majority of these countries have gone through financial challenges to meet their funding needs (see Reinhart and Rogoff (2009) for debt distress and Laeven and Valencia (2018) for financial and banking crisis). These challenges have increased developing countries need for public debt. The presumption is that lower public debt relative to higher tax revenue implies higher fiscal space to fund development needs in future. Further, lower budget deficits relative to higher tax revenue is presumed to enhance higher fiscal space. We report the sources of fiscal space and measure fiscal space for selected SSA in *Table 3.1*.

There is a wide variation of fiscal space for countries under investigation as the fiscal space oscillates between -38 and 4.4. This in turn shows that some countries have exhausted their fiscal space. In fact, countries like Cameroon, Central Africa Republic, Chad, Congo Republic, Cote D'Ivoire, Equatorial Guinea, Guinea Bissau, Mali, Niger, and Togo have not had fiscal space for the period 1997-2016. On the other hand, Botswana and Namibia provide evidence of higher fiscal space of around 4.4 and this is well reflected as their average tax revenues are also high. As a source of revenue, grants seem to form a larger component of budgets in SSA. Accordingly, Heller (2006) argues that external grants can provide fiscal space for developing countries in contrast to debt that carries future debt service obligations[4]. As we can see, it is clear that some countries have high average debt levels above 90 percent of GDP and this presenting worrying scenarios for future fiscal space[5]. Indeed, higher public debt implies larger interest burdens and consequently lower fiscal space to the concerned countries. Guinea Bissau and Congo Republic have on average public debt above 100 percent compared to Botswana. Both countries are beneficiaries of the HIPC initiative and as such it is expected that the debt relief should have played a significant role in debt reduction and creation of fiscal space. Guinea Bissau on the other hand has a higher grant component compared to tax revenue, which therefore means the country is exposed to grant volatility thus going forward there is need for reforms in the tax revenue sector.

Table 3. 1 Key average fiscal space indicators in SSA 1997-2016

Country	Grants	Public debt	Tax revenue	Total revenue	Fiscal space

[4] Heller (2006) argues that the flow of grants has significantly reduced, and many donors are not willing to provide this fund commitment for more than 1 or 2 years and that they are volatile and not reliable for long term policy planning. Further, they advocate for low-income countries to raise tax revenue as a share of GDP to at least 15 percent.

[5] Reinhart and Rogoff (2010) finds that countries with public debt above 90 percent have lower growth rates and similarly, higher public debt is positively related to higher inflation in emerging market economies.

Benin	8,5	47,4	13,2	17,9	1,0
Botswana	1,6	14,6	25,5	39,1	4,4
Burkina Faso	11,8	39,5	11,9	20,7	1,5
Cameroon	3,8	51,1	11,2	17,9	-0,2
Cape Verde	14,2	79,7	17,1	26,7	0,3
Central Africa Republic	12,8	66,8	7,8	14,7	-3,9
Chad	7,2	46,2	8,4	15,7	-2,3
Congo, Rep.	5,1	143,1	9,9	36.9	-10,7
Côte d'Ivoire	3,9	86,8	15,6	18,2	-0,6
Equatorial Guinea	9,0	53,1	9,2	27,0	-0,6
Gabon	1,3	57,8	16,0	28,2	1,3
Guinea-Bissau	22,9	185,0	5,9	16,7	-38,1
Kenya	4,5	53,1	15,3	19,3	1,5
Mali	11,2	61,0	11,5	19,6	-1,1
Mauritius	0,8	51,0	17,3	19,2	2,0
Namibia	3,0	21,4	28,5	29,9	4,2
Niger	13,7	59,6	10,7	20,7	-1,8
Nigeria	1,0	32,8	8,8	16,9	0,9
Senegal	8,7	53,2	16,9	17,3	1,7
Togo	7,5	82,9	14,7	16,5	-1,2
Median	**7,3**	**53,2**	**12,5**	**19,3**	**0,1**
Mean	**7,6**	**64,3**	**13,8**	**22,0**	**-2,1**

Source: IMF, UNU-WIDER and Authors calculations

Notes: The colours: Green – No fiscal space, Yellow – Presence of fiscal space, Light Blue – Resource-based economies, Red – Highest public debt and Pink – Tax revenue are less than grants on average. For fiscal space, negative sign indicates no fiscal space.

It is important to note that the non-tax revenue also play a significant role in budget financing. The existing data show that non-tax revenue is about 3 percent of GDP on average for the selected group of countries used in our analysis, which is similar to most developing countries. At the same time, tax revenue constitutes about 15 percent of GDP on average, and clearly constitutes the majority of fiscal revenue. However, in resource-based countries, non-tax revenue oscillates between 2 and 11 percent of GDP because it includes mineral royalties and other mineral-related payments: Nigeria (2.1% of GDP), Equatorial Guinea (17%), Gabon (0.7% of GDP), Republic of Congo (25% of GDP), Botswana (14% of GDP) and Cameroun (4% of GDP).

Although the non-tax revenue can play an important role in enhancing fiscal space they are highly volatile and are affected by global shocks. Mourre and Reut (2019) finds that non-tax

revenues are a source of fiscal risk among European Union countries as they are three times more volatile that tax revenues.

3.2 Literature Review

There has been a large and growing literature on fiscal space in the last decade. The literature has been of extreme importance especially after the debt reliefs and the financial crisis as in the later countries which employed austerity measures to resuscitate their economies. Therefore, the extent of literature in this chapter has been undertaken on the determinants of fiscal space to enhance fiscal sustainability.

Key channels that influence fiscal space have been explored in literature as discussed in this chapter. They include: the relationship between public debt and borrowing costs that will impede investment and growth that can influence fiscal space in the long run. The elevated uncertainty in the economy as debt increases, as high debt is associated with volatile output which reflects limited scope of fiscal policy to support the economy when faced with shocks. Therefore, public debt through borrowing in the domestic and foreign market constitutes another channel for enhancing fiscal space. However, as argued in literature, debt can enhance fiscal space, but increased debt can lead to a rise in debt service costs thereby impeding growth and service delivery. The conventional view of public debt is that increased spending due to higher debt positively impacts on disposable income increasing aggregate demand and output, (Elmendorf & Mankiw, 1999). According to Keynes (1937) the government should spend more in recession to stimulate recovery, and in the short run public debt can help boost aggregate demand. In the same line, Barro (1974) asserts that the economy is made up of forward-looking consumers and they will consider government's budget constrain in their decision-making process. Therefore, it does not make a difference whether government consumptions financed by current taxation or issuing bonds. Thus, if Ricardian equivalence does not hold then increased private savings shall not make up for high deficits.

Accordingly, public deficit also constitutes a major part of debt and a source of constrained fiscal space for most economies. There is rich a literature on the sources of fiscal deficit, including: governments' short-sightedness and the common pool problem. In the case of *governments' shortsightedness*, government's overlook long-term consequences of budgetary imbalances (Debrun & Kumar, 2007). The authors argue that deficits can be because of

governments anticipating the possibility of being replaced in future by political competitors. Thus, the deficit bias can be *'strategic'* as they can be used to constrain future governments spending by creating higher deficits. On the other hand, the *common pool* problem arises due to the deficit bias because interest groups free ride on public goods that leads to large deficits, and debt accumulation and the problem manifests in fragmented and heterogeneous governments (Velasco (2000); Alesina and Perotti (1995)). As such, the common pool problem can lead to pro- cyclical fiscal policy because of spending pressures being high in a boom.

Other authors have argued in support of tax revenue as a channel to enhance fiscal space of a country. There are several ways the government can raise tax revenue; including, broadening the tax base through bringing untaxed activities for goods and services into the tax net. Similarly, the government can enhance tax revenue by simplifying the tax structure and reducing tax exemptions afforded within the economy. Furthermore, the design of tax structure can succeed through improved administration and reforms in tax governance. As argued by Aizenman and Jinjarak (2010) tax revenue enhances fiscal space and provides a better channel for gauging the country's ability to meet its future debt obligations.

Relatedly, fiscal space has also been measured by considering market access via risk premia. For example, Botev *et al.* (2016) argues that fiscal space is related to loss of market access as well as long-term sustainability. Indeed, this hypothesis has been advanced through several empirical studies that focus on market access Ghosh *et al.* (2013) and long-term sustainability by (Blanchard et al., 1991). The hypothesis by Blanchard *et al.* (1991) is premised on the tax gap as a measure for fiscal space which is estimated by taking the difference between sustainable tax as a share of GDP to actual tax revenue. On the other hand, Brun et al. (2006b) posits that fiscal space is the difference between the present level of tax revenue to potential tax revenues. Along same vein, Park (2012) elucidates that fiscal space is the distance between the current tax revenues and the maximum possible tax revenue for a country, while Marcel (2014) measures fiscal space as the required fiscal adjustments to obtain a 60 per cent debt to GDP ratio.

As we indicated earlier, several studies have pitched their measure of fiscal space by considering interest rate-economic growth differential by inferring that in presence of primary balance, the economy is growing at a higher rate relative to nominal interest rate to mitigate the effects of a higher public debt. However, this approach fails to capture country specific factors that influence fiscal space. Similarly, due to data limitations in developing country the

market access approach to measure fiscal space cannot be utilized. On other hand, the Aizenman and Jinjarak (2010) measure of fiscal space is a simple computable approach and that shows the country's ability and willingness to meet the debt obligations and expenditure requirements. Despite the merits of this measure, the measure is premised on strong assumptions that it reflects the number of years a country shall take to meet the debt obligation with the available tax revenue. This assumption is at best hypothetical as most developing countries experience limited tax revenue which makes it difficult to infer the years to pay off its debt obligations. Secondly, the averaging of tax revenue to GDP ratio over seven (7) years (see Aizenman and Jinjarak (2010) averaged from 2000-2006) and three (3) years (see Aizenman et al. (2019)) to smooth out business cycles is not reflective of country dynamics. Importantly, countries have different periods in which they experience business cycles and thus, varying over time.

Furthermore, other measures for fiscal space are provided in literature and they include: market perception, external and private sector debt, and the balance sheet approach. Market perception approach considers a country's ability to issue new debt or roll over debt, therefore, sovereign risk will reflect a country's ability to meet its obligations. As mentioned in Kose et al. (2017), market risk can be gauged through credit default swaps (CDS) spreads and credit ratings as they monitor investor sentiments. Similarly, external and private sector debt also forms part of fiscal space channel. (Kose *et al.*, 2017) argues that private sector debt has the potential to affect fiscal sustainability, such that, if there are bailouts in the financial sector, government revenue will be constrained. On the other hand, the balance sheet approach provides information on a country's ability to have more resources. Therefore, countries with high short-term foreign debt are exposed to market risks due to interest rates or exchanges rate changes. Although these approaches could provide a better measure of fiscal space as they are embedded with market perception and include interest rate and growth, they face serious limitation for lack of fiscal data as shown in dataset developed by (Kose *et al.*, 2017).

Ghosh *et al.* (2013) estimates debt limit and defines fiscal space as the difference between debt limit and actual debt. On the other hand, Heller (2005) and Ley (2009)) define fiscal space as the budgetary room to create and allocate funds to enhance growth and mitigate business cycles

without jeopardizing liquidity and fiscal sustainability[6]. Therefore, a core aspect in definitions provided in fiscal literature is that fiscal space refers to the country's ability to service its debt portfolios and create room for fiscal maneuvers[7]. Similarly, fiscal space is the available room to raise spending or lowering taxes in relation to a pre-existing baseline with prejudice to market accessibility and debt sustainability IMF (2018)[8].

Schick (2010) argues that fiscal space for developing countries refers to countries undertaking growth enhancing investments in physical and human capital using borrowed funds without government prejudice to long run fiscal sustainability. In the same vein, Ghosh *et al.* (2013) defines fiscal space as the difference between debt limit and actual debt. Relatedly, from a revenue perspective, Brun *et al.* (2006a) elucidates that fiscal space is the share of current government revenue to potential tax revenue. Park (2012) measures fiscal space as the distance between the present tax revenue and the maximum potential tax revenue, while Aizenman and Jinjarak (2010) defines fiscal tightness as a ratio of public debt to tax revenue, which is inversely related to tax years it would take to repay the debt. The intuition towards Aizenman and Jinjarak (2010) is that tax revenue provides an important channel for gauging the government's ability to raise enough resources in future to meet debt obligations. As such, a country that can raise more tax revenue will have the incentive to smooth the current spending needs through borrowing but still have room to maneuver in future.

Behera and Dash (2019) examined the relationship between government expenditure and fiscal space in 21 states in India for the period 1980-2014. They measure fiscal space using tax revenue, non-tax revenue, fiscal transfers, and government borrowing. Using a panel regression, they find that tax revenue has a significant positive effect on health spending allocation while borrowing exhibits negative effect. It has also been alluded that increased fiscal space may result from efficient expenditure management. Importantly, when

[6] Romer and Romer (2019) define fiscal space as the room a country has to use fiscal policy to stimulate the economy or undertake bailout or recapitalisation of financial sector. Thus, fiscal space is given as the negative ratio of gross government debt to GDP.

[7] IMF (2016) define fiscal space as the room for undertaking discretionary fiscal policy relative to existing plans without undermining fiscal sustainability. Others like Nooruddin and Chhibber (2008) define fiscal space as the government's ability to spend money in the short term thus measures fiscal space as the difference between receipts on revenue and the sum of expenditures on civil administration including pensions, retirement benefits, the police and debt servicing.

[8] Accordingly, there are three stages in the measurement of fiscal space: the macroeconomic where domestic and foreign conditions that affect fiscal policy are assessed; debt sustainability that incorporate a country's fiscal sustainability and access to finance, and dynamic fiscal policy to capture macroeconomic outcomes IMF (2018).

governments reduce economic costs, for example, administrative costs for delivery of services can result to increased savings by the country and thus resulting to fiscal space (Asher & Bali, 2017).

Ko (2020) examines fiscal capacity of welfare states to obtain for a sustainable welfare pooled time series cross-sectional model. Their analysis measures fiscal space by following Ghosh *et al.* (2013) approach as the difference between debt limit and actual debt. Their findings show that democratic states experience fiscal sustainability.

Furthermore, in order to create fiscal space, the IMF in several report counsels member countries, especially developing countries, has argued for reductions in the wage bill as a share of GDP. Heller (2005) notes that the IMF advocates reductions in spending on salaries and wages in non-key sectors of the economy. Building on Heller (2005) we argue that increases in civil service wages and salaries reduce the countries fiscal space. Moreover, following a reduction in revenues, developing countries frequently resort to a freeze in civil service employment in order to shrink the wage bill.

Pensions on the other hand are non-discretionary outlays, and their payments plays a role in shrinking fiscal space. Indeed, fiscal space can be reduced with increased outlay on pension requirement due to demographic changes. Marcel (2014) argues that the OECD projected an increase of pension payments from 8.4% of GDP in 2010 to 10% of GDP in 2030 as a result of demographics changes. Earmarked transfers to regions (local governments) are similarly a discretionary expenditure unless they are legally legislated. This is not to say that it is easy to reduce nominal transfers, although it is less difficult to reduce the real value of such transfers that is not raising them by the amount of inflation. Thus, a discretionary increase in earmarked transfers reduces fiscal space and narrows a country's ability for fiscal manoeuvre.

In the presence of numerous fiscal space definitions, the question that arises is how fiscal space is measured. As noted earlier, this chapter presents multiple measures of fiscal space using different indicators. Although the literature provides multiple measures of fiscal space, there is no consensus on fiscal space definition. We have reviewed the various measures of fiscal space in literature based on debt sustainability approach and offer an improvement on the measurement of fiscal space. We focus on debt sustainability because of availability of data and debt as a major fiscal sustainability issue in the global economy and SSA in particular. We contribute to fiscal space literature by improving on Aizenman and Jinjarak (2010) definition of fiscal space.

3.3 Measurement of fiscal space

3.3.1 Debt Sustainability Indicators of Fiscal Space

Debt is an important indicator of an economy's health and a key factor for fiscal sustainability. It explicitly defines a set of government liabilities based on the financial instruments used, as the growth of public debt is important due to the economic impact embedded in it. As such, economic and financial crises are likely to contribute to the build-up of debt and this may depress investment, future growth and institutional reforms. Accumulation of debt burden has a strong negative effect on a country's credit worthiness, investment ability and impedes a country's ability to undertake policy reforms for sustainable development (Reinhart and Rogoff (2010); Krugman (1988); Sachs (1989)). The assessment of fiscal space under the debt sustainability follows the debt dynamics approach:

$$\Delta d_t = \left(\frac{r_t - g_t}{1 + g_t}\right) * d_{t-1} - pb_t + sf_t \qquad 3.1$$

Where d_t refers to public debt to GDP ratio, r_t is the real interest rates, g_t is output growth, pb_t denotes primary balance as a ratio to GDP and sf_t is the stock-flow adjustment as a share of GDP. The equation shows the accounting relationship between changes in public debt and past debt, the interest - growth differential and the primary balance.

Based on the equation identity above, one important measure of fiscal space is the debt sustainability gap. Zandi et al. (2011) and Ostry et al. (2010), argue that the debt sustainability gap arises from the difference between a country's current debt and its estimated sustainable debt level:

$$debt\ sustainability\ gap = \ d^* - d_t \qquad 3.2$$

Where d^* is the benchmark sustainable debt and d_t denotes the current debt. Similarly, the primary balance sustainability gap also provides a measure for fiscal space. The primary balance sustainability gap is given as the difference between debt stabilising primary balance and current primary balance.

$$primary\ balance\ sustainability\ gap = pb^* - pb_t \qquad 3.3$$

Where pb^* is the benchmark sustainable primary balance and pb_t denotes the current primary balance. From equation one above, if Δd_t is set equal to zero to stabilize debt and sf_t is ignored or set equal to zero, then we have:

$$pb^* = \left(\frac{\tilde{r} - \tilde{g}}{1 + \tilde{g}}\right) d^* \qquad 3.4$$

Where $\tilde{r}$ denotes country specific long run real interest rates and $\tilde{g}$ refers to long run growth rate of the economy. Estimating the benchmark sustainable debt to GDP ratio as used in the above examples is key in determining fiscal space in debt sustainability approach. On the other hand, the literature provides several measures for fiscal space, including median or mean debt to GDP ratio of a country or a defined group of countries; the signal approach that indicates the debt level that best predicts the occurrence of debt distress; sum of present discounted value of all future projected primary balance and ability to pay model.

Estimating a sustainable debt level by using the median or mean of a country or a group of countries from the same region or income group is the most straight forward method. The intuition behind this approach is that countries that fall in the same income group or region and are in same median are on a debt sustainable path. In the case of a country, the median or mean could provide information on a country's specific factors and ability to repay its debt as it captures debt dynamics overtime incorporating historical behaviour. On the other hand, the signal approach can be used to derive debt to GDP ratio and other fiscal indicators that predict debt distress (Kaminsky *et al.* 1998). The estimated debt threshold should maximize the signal to noise ratio, that is, it should provide a correctly classified crisis that can influence policy response and is given as:

$$signal\ to\ noise\ ratio(d^*) = \frac{TP(d^*)/N_c}{FP(d^*)/N_{N_c}} \qquad 3.5$$

Where $TP(d^*)$ denotes the correctly classified crises, $FP(d^*)$ refers the total number of false crises, N_c is the total number crisis observations and N_{N_c} is the total number of non-crisis

observations. The IMF uses this approach to identify debt distress countries and mostly countries that did not experience a crisis are left out in the analysis.

Calculating the present discounted value of future projected primary balances of a country is the other approach for sustainable debt. Therefore, the intertemporal budget constraint can be given as:

$$d_t^* \leq \sum_{i=1}^{\infty} \left[(1/1+r)^i E_t(pb_{t+1}) \right] \qquad 3.6$$

The above intertemporal equation shows that the government will raise sufficient revenue to repay its debt obligations in future. This approach allows for estimation of country specific sustainable debt levels while using fiscal projections information of a country. However, the method suffers from forecast uncertainty as most fiscal forecasts are predicated on macroeconomic projections and assumptions of multiple years of policy decision making. The reliability of these projections is further affected when countries have volatile fiscal balances.

3.3.2 Debt sustainability Analysis by the International Monetary Fund (IMF)

According to the International Monetary Fund and the World Bank, debt sustainability is roughly categorised as low, medium or strong. In this regard, from 2005, the IMF-World Bank established a debt sustainability framework (DSF) for Low-Income Countries (LIC) to assess a debt sustainability analysis (DSA). The DSF has been touted as a central tool for assessing macroeconomic stability in this group of countries in order for governments and the international community to devise interventions in case of a debt crisis. The DSF framework is based on probit regression that builds five thresholds of which the dependent variable is that the country will experience debt distress (Berg et al., 2014). The framework assigns a risk taking to a country by comparing the debt burden measures projected out for 20 years to the corresponding thresholds. Therefore, the probability of a country to experience debt distress is given as follows:

$$Pr_j(y_{it} = 1) = \gamma \left(\beta_{d_j} d_j + \beta_{MIC} d_j \times MIC + \beta_{CPIA} CPIA + \beta_{gdp} gdp \right) \qquad 3.7$$

where d refers to debt, j denote five alternatives that include (i) the present value of debt as a share of GDP, (ii) the present value of external debt as a share of exports, (iii) the present value of external debt over revenues, (iv) debt service as a share of exports, and (v) debt as a share

of revenue. The probability of a country having debt distress is denoted as $Pr_j(y_{it} = 1)$. According to the DSF, a debt distress episode refers to periods lasting three or more years in several ways that include (i) build-up of arrears on public and public-guaranteed (PPG) external debt in excess of five per cent of outstanding PPG external debt, (ii) rescheduling of obligations due to Paris Club creditors, and (iii) the disbursement by IMF of resources exceeding 50 percent of IMF quota.

It is important to note that the DSF by the IMF and the World has greatly influenced the trajectory of financial and lending market globally and it continuous to do so. However, it has also come under criticism for a number of reasons. For example, Guzman and Heymann (2015) argue that the DSF methodology projections have been biased resulting to distortions on debt restructuring thus negatively affecting the concerned countries. Indeed, this analogy is confirmed by the IMF (2002) report which notes that for Brazil, Argentina and Lebanon the projections were overly optimistic as they showed that debt was stabilizing yet they were on upward trajectory. During the European debt crisis, the IMF (2011) report notes under different scenarios shows that Greece, Italy, Ireland, Iceland, Italy, Portugal, Ukraine and United Kingdom experienced a rapid increase in public debt. Indeed, it was established that the forecasts were biased, and the IMF underestimated the rise in public debt. For example, for Greece the debt was underestimated by over 100 percent covering a horizon of six (6) years. Similarly, Pinto (2019) posits that DSF framework requires improvement in order to explicitly assess debt sustainability in Low-Income Countries. The author argues that there is need to shift the focus from external debt to public debt as the debt trajectory has shifted to include a big chunk of domestic borrowing, and along the same vein the focus should be on historical data with a shorter projection period. Moreover, the framework should focus more on sustainability and development especially for LIC.

We recognise that the debt sustainability framework (DSF) and the debt sustainability assessment (DSA) play an important role in analysing fiscal sustainability in informing policy interventions by the government. We view the DSF as a strategy for applying various shocks to the macroeconomic framework such as a growth shock, an export shock, an exchange rate shock or an interest rate shock and assessing the impact on fiscal performance and the government's ability to service its external debt. This contrasts with the thesis' goal of establishing a single measure of fiscal space, which relies on historical evidence on tax revenue

and public debt. Our measure compares each country to the average of all other countries. We argue that this relative measure is meaningful in revealing a country's tax and debt trajectory to signal fiscal distress.

Because good performance is a relative measure by nature, the comparison of a single country's performance to all others is valid. Of course, one could argue that all countries performed poorly in some economic aspect, analysts usually use some relative comparison in order to make judgements and allocate resources.

3.3.3 Fiscal tightness (de factor fiscal space)

We also consider the de factor fiscal space as introduced by (Aizenman & Jinjarak, 2010). The authors estimate fiscal space by taking public debt to tax revenue and define fiscal space as being inversely related to the tax years it would take to repay the debt. This approach considers realised tax collection as an important channel in determining a country's ability to meet its debt obligations. The approach is given as follows:

$$FS_{it} = \frac{debt_t}{tax\ revenue_t} \qquad 3.8$$

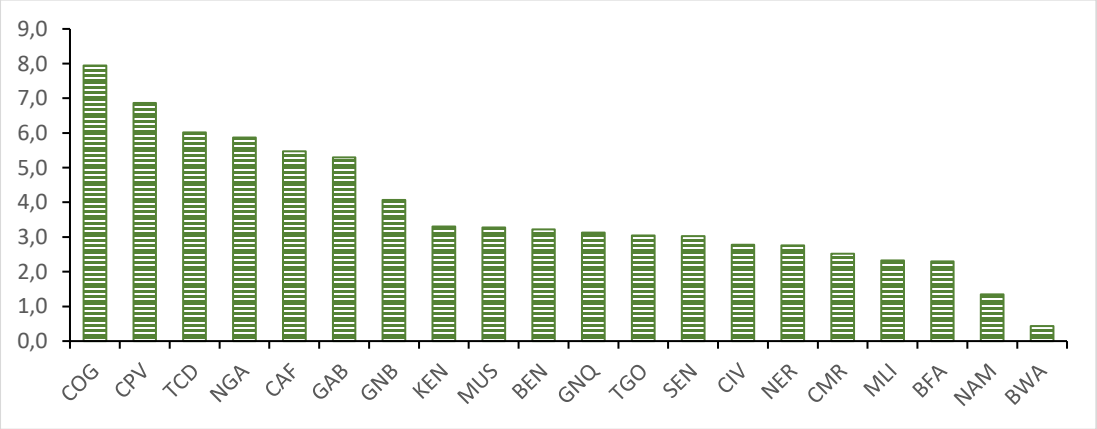


Figure 3.1 Aizenman et al. fiscal tightness (debt to tax revenue) in 2016

This method shows that when the ratio between debt and tax revenue is high, then a country takes a longer period to repay its debt levels. As such, the method provides information on the

fiscal tightness that countries face with increasing debt levels. *Figure 3.1* shows the fiscal tightness of the countries under our investigation. It is evidently clear that, Congo Republic has a high fiscal tightness while Botswana has the lowest in 2016. This measure differs significantly with other fiscal methods in that it does not provide information on the debt limit or tax revenue limit to inform on how much room is available to a country for fiscal manoeuvres. Additionally, since this method provides little information on room for fiscal manoeuvres, policy makers are constrained on when to determine fiscal interventions to an economy given the lack of a benchmark limit.

3.3.4 Other measurements of fiscal Space

As mentioned earlier, fiscal space can be defined as the difference between the group mean debt to GDP ratio of a defined group of countries. In our case we consider countries with fiscal rules in SSA. This approach has been used in several set ups including those by the World Bank (2015) and the Treaty of Maastricht of the European Union (EU) that set the threshold at 60 percent because that was the average debt to GDP ratio during the time of the treaty negotiations (Castro (2011) and Reuter (2015)). The approach is straight forward, less demanding and captures country specific characteristics on debt dynamics. In our analysis, we have taken careful assessment of countries debt levels and excluded outliers in estimating the group average.

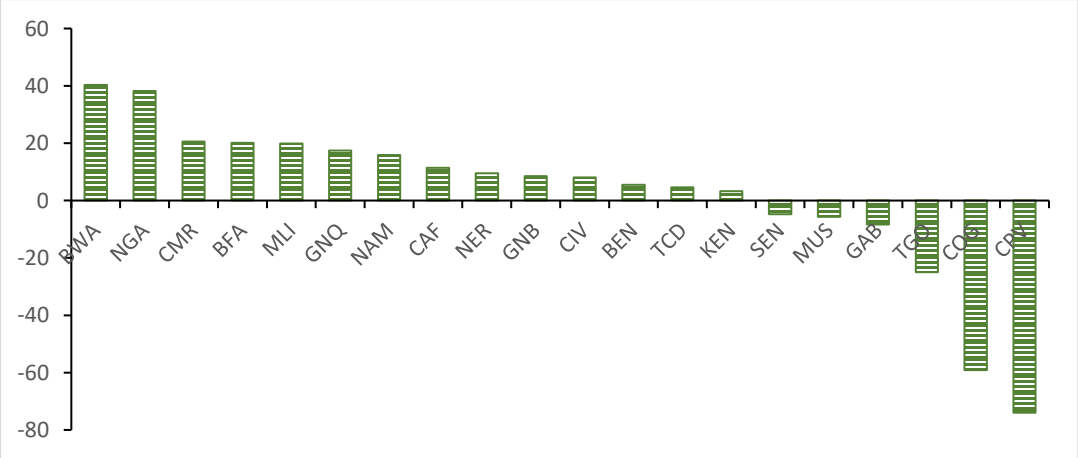


Figure 3.2 Fiscal space (average group debt limit minus actual debt) in 2016

Specifically, we have eliminated countries with debt loads above 150 percent of GDP during the sample period. Among the countries excluded are: Guinea Bissau, Congo Republic, Equatorial Guinea, and Cote d'Ivoire, which all had higher debt to GDP ratios at some point in the sample period. On the other hand, Botswana and Namibia are eliminated in the estimation of the group mean debt to GDP ratio as they had the lowest debt levels of below 5 percent at some point during the sample period. The calculation of fiscal space using this approach is as follows:

$$\mathrm{FS_{it}} = \begin{cases} Positive, & if\ d_{gmean} - d_{it} \geq 0 \\ Negative, & if\ d_{gmean} - d_{it} < 0 \end{cases} \qquad 3.9$$

Where FS_{it} is the fiscal space for country *i* at time *t*, d_{gmean} denotes sample group mean debt as a share of GDP, and d_{it} is the debt as a share of GDP for country *i* at time *t. Figure 3.2*, shows that several countries had fiscal space in 2016. Thus, policy makers had ample room to mitigate the economies in the event of unexpected negative shock. On the other hand, fiscal space had diminished in a few countries with the worst being Cape Verde.

Next, we consider the mean debt to GDP ratio based on supranational and country debt limits. As noted earlier, we consider supranational debt limits (debt rules) as a ratio to GDP[9]. We therefore take careful assessment of regional and country debt dynamics and in this case, we exclude Namibia in estimation of mean debt to GDP ratio in this category. The rest of the procedure are like the above approach such that:

$$\mathrm{FS_{it}} = \begin{cases} Positive, & if\ d_{ggmean} - d_{it} \geq 0 \\ Negative, & if\ d_{ggmean} - d_{it} < 0 \end{cases} \qquad 3.10$$

Where FS_{it} is country *i* fiscal space at time *t*, d_{ggmean} denotes sample group mean debt to GDP ratio and d_{it} is the debt to GDP ratio for country *i* fiscal space at time *t. Figure 3.3*, also shows that several countries had fiscal space, while a few had no fiscal space and were vulnerable to shocks.

[9] In WAEMU and CEMAC the debt limit is set at 70 percent of GDP, in East Africa Community at 50 percent of GDP. At country level, it varies between 25 percent and 60 percent among different countries.

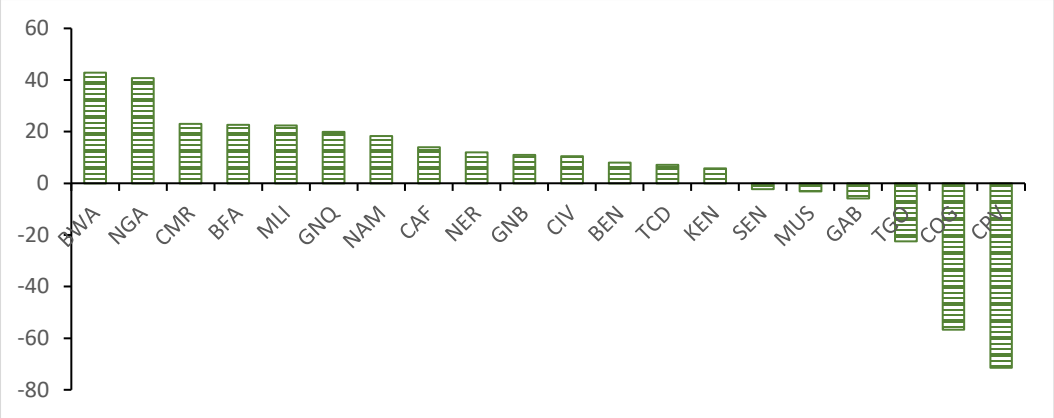


Figure 3.3 Fiscal space (average group (regional) debt minus actual country debt) in 2016

The next measure considers the group median debt to GDP ratio. In this case, a group median is determined from the sample and used as the debt to GDP limit. To arrive at the group median debt, we use the same approach used to determine the group mean by eliminating outliers. Thus, the calculation of fiscal space using this approach is given as follows:

$$\mathrm{FS_{it}} = \begin{cases} Positive, & if\ d_{gmedian} - d_{it} \geq 0 \\ Negative, & if\ d_{gmedian} - d_{it} < 0 \end{cases} \qquad 3.11$$

Where $d_{gmedian}$ denotes sample group median debt to GDP ratio and the other variable definition remain the same as earlier explained. *Figure 3.4* shows that numerous countries had fiscal space, while some had no fiscal space. This measure helps to show how far a country's debt deviates from the median of the group.

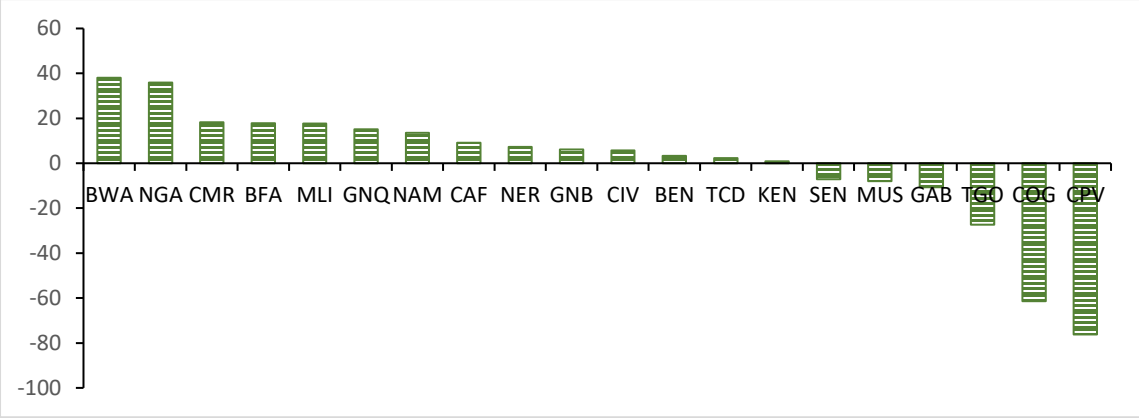


Figure 3.4 Fiscal space (group median debt minus actual debt) in 2016

3.3.5 Improved Aizenman and Jinjarak (2010) measure of fiscal space

In this thesis, we estimate fiscal space by taking the difference between the group mean of debt to tax and actual debt to tax (herein referred to as '*hybrid fiscal space'*). Following this set up, we improve on Aizenman and Jinjarak (2010) by setting a benchmark limit as a reference for policy, while considering tax revenue as an important channel for sustainable revenue. As shown in *Figure 3.5*, we calculate fiscal space by estimating group mean debt to GDP as a ratio of tax revenue to GDP (herein referred to as debt to tax revenue). Once the group mean is estimated, fiscal space is calculated by taking the difference between group mean and actual debt to tax revenue. As with the other methods used above, care is taken to eliminate outliers in the estimation of the group mean debt to tax revenue. Thus, the approach proceeds as follows:

$$FS_{it} = \begin{cases} Postive, \ if \ \ dd_{gmean} - \ d_{it} \ \geq 0 \\ Negative, \ if \ \ dd_{gmean} - \ d_{it} \ < 0 \end{cases} \qquad 3.12$$

Where FS_{it} is country *i* fiscal space at time *t*, dd_{gmean} denotes sample group mean debt to tax revenue and d_{it} debt to tax revenue for country *i* fiscal space at time *t.*

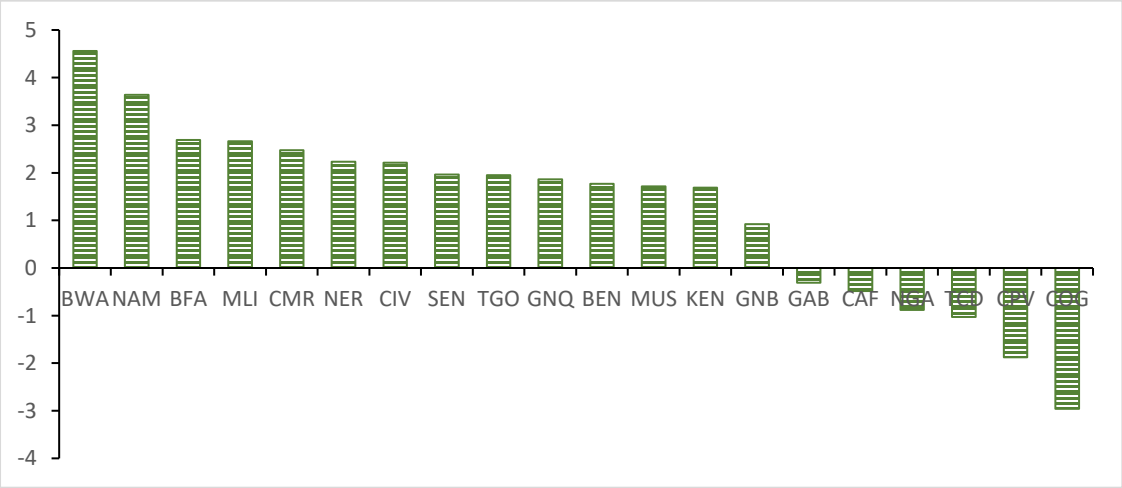


Figure 3.5 Fiscal space (average debt/tax minus actual debt/tax revenue) in 2016

It is important to note that the group mean has widely been utilized, and is the simplest approach employed in empirical literature. Paccagnella (2006) notes that centring around a group mean enables us to interpret the intercept as the expected outcome of the whole group. It is undertaken especially when the research is interested in separating the between group and within group components from the total variation to examine how groups affect individual

performance and thus accounting for the group structure in the model (Cronbach & Webb, 1975). As such, in the analysis variations can be decomposed into between group and within group by group transformation. This helps in the analytical work to reveal individual characteristics in a group. It is widely believed that individuals from the same group or society tend to behave uniformly. Accordingly, Manski (1995) presents three hypothesis that elucidate group effect on a person or society or community: endogenous, contextual and correlated effects. Indeed, the endogenous effect arises when individual behaviour varies with the usual behaviour in the group. The contextual effect arises when individual character varies with the spread of the surrounding behaviour in the group. On the other hand, the correlated effect arises when individuals behave uniformly due to possession of same characteristics. The flexibility of the group mean is vital as it allows for decomposition of total variation to individual and group components as well as between group and within group components, therefore, unequivocally describing the group pattern in the model[10].

This measure is important as it considers a country's ability to meet its debt obligations through taxation channel, which is important for most economies. The tax channel as a revenue source is the only assured source for long term resource mobilisation as a country can influence taxes through various fiscal measures. Moreover, when countries face recession, fiscal fatigue or debt distress, austerity measures always include a tax component as was the case in Greece in 2010. Similarly, the commodity-based economies have of late enhanced diversification measures to increase their tax revenue base due to increased commodity price volatility. The diversification measures signal the fact that oil and other commodity products are subject to depletion, thus, tax revenue provides a safer and long-term channel for a country's revenue base.

In this thesis, we argue that the use of tax revenue to debt versus the group mean measure offers good insights into a country's fiscal space. The most important part of this measure is the

[10] By use group mean of public debt to tax revenue in our fiscal space measurement may be questioned as developing countries derive part of their resource envelop from non-tax sources. In spite of a high non-tax revenue, recent efforts by the IMF and the World Bank have focused on measures of economic diversification to increase tax revenue. Similarly, the non-tax revenue resulting from commodities is subject to global price volatility which negatively affect fiscal revenue of developing countries and, in the end, leading to limited fiscal space and public debt. Secondly, it can be argued that countries face different debt repayment periods or profiles. Thus, our model does not account for this attribute. We argue that a country with a high and sufficient tax revenue shall meet their timely debt obligations have a higher fiscal space. Indeed, we also opine that difference in debt profile does not matter when countries have higher tax revenue. In addition, we argue that despite countries possessing differing attributes in relation to domestic and foreign financial market access, the ability to collect tax revenue mitigates public debt roll over effects which strengthens financial market access.

relative performance of the country versus its peers. We argue that fiscal space is not an absolute quantity, and the same ratio (tax revenue/debt) may have different meanings at different times; for example, depending on global interest rates. The current and expected future interest rate on debt is critical to the amount of potential borrowing by government, which is key to the meaning of fiscal space.

Secondly, this approach considers a limit on the country's ability to borrow and pay which provides policy makers and the market benchmark to avoid debt loads growing higher than tax revenue. Furthermore, estimation of the group mean debt to tax limit provides significant information to policy makers on fiscal interventions to be employed to enhance tax revenue and shrink the debt levels. Our method clearly confirms a few of the earlier results for both countries with fiscal space and without. From our approach, Mauritius fiscal space has improved as well as other countries that have better tax revenue base. We therefore argue that, given the importance of tax revenue as key component of a country's revenue and the main and sustainable source for revenue, we provide a benchmark for fiscal space. This method also supports the diversification efforts by international organisations like the World Bank and IMF.

We acknowledge that our measure of fiscal space may not be a panacea, but it seems to us that the relative nature of the measure is important for judging fiscal space. Further, our measure of fiscal space does not consider uncertainties that may affect future fiscal revenues or expenditures. Nonetheless, we argue that high levels of tax revenue in a country cushions the country and thus provides a buffer that allows increased borrowing or payment of debt service in case of a shock. Furthermore, we can best just how sufficient revenues are by comparing the individual country to the mean of its peers.

Our previous discussions of the various measures of fiscal space have shown that each measure has its strengths and weaknesses, and the measures also employ varied aspects of fiscal sustainability. From the different illustrations of *Figures 3.1* to *3.5* we establish several measures that seem to offer similar results. However, the cross-sectional data show that, different measures considered give different results. In all the figures, the economies are ranked in order of country's fiscal space and in almost all aspects, fiscal space ranking changes only slightly. However, we establish that economies that have fiscal space tend to remain the same regardless of the different approaches and these approaches to a larger extend reveal same results for those without fiscal space. De facto fiscal space which measures the fiscal tightness also tends to show that countries with high fiscal tightness are like those in other methods.

Therefore, it is now apparently clear that the size of fiscal space varies across countries and time. Based on our review of the measures and definitions of fiscal space, and as noted earlier throughout the thesis, we define fiscal space as the difference between group mean debt to tax revenue and actual debt to tax revenue. Table A3.2 reports the correlation of the different measures of fiscal space elucidated in this chapter. The correlation results show that the different measures of fiscal space exhibit perfect association.

3.4 Fiscal space and debt sustainability

This section follows IMF-WB Low-Income Countries debt sustainability framework (DSF) to assess the probability of a country experiencing debt (fiscal) distress. The maximum likelihood estimator (MLE) is used to estimate the probit model. Green (2000) notes that the probit model is simple to use and is based on normal distribution[11]. Following this set up we utilize a simple probit model on our selected sample of SSA countries with fiscal rule. Therefore, our model is given as follows:

$$Pr_j(y_{it} = 1) = \gamma\left(\beta_{FS_j} FS_j + \beta_X X_j + \varepsilon_i\right) \qquad 3.13$$

where FS denotes fiscal space, y is a binary for debt distress that is equal to one when a country experiences a debt distress and zero (0) otherwise. The covariates are denoted by X and ε refers to error term. The list of covariates includes real GDP, world growth rate and other institutional variables like GDP per capita that is used to control for governance and economic shocks. The fiscal space variable used in this analysis follows our earlier definition of hybrid fiscal space, which is the difference between group mean of debt to tax revenue and actual debt to tax revenue. The independent variables are lagged to attenuate the presence of endogeneity that may arise. GDP growth has previous been utilized to control for governance and economic shocks (IMF 2016). We expect a priori that a higher fiscal space will result into a low likelihood of debt distress. This is because countries with higher fiscal space will have a lower level of debt accumulation as they have resources at their disposal to meet public spending outlays. Moreover, we also expect a priori, that increase in GDP growth a proxy for governance results to lower likelihood of debt distress.

3.4.1 Results

[11] For details on the derivation of the probit model and marginal effects used in interpretation of results see Gujarati and Porter (2009) and Ibrahim and Alagidede (2020).

From the analysis as shown in Table 3.2, we find that fiscal space is associated with the likelihood of a reduction in debt distress. That is increase in fiscal space by one percent results to 0.002 per cent reduction in debt distress. We also find that increase in trade openness, GDP per capita and economic growth result to a likelihood of reduction in debt distress. Our results are in line with theoretical predictions that countries with higher fiscal space do not experience debt distress. On the same vein, our findings are consistent with IMF (2014) that higher public debt results to more likelihood for debt distress. As such, our findings show that countries with higher fiscal space experience a lower probability of debt distress or debt rescheduling. Our results are also in line with Aizenman *et al.* (2019) finding that public debt to tax revenue is an important measure of limited fiscal space.

Table 3. 2: Estimation results of the probability of debt distress using Hybrid fiscal space

variables	(1) Probit	(2) Probit	(3) Logit	(4) Logit
Hybrid fiscal space	-0.002[c]	-0.003[c]	-0.005[c]	-0.006[c]
	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita	-0.681[c]	-0.810[c]	-1.283[c]	-1.589[c]
	(0.095)	(0.137)	(0.174)	(0.240)
Trade Openness		0.006		0.010
		(0.006)		(0.013)
Real GDP		-0.109[c]		-0.209[c]
		(0.022)		(0.042)
Constant	7.501[c]	9.593[c]	14.291[c]	18.660[c]
	(0.870)	(1.378)	(1.662)	(2.422)
Pseudo R^2	0.33	0.48	0.34	0.49
Countries	20	20	20	20
Observations	455	449	455	449

Note: Each column presents a separate regression with sovereign default as the dependent variable. All independent variables are transformed to logarithms before estimation. Robust standard errors are in parentheses [c] denotes significance at 1 per cent [b] denotes significance at 5 percent and [a] denotes significance at 10 percent.

We also undertook a robustness test using Romer's measure of fiscal space. Using the same probit model with a dummy of debt distress as our dependent variable and debt to GDP ratio as the measure of fiscal space in addition to other covariates that include GDP per capita, trade openness. The results from the robustness test in Table A3.1 show that fiscal space reduces the likelihood of debt distress.

3.5 Conclusions

In this chapter we have taken a simple approach to provide a measurable way for fiscal space, by considering assured and long-term revenue available. Interestingly, we find that several

SSA countries have higher financing injections from grants. However, in recent periods, the level of grant support has deteriorated especially after the financial crisis. Therefore, as we establish in our simple analysis, increased tax revenue and lower debt levels will enhance the countries to meet financing needs in crisis times. In the same vein, having a more diversified country will help cushion resource-based economies from volatile resource revenue.

Further, we undertook examination of our measure of fiscal space to predict fiscal distress. Using a probit model the findings show that an increase in fiscal space results to a reduction in fiscal distress. These results are similar to the findings in the robustness checks using other measures of fiscal space. Our findings show that increased efforts to scale up fiscal space will enhance a reduction in accumulation of public debt thus, mitigate against fiscal distress. The recent fiscal policy efforts geared towards reforming the tax revenue agencies and increasing tax base efforts have long-term positive policy implications on resource mobilisation. Therefore, there is need for developing countries including those in SSA to broaden their tax base to enhance tax revenue. Moreover, strengthening of tax collection institutions via modernisation on collection of tax revenue and building of human capacity will foster increase in tax revenue and help cushion these economies against debt distress.

Appendix A3.1: Other measures of fiscal space

The ability to pay approach introduced by Ghosh *et al.* (2013) indicates that sustainable debt levels have a point of confinement past which essential parity will be deficient to balance future debt service obligations. The approach features a non-linear response function of the primary balance, interest payments that depend on debt levels. Recently, the model has been employed by Nerlich and Reuter (2016) and Zandi *et al.* (2011) where the parameters of the fiscal response function are evaluated through panel estimation and are same across over nations. The effective interest rate is a component of a nations specific historical average interest rates. The figure below shows the various levels of debt and interest dynamics:

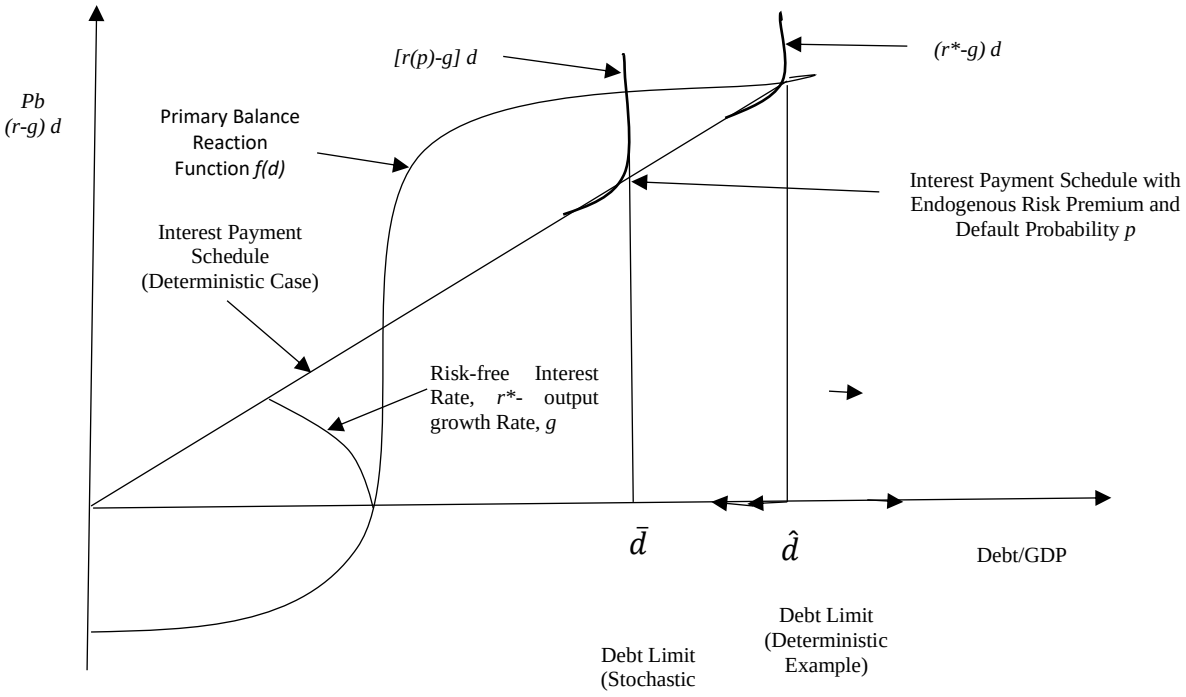


Figure A2. 1 Determination of debt limit
Source: Adopted from Ghosh et al. (2013)

Figure A3.1 shows the stochastic debt limit depicted by an upward pending convex interest payments schedule which is lower than the deterministic case. This approach features a non-linear response function of the primary balance to the debt levels and other covariates. The approach imposes a sustainability criterion by determining the debt limit, thus ruling out a surging debt load and allow for the relationship between debt and interest rates. The estimation of the fiscal reaction function parameters is undertaken under a panel framework. Thus, the extent of the primary balance adjustment in response to changes are assumed to be the same across all countries. This model suffers from numerous limitations including: the use historical

data to estimate the fiscal response function at the empirical stage. Thus, the model is backward looking and assumes that past behaviour may be used to guide future policy; The response of the fiscal response function is assumed to be the same across all countries; The model does not include a country's ability to pay channels like tax revenue: The model is also affected by changes on fiscal variables which may alter the debt limit dynamics. At the data level, the method suffers due to limited fiscal data like interest rates in some countries. The model also relies on 5-year projected interest rates in determining the growth interest differential without considering uncertainty in the debt market.

Table A3. 1: Estimation results of the probability of detection of default using Romer's fiscal space.

Variables	(1) Probit	(2) Probit	(3) Logit	(4) Logit
Public debt	-0.017[a]	-0.017[a]	-0.031[a]	-0.033[a]
	(0.003)	(0.004)	(0.007)	(0.008)
GDP per capita	-0.535[a]		-0.897[a]	
	(0.109)		(0.189)	
Trade openness	-1.116[a]	-1.653[a]	-2.275[a]	-3.371[a]
	(0.344)	(0.401)	(0.660)	(0.698)
Real GDP		0.005		0.013
		(0.010)		(0.023)
Constant	9.685[a]	7.484[a]	18.082[a]	15.056[a]
	(1.332)	(1.763)	(2.937)	(3.122)
Pseudo R^2				
Countries	20	20	20	20
Observations	455	454	455	454

Note: Each column presents a separate regression with sovereign default as the dependent variable. Robust standard errors are in parentheses [a] denotes significance at 1 percent [b] denotes significance at 5 percent and [c] denotes significance at 10 percent.

Table A3. 2: Correlation of different fiscal space measures

Correlation	Fiscal space	Fiscal space 1	Fiscal space 2	Fiscal space 3
Fiscal space	1.000[a]			
Fiscal space 1	0.633[a]	1.000[a]		
Fiscal space 2	0.633[a]	1.000[a]	1.000[a]	
Fiscal space 3	0.633[a]	1.000[a]	1.000[a]	1.000[a]

Notes: Fiscal space: *hybrid fiscal space*, fiscal space 1: average group debt minus actual debt, fiscal space 2: average supranational minus actual debt and fiscal space 3: group median debt minus actual debt.

Chapter Four

Fiscal Rules and the Compliance debate: Why do Countries Adopt Rules and Fail to Comply?

4.0 Introduction

In the aftermath of debt relief in developing countries and the recent debt crisis in Europe many countries have significantly strengthened their fiscal policy. Most importantly, countries have improved their fiscal surveillance with fiscal rules at both national and regional levels. Sub-Sahara Africa (SSA) countries are at the forefront of this trend, and by 2016, 57 fiscal rules were in operation in SSA in 25 countries. This means that on average each country has two rules for fiscal management. The key elements of fiscal rules are the numerical rules that restrict discretionary spending by governments and impart a sense of fiscal credibility. In this chapter, we empirically analyse the probability of compliance of fiscal rules in SSA and examine the role of institutions and macroeconomic variables on the compliance debate. We define compliance of fiscal rules as periods in which countries do not surpass their numeric targets[12].

Fiscal rules compliance questions turn out to be difficult to answer for various reasons. Firstly, apart from the International Monetary Fund (IMF) fiscal rules database, it is usually not clear whether or not countries complied with the details and dynamics of country fiscal rules (IMF, 2017). Secondly, information on compliance of individual fiscal rules is not readily available, and even when available, it is not clear what determines compliance to the rules. Therefore, the compliance question is important and necessary to address before one turn to the effectiveness of rules and their future reforms[13]. This thesis, therefore, aims to answer the following questions:

[12] Throughout the chapter, compliance of fiscal rules refers to events where fiscal outturns are within or below the corresponding numeric fiscal targets (e.g. if the debt limit is set at 50 percent of GDP, and the current debt is less or equal to 50 percent, the country is said to have complied).

[13] In this chapter we refer to effectiveness of fiscal rules based on the success of fiscal rule to produce the desired result or outcome. For example, a fiscal rule is deemed to be effective to enhance fiscal space, if indeed it leads to higher fiscal space. Similarly, a rule is effective if it achieves the intended objective, e.g. if the rule leads to output stabilisation in the short-run and fiscal sustainability in the long-run. As such, effectiveness of rules can be assessed as a process that may take time to realise the intended outcome. Following this line of thought, Poterba

What are the determinants of compliance for different fiscal rules?
Do compliance rates vary across different rules? And
Does the compliance of rules affect their fiscal targets?

The theoretical framework for rules is based on the deficit bias, and rules are introduced to influence policy design and anchor agent's expectation about the government's commitment to fiscal discipline. Recent interest in adoption of rules has risen as a reaction to rapidly rising debt and unsustainable deficits (Hallerberg et al., 2007). Despite the attractiveness of this rules it is not clear on the determinants that enhance the efficacy of such rules and their compliance to mitigate the deficit bias. At the same time, political factors significantly influence fiscal policy compliance, such that democratic and politically stable countries have a higher probability of compliance (Ivanova et al. (2001); Nsouli et al. (2004); Dreher (2006); Joyce (2004)).

There is vast literature on the effectiveness of rules, which has led to a surge in adoption of rules by countries for policy management. In general, empirical evidence suggests that the introduction of fiscal rules leads among other factors to enhanced time consistency of macroeconomic policy, lower fiscal deficits, reduced sovereign risk premia and enhanced fiscal space (Kopits (2004); Calmfors and Wren-Lewis (2011); Bergman *et al.* (2016); (Thornton & Vasilakis, 2017); Nerlich and Reuter (2016)). Against this backdrop, only a few papers have focused on this thematic area of compliance of fiscal rules. Among them, Delgado Tellez et al. (2016) analyse the compliance of fiscal rules at the subnational level in Spain. The authors find that fiscal noncompliance is persistent in Spain and increases with the size of growth forecasts. On the other hand, Cordes *et al.* (2015) examines the compliance of expenditure rules in developed and emerging countries finds that such rules are complied with more often than other rules if employed in a coalition government or in the presence of statutory law and in cases where such rules have explicit nominal targets. Frankel and Schreger (2013) investigates the compliance of supranational rules in the European Union and finds that government

(1994) finds that US states with more restrictive fiscal institutions are better able to achieve balanced budgets, limits on tax revenue and spending, and reduction in deficits.

Bergman et al. (2016) find that fiscal rules are effective in reducing the structural primary deficits in selected European countries. Other authors have found rules to be associated with improved and sustainable public finances (Debrun et al. (2008); Nerlich and Reuter (2013); Dirk Foremny (2014)). Sacchi and Salotti (2015) study the relationship between discretionary fiscal policy and macroeconomic stability in 21 OECD countries. Their findings show that fiscal rules induce discretionary policy to become output stabilising especially in the presence of balanced budget.

forecasts are biased if the government violates the fiscal deficit target of 3 percent of GDP. The authors conclude that this bias is mitigated when rules are supported by fiscal councils[14]. Broadly speaking, fiscal councils can contribute to improved fiscal policy as they can limit political influence over technical aspects of policy formulation. Along the same lines, Reuter (2018) investigates the compliance of fiscal rules in the European Union, and finds that independent monitoring and enforcement bodies are associated with higher probability of compliance.

This chapter complements the existing literature and departs from the above by focusing on the determinants of compliance to fiscal rules[15]. Firstly, we focus on debt rule, balanced budget rule and revenue rules, which are widely employed in SSA. Secondly, we deviate from Reuter (2018) by including other variables that have significant influence on SSA like grants. Numerous SSA countries have grants that amount to 10 percent or more of their GDP. Similarly, most countries in SSA have high debt levels, so interest payments constrain their compliance rates. Given the high levels of inequality in SSA, GDP per capita could shed light on a country's compliance ability. Thirdly, institutional arrangements have a significant influence on a country's fiscal management and could form part of the determinants of fiscal

[14] Fiscal councils are independent bodies set up by governments to evaluate fiscal policy and offer independent macroeconomic forecasts, e.g. making revenue projections., In this case they limit the self-interested upward bias, thus fostering transparency on budgetary decisions (Debrun and Kinda (2017); Beetsma et al. (2019)). According to Beetsma *et al.* (2019), fiscal councils have substantially increased and are heterogeneous in mandate, remit, size etc. across countries. Additionally, they also differ as per their names across countries, e.g. Austria – Fiscal Advisory Council; U.S. – Congressional Budget Office; Denmark – Danish Economic Council; in Kenya, Uganda and South Africa – Parliamentary Budget Office; Belgium – Federal Planning Bureau; and Germany – Independent Advisory Board to the German Stability Council.
It is important to note that having a fiscal council does not indicate that a country has a fiscal rule. Therefore, it is possible for a country to have either a fiscal council or fiscal rules or both at the same time, e.g. Chile has both a fiscal rule and a fiscal council while South Africa has only a fiscal council (see IMF (2017, 2018).

[15] It is important to note there is a difference between budget laws and fiscal rules. A fiscal rule is anchored into the statutory provisions by an Act of parliament or entrenched in the constitution and provides a numeric fiscal target. Further, a fiscal rule cannot be changed regularly as any change will result to change in legislation. However, a budget law is a legislation that provides annual revenue and expenditures in a single or multiple legislation. Similarly, although a budget law is anchored in legislation, from a theoretical stand point it is subject to discretionary revision of the fiscal authorities to meet government spending objectives. According to IMF (2010) the budget law is embedded with principles of accountability, transparency, and stability. Therefore, the executive through the budget offers an account of their spending responsibilities, the role of each institution involved is defined and fiscal instruments are framed in a medium-term framework. Despite this explicit provision of institutions and functions, the budget law is prone to political influence to meet the interests of political elites in which case, it does not constrain the hands of the executive.

We argue that compliance in fiscal rules differs from compliance with budget laws. Fiscal rules compliance refers to meet the required numerical target, for example, a debt rule of 60 percent of GDP is deemed complied with when debt expended is below 60 percent of GDP. However, compliance with budget may involve meeting the budget making requirements and following the laid down budget principles.

rules compliance. Fourthly, this study focuses on Sub Saharan African countries with fiscal rules in place. The SSA region presents an interesting case study, because it has the highest inequality and poverty levels in the world and the majority of the countries are classified as low income by the World Bank (WB). Similarly, majority of the countries have significantly high debt levels and of the 39 countries that benefited from Highly Indebted Poor Countries (HIPC), 36 of them came from SSA (see IMF (2018))[16]. As noted earlier, only a smattering of papers has focused on the issue of compliance and none have focused on SSA despite the region's growing importance in the global economy.

In recent years, there has been a growing recognition that governments may not always serve the public interest. Fiscal policy rules follow the logic of monetary policy rules, such as inflation targeting, which have produced impressive results. In fact, Central banks credibility has increased and made them more transparent and accountable (Wyplosz, 2005). At a fundamental level, fiscal rules are supposed to be simple, easy to implement, and set explicit numeric targets (Schaechter et al., 2012). The compliance of rules in principle, should restore fiscal policy credibility, enhance long-run fiscal sustainability and buttress government efforts of fiscal discipline. Central to this, is the extensive information asymmetry and the dynamic inconsistency of macroeconomic policy, given that public finance and budget processes are at the centre of a political process. Not surprisingly, because of the aforementioned challenges, there has been a rise in adoption of fiscal rules which has extended across the world. At the same time, SSA countries have continued with a surge in public debt and deficit, notwithstanding undertaking reforms on fiscal rules over time[17]. While reforms are important to improve on the rule's performance, the question that arises is why countries fail to keep their promises.

To understand the sources of compliance to fiscal rules, we employ both a panel logistic model and an instrumental variable probit model. The latter approach is employed to address the potential endogeneity problem that may arise in adoption and compliance of fiscal rules. Our empirical findings show that monitoring enhances fiscal rules compliance. Similarly, coverage of rules determines the compliance rate, thus rules adopted and covering the central

[16] Heavily Indebted Poor Countries (HIPC) was launched in 1996 by the IMF and WB, to ensure poor countries have sustainable debt levels. The Multilateral Debt Relief (MDR) initiative was launched in 2005 to supplement the HIPC by the IMF, WB, Africa Development Bank (AfDB) and the Inter-American Development Bank (IaDB) to help meet the Millennium Development Goals (MDGs).
[17] See figure 4.3 and 4.4 on the debt and deficit comparison among SSA countries.

government have a high probability of compliance. Furthermore, institutional factors also play a significant role in a country's compliance rate. High corruption increases the probability of non-compliance while regulatory quality enhances compliance of fiscal rules. Our findings also confirm that, overall, the debt rules are highly complied with and revenue rules are the least complied with. Macroeconomic factors also have a role in the compliance of fiscal rules; that is, enhanced grants and GDP per capita is associated with higher probability of compliance. Our survey also reveals that, significant heterogeneity exists among countries and individual fiscal rules.

The remainder of the chapter is structured as follows: Sections 4.1-4.2 focus on the types of fiscal rules and a survey of fiscal rules in SSA. Section 4.3 reviews fiscal policy is a selected group of SSA countries. Section 4.4 provides a relevant literature review and Section 4.5 presents the construction of a fiscal rules index. Section 4.6 presents the summarized fiscal rules and critique of fiscal rules in SSA. Section 4.7 explains the data used and Section 4.8 explains the compliance statistics. Sections 4.9 explains the econometric methodology and Section 4.10 is not listed. Sections 4.11and 4.12 present the estimation results and robustness check. Finally, Section 4.13 presents the conclusions and policy implications.

4.1 Types of Fiscal Rules

Fiscal rules provide boundaries on fiscal policy that cannot frequently be changed and stipulate operational guidelines that specify the numeric target on budgetary aggregates. Thus, fiscal rules impose long-lasting constraints on fiscal policy with numerical limits on budgetary aggregates. As such, these rules force economic adjustment and serve various objectives, including economic stabilisation. Rules have also been introduced to contain the size of government and act as an anchor for medium term credibility. While various fiscal rules exist in literature, this chapter focuses on certain types of rules. Firstly, we consider rules that have specific numeric targets outlined in a country's legal framework or applied at supranational level as opposed to procedural rules[18]. Secondly, we consider fiscal rules that have a lower

[18] According to Schaechter *et al.* (2012) countries operate either procedural rules or numerical rules or both in their fiscal management. The procedural rules establish good practices and transparency in the budget making process and the structure of this rules can be modified to strengthen institutions including the finance minister (Drazen (2004). However, procedural rules are subject to manipulation by the political class as they are not anchored in legislation. In instances where they are in legislation, they do not offer explicit numeric targets for policy guidance (Schaechter *et al.*, 2012).

frequency of revision and their adoption and revision is binding for three years. Thirdly, we consider rules that capture a large share of public finances both at central government and general government level and have a wide effect on the economy. Fourth, we consider rules that were adopted up to end 2017 both at national and supranational (usually regional) levels.

While fiscal rules may be interpreted in several ways, in this chapter, we refer to those targets and ceilings that are imposed on fiscal aggregates with the aim to provide guidance and impose constraint on the conduct of fiscal policy over a significant period of time. Following Schaechter *et al.* (2012), we define fiscal rules as a long-lasting constraint on fiscal policy through numeric limits on budgetary aggregates[19]. This means, that fiscal limits or boundaries are explicitly set which cannot frequently change, and they should be provided with operational guidance specifying numeric targets that limits a particular budgetary aggregate. However, fiscal rules that apply to local government or subnational government or individual sector are not considered in this analysis.

This chapter considers the following types of fiscal rules: Debt rules explicitly set numeric limits on public debt as a share of GDP. Balanced budget rules constrain the deficit, which in turn influences the debt ratio. Expenditure rules are set in absolute or growth rate limits on spending as a share of GDP. Revenue rules set ceiling or floors on revenues and they aim at boosting revenue or preventing an excessive tax burden. A sovereign wealth fund rule, which is not considered in this analysis, provides a numeric percent of savings from a revenue windfall and the percent of withdrawal in a downturn[20].

4.2 Survey of Fiscal Rules in Selected Sub-Sahara African Countries

The neoclassical fiscal smoothing model argues that governments should employ countercyclical fiscal policy by running surpluses in a boom and deficits in a downturn. In the developing country context, there is a wealth of evidence that they exhibit procyclical fiscal

[19] Fiscal rules can be specified in national constitutions through a statute, an Act of parliament, or a treaty and should explicitly specify the numeric target (e.g. SGP debt rule of 60 percent of GDP, WAEMU deficit rule 3 percent of GDP etc.). Fiscal rules can apply to the general or central government, supranational level (e.g. WAEMU) or subnational governments (e.g. Germany and Spanish subnational rules) (see (Kopits (2004) and Dirk Foremny (2014)).

[20] The appendix provides a detailed explanation of each individual rule and the pros and cons for each rule thereof. In this paper we do not consider the sovereign wealth fund rule in our analysis as the countries in use in SSA are few.

policy rather than countercyclical. This. in turn, has led to macroeconomic volatility, elevated fiscal vulnerability, impeded investment, and exacerbated debt accumulation, ultimately leading to the need for debt relief. For SSA, the procyclicality of fiscal policy has been exacerbated by uncertainty and high volatility of fiscal revenues as several countries depend on commodity linked revenues, credit constrains, exposure of countries to shocks (conflicts, Ebola, trade shocks), high level of informal economy and political business cycles. The empirical literature suggests that market discipline cannot mitigate procyclical fiscal policy and deficit bias. In fact, markets only intervene discontinuously. In this regard, an increasing number of countries has steadily adopted fiscal rules to address these shortcomings in view of creating fiscal space and providing a credible medium-term anchor for public finances.

This section makes three distinct contributions to the fiscal literature. Firstly, we track the evolution of fiscal rules in SSA using various characteristics that uniquely apply to the region. In particular, we provide a background survey to analyse the adoption of fiscal rules following different fiscal slippages and macroeconomic shocks in SSA[21]. Secondly, we corroborate and extend the fiscal policy literature in developing economies and highlight how the efficacy of rules is tied to institutions and the political environment. As such, economies that have rules supported by effective institutions tend to mitigate deficit bias and deploy countercyclical fiscal policy. Thirdly, we present a comprehensive review of rules and institutions for selected SSA countries and how they have evolved in support of strengthening fiscal rules for enhanced fiscal space.

To understand the nature of SSA fiscal rules, this survey studies several SSA countries at both national and regional level, including: West African Economic Monetary Union (WAEMU)[22], Central Africa Economic and Monetary Union (CEMAC)[23], Mauritius, Nigeria and Kenya. This section explores the range of statutory provisions, sanctions for non-compliance, design features and operational arrangements of rules.

[21] As noted earlier, countries employ either procedural rules or numeric rules. Therefore, in this chapter we consider only numeric rules that are captured in a legislation with a clear fiscal numeric target. Countries that have procedural rules, e.g. South Africa, are not considered. South Africa has employed the Public Finance Management Act No. 1 of 1999 (the Act was amended in 2010) in fiscal management, however, this legislation does not set a numerical target (see Republic of South Africa (2010)).

[22] WAEMU member countries consists of the following: Benin, Burkina Faso, Cote D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo.

[23] CEMAC members include Cameroun, The Central Africa Republic, Congo Republic, Gabon, Equatorial Guinea and Chad.

4.2.1 Fiscal rules in Sub-Sahara Africa

The number of fiscal rules in SSA has grown steadily over time, from only 4 fiscal rules in the 1990's to 57 by 2016 (see *Figure 4.1 and Table 4.2*). Over the period, the use of debt rules and balanced budget rules has been considerably high and none of the rules adopted has been abolished. The use of expenditure rule is infrequent with only Namibia and Botswana employing the rule. Currently, about 42 percent and 38 percent of numeric rules in place in SSA are debt rules and balanced budget rules, respectively, with 15 percent being revenue rules and only 3.5 percent are expenditure rules. As noted earlier, fiscal rules were first enacted and used in SSA in 1997, after which the number of countries with legislated fiscal rules has increased to 25 by end of 2016 (see *Figure 4.1*). These rules are adopted at the national and supranational level. The supranational or regional rules include the West African Economic and Monetary Union (WAEMU), Central Africa and Economic Monetary Community (CEMAC) and East Africa Monetary Union (EAMU). To strengthen the effectiveness of fiscal rules, countries frequently employ a combination of rules, with at least 24 countries using more than one rule for fiscal management.

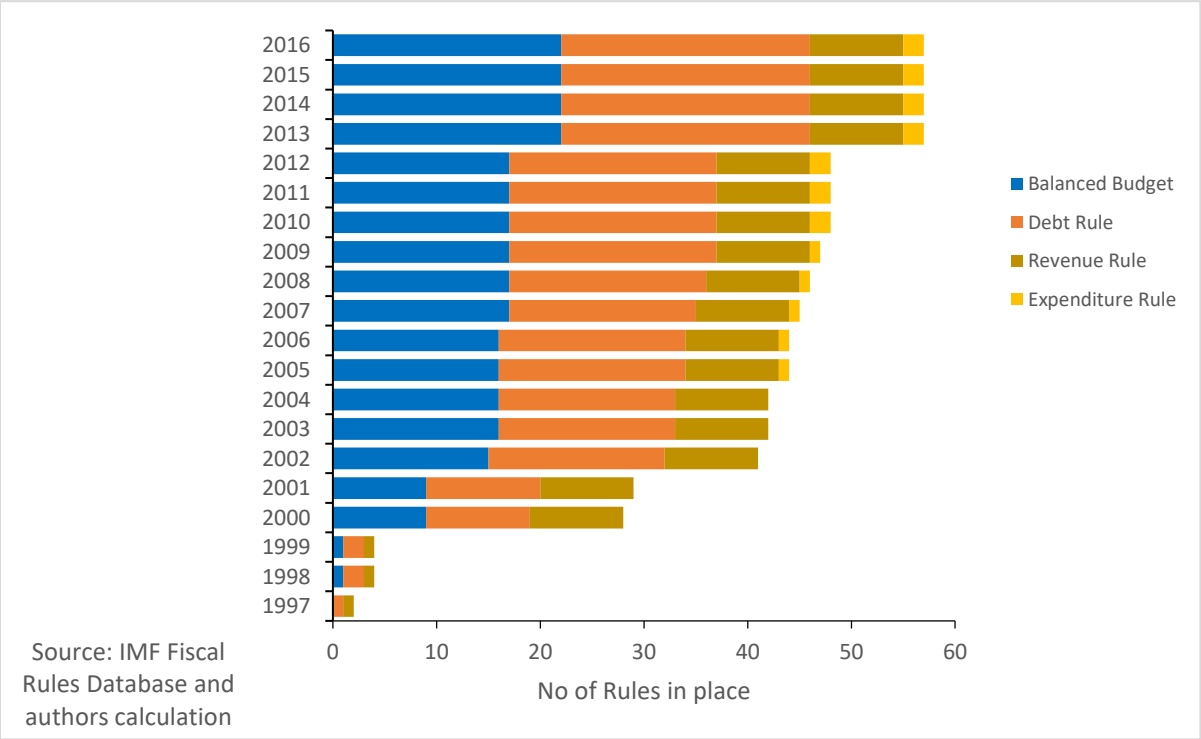


Figure 4. 1: Number of numeric fiscal rules in SSA since 1990's by type of rules

The use of debt rules and balanced budget rules has increased faster compared to revenue and expenditures rules in SSA (see *Figure 4.1*). Similarly, the use of debt and balanced budget rules has increased at the regional level, where they were first used in WAEMU in 2000, CEMAC in 2002 and EAMU in 2013. Although the expenditure rule is powerful, it is difficult to enforce, so the pace of adoption has been slow, with only Botswana and Namibia having employed the rule.

Figure 4.2, on the characteristics of fiscal rules employed in SSA, shows that fiscal rules have gone through several changes, increasing their credibility over time. At the country and regional levels, there also exist considerable variations. The changes made over time, highlight the adoption of rules at the regional level to help mitigate negative spill over effects among member countries. Some countries have clearly defined expenditures at different layers of government and allocations for development and recurrent spending. To strengthen the rules, several countries have oversight institutions like parliamentary committees, and include legislation such as the Public Finance Management Act, which helps strengthen fiscal rules operations. Three countries employ rules as a political commitment while only one country's rules operate under a coalition arrangement.

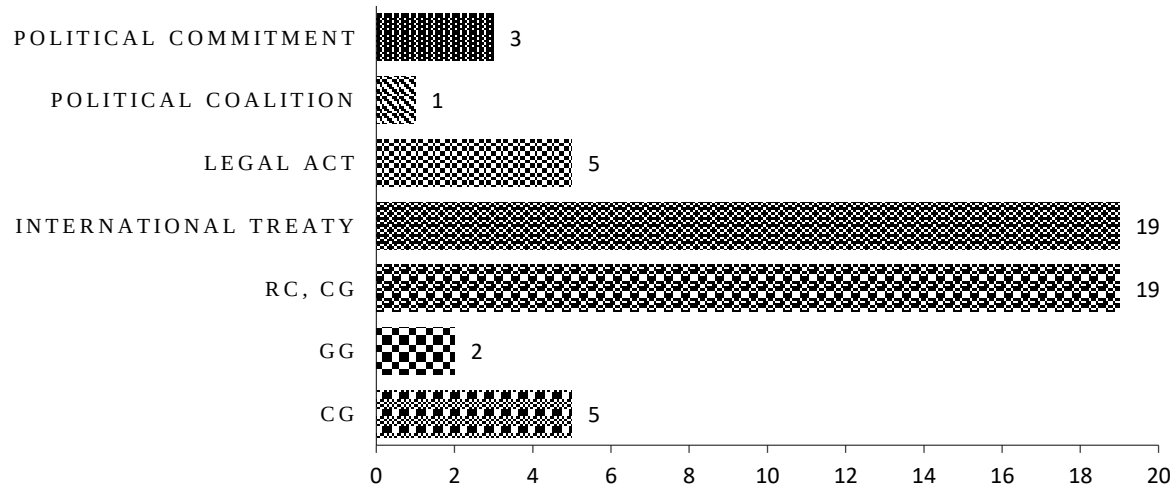


Figure 4. 2 Number of fiscal rules in SSA in 2016 by selected characteristics

Source: IMF Fiscal Rules Database (2016)

Note: Abbreviations: GG – General Government, CG – Central Government and RC – Regional Government

We also see that fiscal rules in SSA are applied at central government (CG), general government (GG) and at the regional (RC) levels (*Figure 4.2*). Countries in WAEMU, CEMAC

and EAMU regions implement rules at both regional level and central government levels[24]. This reflects the willingness of governments to impose constraints at national levels and avoid negative spill over effects at the regional level to ensure coordination. Rules applied at the regional level with national central government implementing the regional treaty has increased considerably. Only two countries, Liberia and Mauritius, implement rules at the general government levels. In terms of legal framework, only 5 countries have a Legal Act to enforce rules in their jurisdictions. We find that of the countries with fiscal rules, only Nigeria and Liberia have *'Fiscal Responsibility Laws'* in place to guide the implementation of rules. It has been argued in the literature that the effectiveness of fiscal rules depends on the efficacy of institutions, and only a few countries from our sample have fiscal councils that help monitor implementation of fiscal rules. Most of the countries with fiscal councils are at the supranational level but supported by national committees. Moreover, to enhance investment, which is crucial for developing countries, 15 fiscal rules explicitly exclude investment. Interestingly, 15 fiscal rules also have escape clauses, which enables these countries to spend beyond the targeted variables limit in case of a shock on the economy (see *Figure A4.1*).

4.2.2 WAEMU

The West African Economic and Monetary Union (WAEMU) has had a long history of fiscal and monetary policy convergence dating back to 1994. Fiscal rules were adopted in the region from 2000 to enhance fiscal discipline. The treaty that defines the convergence criteria contains among other things: a zero fiscal deficit ceiling, member countries' restriction from holding arrears, and 70 percent debt to GDP ratio. In addition, the treaty outlines a decreasing wage bill to 35 percent of the fiscal revenues, tax revenue of 20 percent of GDP and investment from domestic revenue of 20 percent of tax revenue realised within a given financial year (see Masson and Dore (2002); Masson and Pattillo (2002)).

To enhance efficiency in regional fiscal management, fiscal rules are monitored by the WAEMU commission, which is tasked with the responsibility of assessing and monitoring compliance of fiscal rules for fiscal sustainability of member countries by preparing half year progress reports (Hitaj & Onder, 2013). In case of fiscal rules non-compliance by a member

[24] The EAMU – East Africa Monetary Union and the member countries include Kenya, Uganda, Tanzania, Rwanda and Burundi.

state, the report is forwarded to the WAEMU council and subjected to a vote. In order to sanction a member country, the treaty outlines that a two thirds majority must be reached, failure to which the report is made public (Hitaj & Onder, 2013). The WAEMU commission's effort are supplemented by National Committees for Economic Policy (NCEP) that gather country information and prepare national quarterly progress reports on the convergence criteria[25]. Several reforms on rules have been undertaken to enhance fiscal consolidation efforts. In particular, reforms undertaken in 2014 centred on simplification of rules and making compliance easy by revising the zero fiscal deficit to 3 percent of GDP and increasing the tax revenue from 17 percent to 20 percent of GDP (Basdevant, 2015).

4.2.3 CEMAC Fiscal rules

CEMAC is a monetary union created in 1994 to enhance the regional surveillance framework, following several episodes of fiscal distress and the need to coordinate fiscal and monetary policy. This regional groupings' objectives are to enhance fiscal surveillance and prevent the excessive occurrence of deficits[26]. These efforts were refined in 2001 by allowing a quantitative convergence criteria aimed at regional fiscal sustainability and monitoring fiscal rules compliance which was adopted and implemented in 2002 (see Iossifov *et al.* (2009); Mihalyi and Fernández (2018)). The surveillance criteria adopted by CEMAC member countries included: the stock of public debt to be less or equal to 70 percent of GDP, non-accumulation of arrears and a positive fiscal balance. The CEMAC rules envisage compliance slippages thus, countries that do not meet these criterion are required to adopt a three-year adjustment programme (BIKAI, 2015). Several revisions on rules have been undertaken in 2005 to include oil wealth and in 2008, to include the structural fiscal balance on the balanced budget rule (BBR) to be balanced or in surplus. Additionally, the 2008 reforms included adoption of the non-oil basic fiscal balance that helped step up surveillance efforts as it delinks from the

[25] According to Hitaj and Onder (2013), the WAEMU council publishes a report on regional member fiscal sustainability and may assist the member country seeking financial support by granting access to WAEMU resources. The member country is also required under the treaty arrangement to come up with a plan to correct the fiscal deficit within 30 days and the council has a series of sanctions, including: to publish the country's economic situation with assistance to the country; allow the West African Development Bank to review the country's development plan; and suspend the flow of regional resources to the country.

[26] The history of convergence for Central African countries dates back to 1946, during the French colonisation of these countries. Since the 1985 policy of a strong French Franc in the francophone region, subsequent efforts have been employed for monetary and fiscal surveillance. This led to 1994 devaluation of CFA franc that was important in improving the terms of trade and enhanced economic growth in the region (Iossifov et al., 2009).

volatile and temporary oil revenue. Between 2012 and 2016, several other reforms have been undertaken to further tighten the rules by including the medium-term fiscal framework which limits non-oil primary deficit and a lower debt ceiling (Mihalyi & Fernández, 2018). Moreover, other reforms include a new monitoring mechanism on a three-year debt level with a new debt ceiling of 70 percent of GDP on average, which includes oil revenues.

4.2.4 Mauritius

Over the years, Mauritius has recorded an impressive track record on governance and institutional performance compared to other SSA countries. The country adopted the debt rule under the Public Debt Management (PDM) Act that was passed in 2008. This rule is captured in the PDM Act section 7, subsections (2) and (3). The Act outlines that total outstanding amount of public debt shall, at the end of each fiscal year, not exceed 60 percent of GDP at the current market price for that fiscal year (see Republic of Mauritius (2008)). In addition, the PDM Act shows that the percentage referred to in subsection 2 shall, at the end of 31 December 2018, decrease and shall not exceed 50 percent of GDP, which shall remain the ceiling going forward. The fiscal rule further provides room for escape clause, where, in the event of a natural disaster or emergency, or the government undertakes large investment project(s) and in the presence of economic slowdown, the rule shall be violated.

4.2.5 Nigeria

Following the volatility of oil prices, there has been concerted efforts to ensure sustainability of fiscal policy in Nigeria. The adoption of fiscal rules and anchoring them to the country's legislation follows advice from the IMF to counter fiscal procyclicality in the country. In 2003, the IMF advised the Nigerian authorities on the need to address the boom and bust cycles that characterise fiscal policy in the country and recommended the adoption of oil price based fiscal rules (IMF, 2003). This advice followed a worrisome trend development in 2002 where despite high oil prices there were no mechanisms to save excess oil proceeds. Following a political agreement in 2004 an oil price fiscal rule was introduced that provided for excess oil revenue to be saved in an excess crude oil account (sovereign wealth fund). In the following years with technical advice from IMF, the BBR operated under the fiscal responsibility Act that was introduced in 2007 (see Republic of Nigeria (2007)). Initially, the law applied to the federal

government but since then states have passed legislation in support of the Act (IMF, 2007). The country employs a BBR that is captured under the Fiscal Responsibility Commission (FRC) Act 2007. The FRC Act establishes the commission responsible for observing and authorising provisions of the Act to guarantee effectiveness. *Part II (section 12 sub-section 1,2) and IV (section 41 sub-section 1a, 1b)* of the Act states that:

> *"Aggregate expenditure and amount appropriated shall not be more than 3 percent of GDP or any sustainable level as may be determined by the national assembly in each year. Aggregate expenditure may exceed … if there is a threat to national security of federal republic of Nigeria".*
>
> *"the government at all tiers shall only borrow for capital expenditure and human development, provided that, such borrowing shall be on concessional terms with low interest rates and a long amortization period … and the government shall ensure that public debt proportional to national income is held at sustainable level".*

The Fiscal Responsibility Act 2007 provides the ceiling on the fiscal deficit of the government to be within + or - 3 percent of GDP of balanced. Similarly, the law provides the commission with the responsibility of ensuring compliance of the fiscal rules for the federal, state or local governments to operate within the established legislation. Under the Act, the commission is mandated to publish on a quarterly basis a list of the governments that have exceeded the limits of consolidated debt. Additionally, the commission is mandated to ensure that the exceeded debt is brought within limit, not later than end of 3 subsequent quarters within the same financial year while achieving a minimum of 25 percent in the first quarter.

4.2.6 Kenya

Kenya was the first country in SSA to employ national fiscal rules in 1997, which included the debt and revenue rules. Although the country was not a beneficiary of HIPC and Multilateral Debt Relief Initiatives (MDRI), Kenya has been involved in negotiations with lenders on debt for development swap arrangements, debt cancellations and rescheduling on several occasions. In fact, Kenya has more than three times requested a rescheduling of bilateral debt through the Paris club, in 1994, 2000 and 2004 (Blackmon, 2014). Similarly, Kenya has defaulted on external debt twice in 1994-1998 and 2000-2001 (Reinhart, 2010). To mitigate such debt

distress episodes, fiscal rules were adopted. These rules have been important in raising the country's sustainability and credibility levels since then. At the same time, successive governments have employed ways to enhance fiscal discipline. These efforts led to formation of the Parliamentary Budget Office (PBO) in 2007. Thereafter, following the ushering in of the new constitution in 2010, the country embarked on further improving fiscal policy with the 2012 Public Financial Management (PFM) Act (see Republic of Kenya (2012)). In addition, oversight roles have been enhanced through other agencies, including parliament, the auditor general, the anti-corruption agency and the public prosecution office. In fact, the auditor general is constitutionally required to provide audit reports to parliament bi-annually.

4.3 Fiscal Policy in Selected Sub Sahara African Countries

Fiscal policy plays a critical role of maintaining economic stability, resource allocation and redistribution of income (Tanzi (2008); Bunea-Bontas and Petre (2009)). Empirical evidence suggests that government spending and taxation can enhance public finance objectives and mitigate the deficit bias. However, a closer look at government spending as a share of GDP in SSA shows that it has been on the rise, which lowers a country's fiscal space. Tax revenue in SSA as shown in *Table 4.1* reflects low revenue collection, as on average countries collect 13.7 percent tax revenue as a share of GDP, which is way below other comparator regions: Latin America, Europe and Central Asia at (22 and 20) percent of GDP, respectively (IMF 2018). As has been argued in the literature, tax revenue presents the best channel of government financing; therefore, good policy reforms should accelerate tax revenue. Further, we also establish significant heterogeneity among SSA countries on tax revenue, as some countries have the capacity to mobilise up to over 25 percent of GDP (e.g. Namibia and Botswana) compared to 5.7 percent of GDP for Guinea-Bissau.

Table 4. 1 Average Macroeconomic variables in SSA between 1997-2016 (% of GDP)

Country	Tax Revenue	Total Revenue	Expenditure	Deficits
Benin	13,2	17,9	19,7	-1,8
Botswana	25,5	39,1	38,7	0,5
Burkina Faso	11,9	20,7	23,4	-2,7
Cape Verde	17,1	26,7	33,7	-7,0
Cameroon	11,2	17,9	16,6	1,2
Central African Republic	7,8	14,7	15,8	-1,1
Chad	8,4	15,7	18,1	-2,5
Republic of Congo	9,6	36,9	34,7	2,2
Côte d'Ivoire	15,6	18,2	19,8	-1,7

Equatorial Guinea	9,1	27,0	23,9	3,1
Gabon	16,3	28,2	24,5	3,7
Guinea-Bissau	5,7	16,7	20,5	-3,8
Kenya	15,2	19,3	22,5	-3,1
Mali	11,3	19,6	20,4	-0,8
Mauritius	17,2	19,2	22,7	-3,7
Namibia	28,5	29,8	32,2	-2,4
Niger	10,5	20,7	22,0	-1,3
Nigeria	8,8	16,9	17,0	-0,1
Senegal	16,8	17,3	19,3	-2,1
Togo	14,2	16,5	20,0	-3,4
Mean	**13,7**	**21,9**	**23,3**	**-1,3**

Notes: Source: IMF/WEO, UN-WIDER and WORLD. Average data from 1997-2016 for countries with Fiscal rules in place.

Similarly, we notice modest budget deficits in SSA as shown in *Table 4.1*. Countries with fiscal rules have a minimum mean budget deficit of -3.8 percent of GDP and a maximum value of 3.7 percent of GDP for Guinea-Bissau and Gabon, respectively. In the case of Gabon, the fiscal policy has been driven by strong economic growth and fiscal reforms to enhance tax revenue and usage of oil revenue. The country has also implemented reforms to aid in government spending to mitigate the deficit bias (World Bank 2019). On the other hand, government spending varies significantly among the SSA, as we can see, Botswana has the highest spending of 38.7 percent of GDP, while Nigeria has the lowest spending of 17.9 percent of GDP. Despite the higher percentage rate, Botswana has an expenditure rule which outlines that spending cannot be more than 40 percent of GDP within a given year and, indeed this rule has been complied with since inception (IMF 2018). Botswana also has a robust tax revenue collection infrastructure compared to other developing countries. For Nigeria, despite having an abundant oil revenue, the country faces a myriad of challenges including exposure to oil price shocks that affects the country's fiscal revenue. We also establish as shown in *Table 4.1* that some countries have low levels of tax revenue, however, they tend to have more total revenue. This is because a majority of these countries are resource-based economies thus, their revenue envelop depends on oil revenue (e.g. Equatorial Guinea, Nigeria, Gabon and Republic of Congo).

Debt levels in SSA have been on the rise in recent years as countries enhance their investments to accelerate economic development. As noted earlier, several SSA countries have had a history of debt distress and most of them benefitted from HIPC and MDR initiatives. As shown in

Figure 4.3, SSA's debt profile reveals interesting cross-country variations with some countries having debt levels above 100 percent of GDP by end of 2016 (e.g. Cape Verde at 129 percent and Congo 114 percent). On average the debt levels are on the rise again from a low of 30 percent in 2005 to the current 52 percent in 2016. It is however noted that the HIPC initiative played a significant role in reduction of debt accumulation among SSA countries. Despite all the countries shown to have fiscal rules to mitigate increased debt and deficit, the Congo Republic and Guinea Bissau had a surge in debt levels in the periods between 1996 to 2016 of 143 percent and 184 percent of GDP. The theoretical literature on debt is well known; higher public debt increases the cost of repayment and negatively affects compliance of fiscal rules reducing a country's fiscal space.

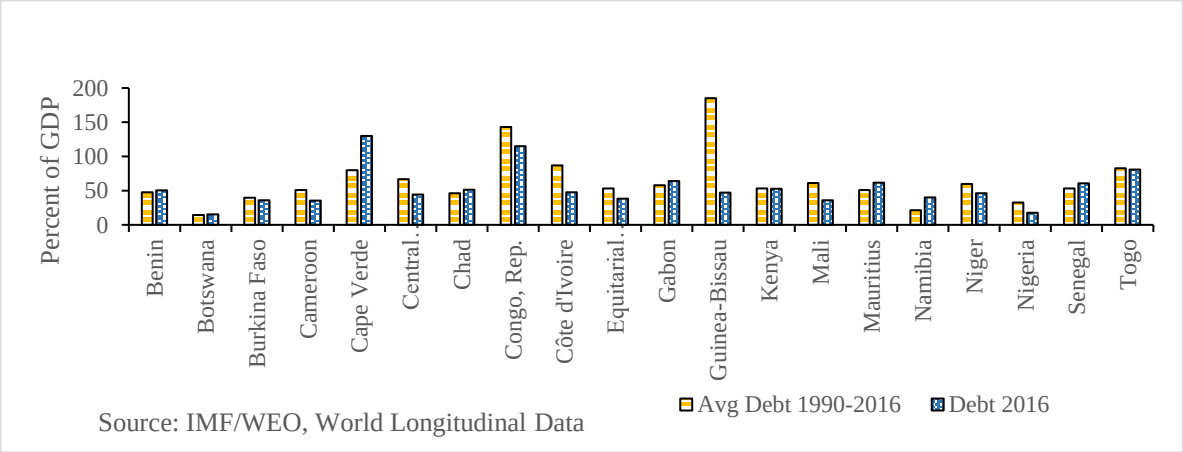


Figure 4. 3 Debt profile in Sub-Sahara Africa

On the other hand, the deficit levels in SSA have continued to widen with significant heterogeneity among countries, as shown in *Figure 4.4*. We find from *Figure 4.4* that the deficit in the Congo Republic increased to a high of 20 percent of GDP in 2016. Moreover, before the financial crisis in 2007 many SSA countries had surpluses but nearly all of these had subsequently turned to deficits after the crisis. The widened fiscal deficits reflect institutional weaknesses related to limited capacity for revenue and expenditure forecasting and debt management, which varies across countries.

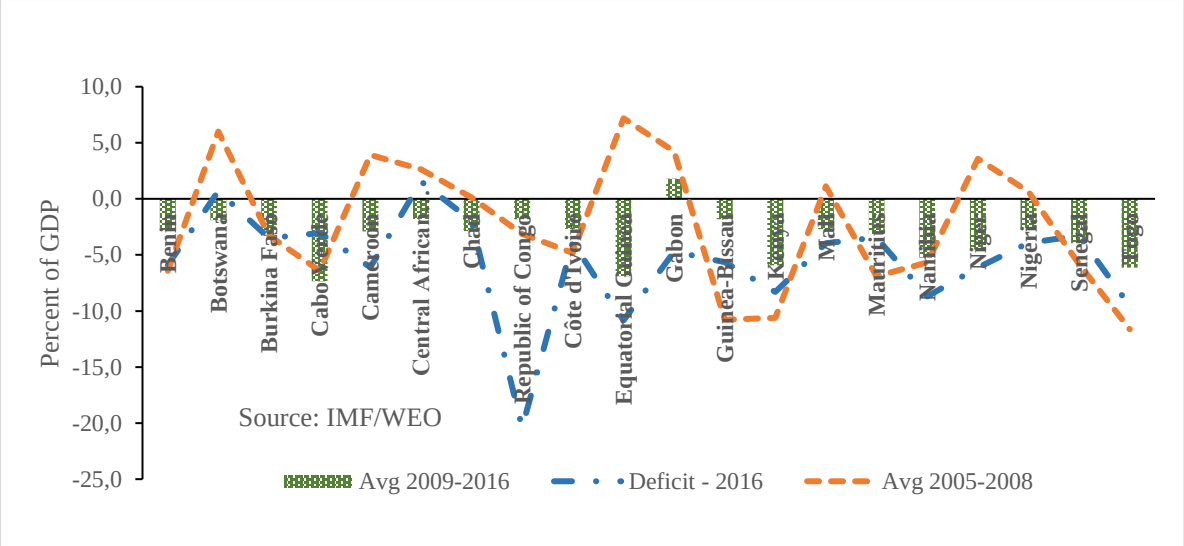


Figure 4. 4 Deficit profile in SSA

4.4 Literature Review

Compliance with fiscal policy rules has gained momentum in recent years through a burgeoning literature on fiscal rules. The contemporary fiscal policy debate is framed in terms of two perspectives of compliance in form of enforcement and management. According to Tallberg (2002), the two perspectives of enforcement and management employ a coercive strategy of enhanced monitoring and sanctions to increase the probability of policy compliance. On one hand, management: embraces a problem-solving strategy geared towards improved capacity building and transparency. On the other hand, the enforcement approach is anchored in theory that, countries are rational actors that weigh costs and benefits of alternative choices when faced with a compliance decision. Elliott and Bayard (1994) and Dorn and Fulton (1997) the proponents of this school of thought argue that, countries as sources of noncompliance are driven by incentive structure. Thus, countries choose not to comply when the benefits to shirking outweigh the costs to detection. Therefore, according to these authors, compliance can be improved by increasing the likelihood of detection through enhanced monitoring and cost of imposing sanctions.

At the policy implementation level, countries may choose not to comply because their interests may include appending the signature for recognition but not compliance. This is because globally, a country's actions are driven by priorities, and given that compliance entails committing limited resources they may choose not to comply. Similarly, countries may choose

not to comply because they do not value the contents of rules but consider the acts of participation and signing as more important. Underdal et al. (2002) contends that for effective policy compliance, coordination supersedes collaboration. This is because countries and other international organisations employing a coordinated approach tend to be more effective than countries collaborating as some have an incentive to renege on their commitment. It is, therefore, important that countries cooperating on policy implementation employ enforcement mechanisms to deter noncompliance. Monitoring and sanctions are at the forefront of this strategy. Monitoring enhances transparency, while sanctions increase the cost of noncompliance and compel policy-makers to comply (Tallberg, 2002).

The management approach is built on the belief that a country's ability to comply with policy rules, both local and international, is based on the aspects of efficiency and interest (Chayes et al. (1998); Haas et al. (1993); Chayes and Chayes (1995)). The authors posit that countries fail to comply because of limited capacity and rule ambiguity. Consequently, noncompliance is mitigated through problem solving of capacity building, proper rule interpretation and transparency of policy. The government may experience limited capacity due to lack of administrative capacity to implement the policy. Similarly, financial constraints may impede the country's ability to meet the requirements of the policy in place. Furthermore, at the international level, noncompliance may be inadvertent. In this case, efficient implementation of a treaty may be hampered by unclear treaty language to member countries. Therefore, capacity building, rule interpretation and transparency are mitigating factors to noncompliance. In this case, transparency, improves compliance by facilitating coordination of policy rules and provides reassurance to actors and improves awareness employing social pressure for non-compliant members to stick to the policy rule.

The theoretical framework for fiscal policy compliance argues that in a democratic environment, fiscal rules compliance can be enhanced. Wierts (2012) opines that expenditure rules in the European Union are based on coalition agreements, as such, any non-compliance by any spending ministry may give rise to political costs as the minister in charge of the finance ministry attaches strong political weight to implementation of the coalition agreement.

From a theoretical perspective, there are several reasons that motivate governments to adopt fiscal rules, prompt the country to comply with the rules and create effective rules when implemented. The adoption of fiscal rules can be argued to be motivated by the governments'

desire to advance prudence in fiscal management and strengthen fiscal credibility. From a credibility standpoint, independent institutions play an important role in fiscal management. The seminal work of Kydland and Prescott (1977) argues that independent institutions can mitigate the potential conflict between policy discretion and optimal policy. The Kydland and Prescott (1977) hypothesis argues in favour of time consistency of macroeconomic fiscal policy for enhancement of sustainability of the government's agenda to build confidence in the country. As such, fiscal rules play an important role in enhancing credibility and fiscal policy discipline. In particular, fiscal rules can be used to achieve output stabilisation in the short run and fiscal sustainability in the long run. This line of reasoning argues that fiscal rules can be instrumental in addressing the dynamic inconsistency of macroeconomic policy by helping countries to keep away from narrow policies Kopits (2004) thus advance fiscal policy credibility. Schaechter *et al.* (2012) opines that the credibility of fiscal rules is enhanced when they are embedded with flexible features and supported by independent bodies. Moreover, empirical evidence shows that prudent debt management by the current government induces future governments to pursue optimal and time-consistent fiscal policy (Barro and Gordon (1983); Lucas Jr and Stokey (1983); Wyplosz (2012)).

Similarly, fiscal rules are adopted to mitigate the deficit bias. The deficit bias has been found to be common in fiscal policy via several channels. As such, it is argued that it arises due to presence of political distortions in a country. According to Von Hagen and Harden (1995), it can be mitigated by delegation of fiscal decisions to the finance minister. Von Hagen and Harden (1995); Weingast et al. (1981) and Velasco (2000) posit that deficit bias arises as a result of the *common pool problem* in society. The *common pool problem* is present when multiple decision-makers involved in budget formulation. For example, the presence of the spending line ministries, civil society, advocacy groups and other political representatives in the budget process agitate for funding, they fail to internalize the cost of the higher deficit that results in higher taxes in the long run--thus leading to deficit bias.

On the other hand, the literature shows that governments short-sightedness problem is also a reason for increased fiscal deficits. Alesina and Tabellini (1990) indicate that the *'short-sightedness'* theory arises from the current government increasing budget deficit because they are worried of being replaced by voters in the next election. Similarly, *governments' shortsightedness* is attributable to its ability to overlook the long-term consequences of such budgetary imbalances (Debrun & Kumar, 2007). (Larch *et al.*, 2021) explain that the short-sightedness of government is designed to attract more voters in the near-term, via higher

expenditure, but creates higher public debt that reduces a country's future fiscal space. To this end, the increased deficit bias is a *'strategic'* constraint on the future fiscal space of governments.

Furthermore, as noted earlier, time inconsistency is apparent as governments may commit to fiscal policy discipline that is not credible in the short run thus experiencing increased fiscal deficits (Persson et al., 2006). In this case, under the *time inconsistency theory* governments anticipating being voted out in an upcoming election may resort to higher deficits and increased borrowing and fail to internalize the costs of higher debt. This arises because there is no contractual enforcement mechanisms between the current voters or government and the future government. In this event, the present government offers suboptimal fiscal policy with increased debt to be repaid by another future government.

Chari and Kehoe (2008) argue that time inconsistency can result in the free rider problem in a monetary union, which tends to lead to increased inflation. They further argue that this in turn reduces the real value of the nominal domestic debt, which reduces the distortionary taxes that would be used to pay for debt obligations. In short, each fiscal authority issues more public debt, which increases the inflation rate because it is monetized by the monetary authorities. However, if the monetary authority commits to strict monetary policy, the fiscal authorities will have less incentive to increase public debt, as it will simply then push up interest rates. Thus, imposing debt limits for fiscal policy in a monetary union can help prevent monetary policy distortions in inflation or interest rates. The above theoretical arguments show that fiscal rules are imposed to ensure fiscal discipline. This will deter the present political leaders expected to be voted out to expend in line with the set rules.

At the same time, the signalling hypothesis, as proposed by Akerlof (1970) and Spence (1971), has gained momentum in the policy environment. When this framework is applied to public finance, the basic premise is that policy makers are motivated to adopt fiscal rules to signal the government's commitment in conducting prudent fiscal policy. Braun and Tommasi (2002) argue that policymakers can engage in signalling activity by committing themselves through agreements with or adoptions of fiscal rules that they are not committed to complying with and does not alter the behaviour related to fiscal outcomes[27]. In the same line, it has been found

[27] Braun and Tommasi (2002) argue that fiscal rules help creditors reduce costs involved in information gathering of a country to establish payment ability as they signal the government's commitment to fiscal discipline. This, in turn, makes it costly to break the rule thus creditors and financial markets act as enforcers of fiscal commitments.

that disciplined governments adopt fiscal rules to signal to the market their commitment to enforcing fiscal discipline, which helps reduce public debt costs and supports monetary policy through mitigating the inflationary pressures (see Schaltegger and Torgler (2006); Debrun and Kumar (2007); Tomann (2017); Afonso and Jalles (2019))[28]. Similarly, Debrun and Kumar (2007) posit that institutional reforms via fiscal rules act as a signal to voters on policymakers incentive to conform to fiscal discipline thus, avoiding being voted out. Along the same line, it has been argued that in a democratic country, citizens will demand for fiscal transparency resulting to fiscal discipline. This line of thought is supported by Wehner and De Renzio (2013) argument that governments are more likely to be accountable in a democratic state and when they depend on revenue from citizen taxes to finance public expenditures.

Additionally, in the face of increasing challenges in the financial markets, creditors are seeking market assurance, and this has led to a growth of credit rating agencies to fill the gap. It is believed that rating agencies provide significant information to market participants, and that they can be used to instil public finance discipline. Theoretically, according to the Leviathan philosophy, governments are inherently inefficient due to the lack of a competitive market force. Along these lines, it has been argued that fiscal rules enhance discipline in public finance and improve credit ratings for countries by reducing the borrowing costs (see Bayoumi et al. (1995); Johnson and Kriz (2005)). However, empirical literature on the relationship between fiscal rules and credit ratings has offered mixed results. Maher et al. (2016) examine the relationship between tax and expenditure limits on the credit ratings of US municipalities. Their findings show that tax and expenditure limits have a weak and negative impact on credit ratings. On the other hand, Stallmann et al. (2012) find that tax limits are associated with lower credit ratings while expenditure limits are associated with higher credit ratings[29].

Further, there are several reasons that prompt governments to comply with fiscal rules. Along these line, Inman (1996) argues that compliance can be achieved in presence of independent monitoring, economically significant sanctions and design of the fiscal rule. As such, it can be viewed that the implementation of penalties for non-compliance of fiscal rules can play an

[28] We are grateful to the anonymous referee at Economic Research Southern Africa (ERSA) for helpful comments, especially on expanding the literature on time-consistency and role of credit rating agencies as enforcers for fiscal rules.

[29] Johnson and Kriz (2005) examine the relationship between tax revenue and expenditure rules and credit ratings and find similar results. They find that tax rules lower credit ratings while expenditure rules improve credit ratings. In line with Maher *et al.* (2016), the results show that municipalities face increased borrowing costs in the presence of tax revenue and expenditure limits. This is because rating agencies convey information to the public that is used to determine their creditworthiness.

important role in ensuring governments meet the requirements of fiscal rules. Additionally, the political set up plays an important role in compliance of fiscal rules. For example, in the European Union expenditure rules are set in a coalition framework and as such any violation can elevate political costs as ministers of finance attach high political weight on compliance with agreements (Hallerberg *et al.*, 2007).

Spillover and outside pressure can play a role in influencing compliance with rules (Badinger & Reuter, 2017b). In a monetary union, Badinger and Reuter (2017b) opine that a member country may fail to internalise spillover effects thus, interfere with outcomes of a monetary policy. Countries or monetary unions with inflation targeting regimes will use a stringent fiscal rule to reduce negative spillover to other member countries.

Empirical literature also elucidates on the reasons that motivate efficacy of fiscal rules to achieve the desired objective. Regarding the efficacy of fiscal rules, it has been argued that the effectiveness of fiscal rules is dependent on the efficiency of institutions and their ability to provide autonomous budgeting. Wiert (2009) explains that in the process of budgeting, the finance ministry channels additional resources to line ministries, which are tasked with spending and implementing the budget efficiently. Moreover, failure to comply with spending and budget requirements results in future oversight of the concerned ministries, which they wish to avoid. This analogy has been supported with empirical evidence. Dirk Foremny (2014) investigates the effect of rules and tax autonomy in 15 European countries. They find that the effect of fiscal rules depends on their constitutional structure. Fiscal rules are shown to decrease the overall budget deficit in a unified country compared to sub-national state entities. Several authors have also shown that the performance of fiscal rules depends on institutional and government effectiveness or *'institutional environment'* to enhance fiscal space. Wyplosz (2012) posit that fiscal rules and institutional quality in a country are instrumental to enhance fiscal sustainability.

The institutional role of the effectiveness of rules is critical and has been further explored in the literature by other authors. Muscatelli et al. (2012) argues that transparency in the decision-making process helps enhance fiscal solvency and fiscal space. Therefore, good governance and efficiency are helpful in promoting fiscal discipline. Hallerberg *et al.* (2007) investigates the effect of fiscal rules and budget procedures on public finances among 15 European countries. They find that rules have improved fiscal performance, especially in countries with coalition governments who tend to have less fiscal discipline. Furthermore, outcomes improve

when the minister of finance can delegate enforcement government contracts. They also find that institutional reforms, especially concerning fiscal rules, has mitigated the deficit bias, especially during election periods.

The literature also offers evidence that countries are motivated to adopt fiscal rules to meet the monetary union objectives. This reasoning is premised on the time inconsistency theory that results to a free rider problem in the monetary union. Chari and Kehoe (2007) opine that time inconsistency arises due to desire of the monetary union incentive to increase inflation in presence of high debt levels. The participation of countries in a monetary union confers significant benefits on the individual members and the group, usually lower inflation and exchange rate stability. Bergin (2000) argues that because the price level is affected by the budget constraint in a monetary union, the increase in public debt for a country may not supported by future taxes. This is because a country within the monetary union may not increase price levels on their own without affecting other monetary union members. As such, the cost of inflation because of high public debt is borne by all residents of all monetary union member states. In this case, fiscal rules will mitigate the negative effect arising from an increase in the price level within the monetary union.

Relatedly, Buti and Giudice (2002) opine that fiscal rules in a monetary union are adopted due to countries' failure to internalise spillover effects. It is also believed that in a monetary union when the interest rates are low it may result to expansionary fiscal policy at country level which will be absorbed within the monetary union. A monetary union requires sound fiscal policy. The recent debt crisis in Europe has demonstrated that unsound fiscal policy can have negative spillover effects on other member countries in the union. Fiscal rules were enshrined in the union constitution to mitigate the spillovers from existing debt crisis to the banking system in the union. The rules were also enshrined to mitigate political influence in the union in the implementation of the fiscal policy among member countries to mitigate the deficit bias (Ilzetzki & Jin, 2021).

Of recent, there has been a surge in independent fiscal councils as they have been found to improve fiscal performance. This fiscal councils are entrusted with the responsibility of real time surveillance of public finances. In general, empirical literature suggests that fiscal councils have enhanced policy transparency, reduced forecasting bias and fostered a sense of government commitment to fiscal discipline thus ensuring compliance with fiscal rules (see Calmfors and Wren-Lewis (2011); Debrun and Kinda (2017); Beetsma *et al.* (2019) and

Onofrei et al. (2020)). In fact, Beetsma *et al.* (2019) finds that the use of fiscal councils is associated with accurate and precise fiscal forecasts and enhanced compliance of fiscal rules. In the same framework, Debrun and Kinda (2017), find that fiscal councils are associated with sustainable public finance. In line with the above findings, Hagemann (2011) posits that fiscal councils can be used as a signal for commitment and can buttress a governments capacity to comply with fiscal rules.

In general, empirical studies on the effects of fiscal rule compliance are limited. Cordes *et al.* (2015) examines the effectiveness of expenditure rules by considering 35 expenditure rules between 1985 to 2013. They find that expenditure rules can foster better spending and they have a higher compliance rate compared to balanced budget rules, particularly when expenditure rules are under the control of government and enshrined in law or political coalition. Coombs (1980) argues that policies have an impact only if they are successful in changing the behaviour of target individuals. The author argues that the target individual may not comply due to lapses or ambiguity in communication, insufficient resources, an objection to a policy or doubts about the authority's commitment upon which the policy is based. The remedies proposed by Coombs (1980) include improved communication and provision of additional training and resources.

Reuter (2018) investigates the compliance of fiscal rules in 10 EU countries. The author employs a logistics estimation strategy and finds that the average compliance rate across all rules is 50 percent. The findings also show that independent institutions, monitoring and enforcement play an important role in rules compliance. Cho and Vadlamannati (2012) examines the compliance of the anti-trafficking protocol in 147 countries from 2001 to 2009. The two authors employ a probit model in their estimation strategy. Their findings predict that ratification of anti-trafficking law leads to high compliance with prevention policy. Therefore, the implementation of the protocol helps reduce domestic resistance and implementation costs.

When implementing fiscal rules, several factors have also been advanced that influence fiscal policy compliance. Hidden and contingent liabilities are at the forefront of lack of compliance. Accumulation of hidden liabilities such as pension fund liabilities, present a source of fiscal stress to a country and may result in non-compliance to the fiscal policy rule, and ultimately leading to increasing taxes or reduced spending to meet pension obligations when they fall due (Splinter, 2017). Reinhart and Rogoff (2011) opine that contingent debt, resulting from

government guarantees of state enterprise or private borrowing being called, can take the form of unreported domestic debt and private debt that becomes public debt. Reinhart argues that hidden debt has been a key driver of sovereign defaults in history and was the driving force that led to Greece's default. In addition, government ownership may result in fiscal unsustainability in the long run when organisations are not prudently managed. Empirical evidence shows that SOE's have been used the governments to borrow funds to finance projects outside their operations. This in return, results in future commitments that impose large burdens on SOEs and require governments to take over their debt and create a failure to comply with fiscal policy requirements.

It is also important to note that, in order to assess the effect of fiscal rules, the quality of fiscal data also needs to be considered. To this end, the International Monetary Fund has developed a code for fiscal reporting aimed at enhancing transparency to improve on management of public resources. Capasso et al. (2020) opine that fiscal transparency makes citizens better informed about usage of public resources and enhances compliance for tax payments. Furthermore, global networks such as the Global Initiative for Fiscal Transparency (GIFT) highlight the vital role played by having quality information. The provision of quality fiscal information enhances the compliance for payment of taxes, counters the policy-makers appetite for corruption activities and enhances the accountability of their political choices (De Simone et al., 2017).

The IMF (2015) has long recognized the importance of high-quality fiscal data and to this end provides countries with relevant technical assistance. They have noted that quality reporting of public finance is central to fiscal transparency as it offers room for analysing and a grasp of the government's fiscal spending and strengthening fiscal policies and mitigating risks (IMF, 2015, *Philippines Fiscal Transparency Evaluation*). For example, during the global financial crisis of 2008 – 2009, it became apparent that unreported fiscal deficits in Greece resulted to non-compliance of EU's deficit rule thus exacerbated the countries exposure to debt distress. Fouad et al. (2019) notes in the IMF fiscal transparency evaluation report for Senegal reveals that although fiscal reports are reported quarterly, they do not cover all public sector debt. The inadequate coverage of public sector debt may result to non-compliance with fiscal rules. It is also important to note that prevalence of undisclosed or hidden public debt affects compliance with fiscal rules.

From an exchange rate perspective is that it can influence the effectiveness of fiscal rules. This view is observed in literature and supported by IMF exchange rate data, showing that it is a short-term goal of most African countries to maintain real exchange rate stability; that is, not to allow their nominal exchange rate to vary by more than the inflation differential with their partners. Thus, almost no African country allows a true free-floating exchange rate like the US dollar or Euro, as they have a dislike for depreciating nominal rates and use their foreign reserves to influence/manage their nominal exchange rate. We note this phenomenon to emphasize that there may not be such a large difference in short-term behaviour between fixed and floating rate countries.

The countries in my sample come largely from member of the WAEMU and CEMAC monetary unions because their members maintain a large number of fiscal rules. By their nature, monetary unions will maintain many fiscal and other rules/regulations, in this case to maintain the fixed nominal rate against the Euro. Fixed exchange rates require more policies to constrain inflation, which is why fiscal constraints are so important in this case. Nonetheless, many countries with fixed nominal rates often see changes in their real exchange rate. I have argued that fixed exchange rate countries, like those belonging to monetary unions, are more likely to maintain fiscal rules, but this does not diminish the value of the analysis.

From a theoretical viewpoint, the short-sighted governments will increase their present spending as they can defer the cost of expansionary policy to the future. It is conventionally viewed that countries with a fixed exchange rate operate with more fiscal prudence as any laxity in fiscal policy exposes foreign reserves to speculative attacks that can result in devaluation. Bova et al. (2014) notes that some countries have adopted fiscal rules as a road map to joining currency unions. Schaechter *et al.* (2012) argues that because of lack of independent monetary policy, member countries tend to internalise regional costs of fiscal discipline by individual countries adopting fiscal rules. Tornell and Velasco (2000) examines the effect of flexible and fixed exchanges on fiscal policy. They find that use of fixed (flexible) exchange rates in the presence of fiscal indiscipline in the present period results in increased costs in the future (today).

There is inadequate consensus on the effect of exchange rate type on fiscal discipline; some argue that a fixed exchange rate imposes fiscal discipline while others opine that flexible exchange rate results in improved fiscal discipline. Kaminsky et al. (2004) argue that neither a

fixed exchange rate nor flexible exchange rate influence fiscal prudence. At the same time, Fatás and Rose (2001) find that membership in a monetary union does not impose fiscal discipline. Duttagupta and Guillermo (2006) establish that a fixed exchange rate and being a member of a monetary union increases spending and free riding behaviour among countries. Moreover, it has also been argued that countries in a currency union have the incentive to overspend because the inflationary costs from increased fiscal deficits will be shared within the union. Additionally, the free riding phenomenon can intensify especially if there are no enforceable fiscal rules and weak policy coordination among union countries; then the fixed exchange rate can motivate transmission of fiscal slippages among member countries.

4.4.1 Critique of Fiscal rules in Sub-Sahara Africa

Fiscal rules serve long-term objectives and can be used to constrain various fiscal policy variables such as public debt. It is difficult, however, to set the debt limit since it is not controlled directly, as it is a result of revenue, spending, interest rates and exchange rates. As such, debt targets should be accompanied with policies for other fiscal variables.

To further enhance the effectiveness of fiscal rules, some governments outside SSA have introduced independent fiscal agencies to inform, analyse and implement fiscal policy and these fiscal councils and committees have made a compelling commitment to fiscal discipline. Fiscal councils or committees help to realign fiscal rules to be more countercyclical, as is the case in Chile. In SSA, none of the countries have fiscal councils or committees in place. This fiscal councils also reflect the political will and commitment to stabilise or consolidate fiscal positions (Debrun *et al.*, 2008). Among the successful councils includes Belgium high council which prescribes explicitly yearly borrowing requirements of government and publishes two reports each year. Sweden's Fiscal policy council screens consistence with surplus objective of 1 percent of GDP over the business cycle and presents annual reports to government.

There is lack of clear delegation of fiscal rules implementation in SSA, as most of the rules are left at the Ministries of Finance. SSA countries generally lack clear legal mandates on the delegation of fiscal rules, thus, the rules are often not enforced. As recognised in the literature, economic theory provides several basic criteria to follow in the delegation process (Alesina & Tabellini, 2008). Firstly, socially harmful distortions in policy implemented by elected leaders need to be clearly identified. Secondly, there should be a broad consensus on what constitutes

a sound policy, as this is important in deciding the mandate for which independent agency can be held accountable. Thirdly, chosen policies ought not to have a major impact on income. Lastly, assignment should not prompt a noteworthy strategy coordination issue.

There are significant challenges to implementing SSA fiscal rules. For example, only 2 countries have fiscal responsibility laws that guide the implementation of such rules. To increase the effectiveness of fiscal policy rules, they should be supported with explicit legislation that outlines the roles of the supporting institutions. Furthermore, escape clauses are often important for fiscal policy rules and require unambiguous language. In addition, the exclusion of investment by 15 fiscal rules in SSA does not specify the type of investments to be excluded.

Furthermore, fiscal rules should place emphasis on countercyclical policies that target the structural fiscal balance, which is adjusted to accommodate cyclical swings. In particular, the design of fiscal rules determines their compliance rate and the enhancement of countercyclical fiscal policies. Bova et al. (2014) point out that flexible fiscal rules with explicit escape clauses and exclude public investment enhance countercyclical fiscal policy[30]. Of the rules in SSA, none places emphasis on countercyclical fiscal policy. Countercyclical fiscal rules will allow automatic stabilisers to operate when the economy deviates from the target. Moreover, temporary surges in debt during a recession will be eliminated during boom times, and the fiscal rules should be engineered to produce sufficiently large surpluses during these booms so this can smooth spending during recessions. Additionally, a robust fiscal rule should have a numeric constraint and clear means of enforcement. The SSA fiscal rules do not provide clear enforcement mechanisms and lack clear institutional sanctions that could deter country deviations from their enforcement.

Interestingly, over 50 percent of countries with fiscal rules in SSA are implemented at the supranational level see *Figure A4.3* (Appendix). Supranational rules are important as they compel countries to accept fiscal constraints, however, they lack strong monitoring and enforcement mechanisms. A closer look at these regional rules shows that they impose similar limits, but they are not sensitive to country differences. Similarly, there is less local political

[30] The design of fiscal rules is vital to enhancement of countercyclical fiscal policies. As such, flexible fiscal rules, with well-designed escape clauses that exclude public investment will accommodate countercyclical fiscal policy (for details see Guerguil et al. (2017)).

commitment to impose sanctions when limits are threatened. Most of the supranational rules are simple so that they are easily accepted at each member country, but they are nonetheless ambitious. For example, the WAEMU debt rule of 70 percent of GDP is easy to be accepted by regional member countries, but is nevertheless highly constraining, especially for those struggling with public debt. Supranational rules in SSA often do not have a link to national rules, thus, raising coordination issues of the two levels. Some of the supranational rules do not have monitoring and enforcement mechanisms (see EAMU rules) and have no clear mandate of the institutions to sanction countries that deviate from the treaty. As such, to complement supranational rules, the national rules should be stringently linked, otherwise this encourages moral hazard. Regional rules should have tougher monitoring provisions that allow regional bodies to intervene.

4.5 Construction of the Fiscal Rules Index

We construct a fiscal rules index in this chapter based on the characteristics of rules outlined in the IMF fiscal rules database (2017)[31]. The index also includes some additional features not captured in the IMF database that countries have undertaken as part of reforms of fiscal rules. These fiscal rules index captures the broader characteristics of fiscal rule, as these rules have evolved with time. Numerous countries have introduced checks and balances in their fiscal management. Kenya introduced parliamentary budget office as part of oversight on the executive. In the WAEMU region, the union introduced a cap on wage payment to tax revenue of 35 percent and requiring at least 20 percent of tax revenue to be used for domestic investment. Thus, reforms on fiscal rules have been ongoing, including changes introduced to specific variables and the strengthening of public finance management. Some countries (WAEMU and CEMAC regional countries, and Kenya and Botswana) have increased the strictness of their rules to mitigate the deficit bias in recent years, and some countries have achieved relative fiscal stability (Mauritius, Cape Verde and Namibia).

[31] See Appendix A4.2 for individual country fiscal rules index from 1997-2016.

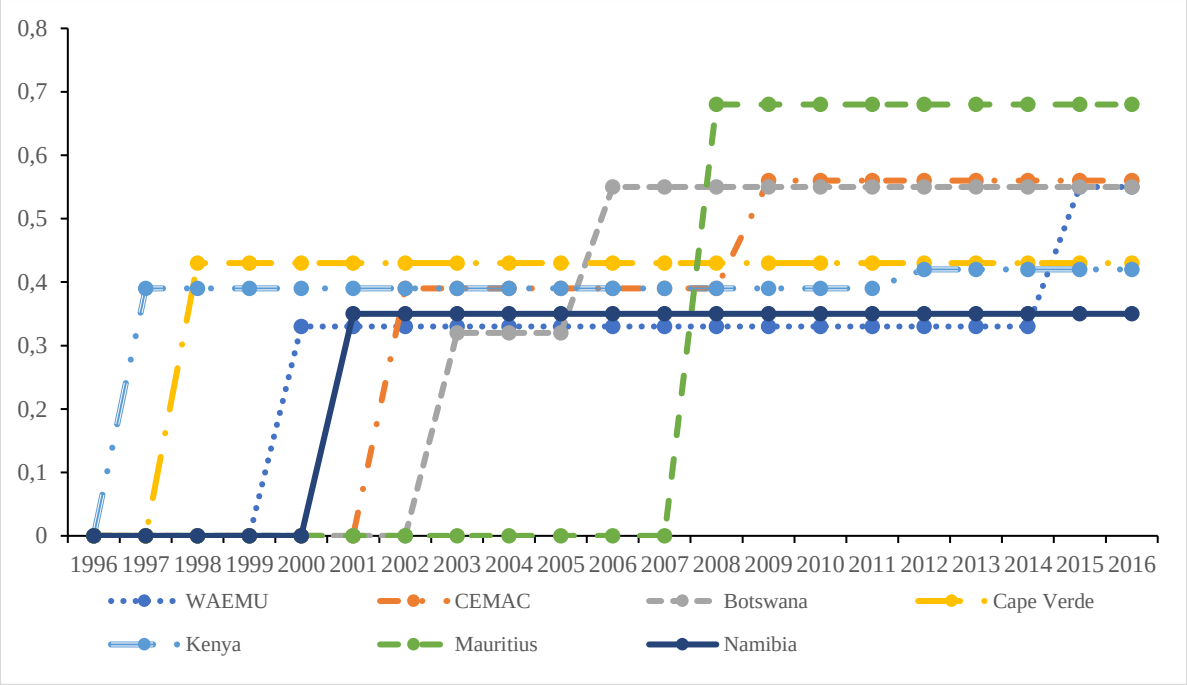


Figure 4. 5 Fiscal Rules Index in SSA over time

In the construction of the Fiscal rules index we adopt the following characteristics in our criterion: (1) the legal framework of the rule, (2) the space to reassess the rule, (3) the institutions charged with monitoring and enforcing the rules, (4) enforcement mechanism, (5) development and investment visibility, and (6) escape clauses. Each of these criteria have simple numerical values.

Table 4.2: Criteria for construction of the fiscal rules index

Criterion	Description and allocated values
Criteria 1: legal framework of the rule	5 if enshrined in the constitution, 4 if International treaty, 3 if fiscal rules in an Act of parliament, 2 if a fiscal rule reached from a coalition government or through other different layers of government but support by legislation and 1 if political commitment.
Criteria 2: space to reassess the rule;	3 if the rule cannot be modified and supported by legislation, 2 if there is some room to revise the objectives, 1 if there is opportunity to revise the rules. (for example, the statutory base of the rule simply contains wide principles but does not lay down procedures for revision involving other stakeholders).
Criteria 3	The criteria used is to take a simple average of the two elements in 3a and 3b.
Criteria 3a: the institution charged with monitoring of the rule.	3 for monitoring by an autonomous institution (for example, fiscal council or independent institution) or an oversight role by national parliament, 2 for observing by the ministry of finance or other related government institution, 1 for no regular public monitoring of the rule.
Criteria 3b: the institution charged with enforcement of the rule.	3 if enforcement by an independent body (for example, fiscal council or parliament oversight), 2 if enforced by the ministry of finance or related government institution and 1 if there is explicit institution charged with enforcement of the rule.
Criteria 4: Enforcement mechanism;	4 if there are programmed correction and sanctions in the event of failure to comply, 3 if there is programmed adjustments in the event rules are not complied with and possibility of forcing sanctions, 2 if the expert capable is obliged to take restorative measures in the event of failure to comply or is required to exhibit

	remedial to parliament and 1 if there are no explicit ex-ante defined actions in the event of no compliance.
Criteria 5: Development and investment visibility in the rule;	1 if the rule explicitly excludes investment in the rule and 0 if silent on investment or otherwise.
Criteria 6: Escape clause;	2 if the rule clearly circumstances in which the rule may not apply including the items and projects. 1 for general use of the clause and 0 when the rule is silent on contingencies.

Source: IMF Fiscal rules database and authors calculation
Notes: Each criterion is based on the characteristics for each fiscal rule.

To construct the fiscal rules index we use a simple average technique, with each criterion given equal weight. Therefore, in this chapter, we follow (D. Foremny, 2014) and use a simple average technique. Jose and Winkler (2008) opine that the simple average technique is easy to fathom and execute in empirical analysis thus robust to estimation errors. As such, in each criterion we divide by the maximum number in the criterion to ensure the variables is between zero and one. If multiple rules are used, the fiscal rules index will be the sum of the individual values. The score is constructed as a simple average of each criteria, as shown in Figure 4.5:

We acknowledge that there are several other techniques that are used to construct the index and they include the principal component analysis (PCA), however, the discrete nature of the fiscal rules characteristics (for instance, 1 when the fiscal rules exclude investment and 0 otherwise) may result in biased results of a PCA-constructed rules index. For example, Kolenikov and Angeles (2009) opine that the PCA requires a large sample size for implementation. Accordingly, the PCA assumes that variables are normally distributed, however, when the dataset is discrete and given the binary nature as is with some of the fiscal rules' characteristics, the assumption is violated. Moreover, the PCA assumes that the sample observations are standardised before the implementation of the technique.

As constructed, a higher index indicates more stringent fiscal rules. The summarized fiscal rule indices are shown below in *Figure 4.5* and all the individual country fiscal rule indices are shown in *Table A4.2* in the Appendices. Post-2008, the Mauritius Fiscal rules index is the strongest in Africa. The Mauritius fiscal policy rule is constitutionally driven and specifically targets debt with explicit institution support.

4.6 Summarised fiscal rules in SSA

As noted earlier, 25 countries in SSA employ fiscal rules both national and supranational as identified in the IMF database (2017), and in total there are 57 fiscal rules in use. The IMF database contains 96 countries with rules, from 1985 to 2016 and the database provides detailed information on type of rules, coverage, legal instruments, and target variables.

Table 4.2 presents the 48 fiscal rules in operation covered in our sample of 20 countries[32]. We determine the number of fiscal rules in a country by counting individual rules being utilized. For example, Kenya uses three fiscal rules (debt rule, revenue rule and balanced budget rule) while Nigeria utilizes one fiscal rule (balanced budget rule). Our sample includes rules that are enshrined under the international treaty or supranational law (75 percent), and constitution or statutory law (10 percent), with negligible levels under coalition agreement and political commitment. At the individual rules level, the sample includes 24 debt rules (44 percent), 22 balanced budget rules (40 percent) and 9 revenue rules (16 percent). The information in *Table 4.2* below is transformed to mathematical formula based on the information contained in the IMF database. In return, this transformed information is utilised to estimate the compliance variable of interest. It is evident from *Table 4.2* that numeric rules in SSA are heterogeneous, as they are not set to the same numerical limit. To track the compliance of fiscal rules, our sample does not include countries that introduced fiscal rules in 2013 or later and no expenditure rules as they are not used in the empirical analysis.

Table 4. 3 Sample of fiscal rules in SSA

Country/Region	Type	From	Revisions	Rule	Other Conditions
BEN	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
BEN	BBR	2000	2009	$bb_t < 3\%$	
BEN	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
BWA	DR	2005		$d_t \leq 40\%$	$dd_t \leq 20\% \, \& \, df_t \leq 20\%$
BWA	ER	2006		$ex_t \leq 40\%$	$ex_t \leq 20\% \, from \, 2015/16$
BFA	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
BFA	BBR	2000	2009	$bb_t < 3\%$	
BFA	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
CMR	DR	2002	2012	$d_t \leq 70\%$	
CMR	BBR	2002	2005	$rev_t \geq ex_t$	
CPV	DR	1998		$d_t \leq 60\%$	

[32] We exclude Uganda, Tanzania, Rwanda, and Burundi from the study because their rules were only initiated in 2013. Liberia is also excluded for lack of data during the sample period.

CAF	DR	2002	2012	$d_t \leq 70\%$	
CAF	BBR	2002	2005	$rev_t \geq ex_t$	
TCD	DR	2002	2012	$d_t \leq 70\%$	
TCD	BBR	2002	2005	$rev_t \geq ex_t$	
COG	DR	2002	2012	$d_t \leq 70\%$	
COG	BBR	2002	2005	$rev_t \geq ex_t$	
CIV	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
CIV	BBR	2000	2009	$bb_t < 3\%$	
CIV	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
GNQ	DR	2002	2012	$d_t \leq 70\%$	
GNQ	BBR	2002	2005	$rev_t \geq ex_t$	
GAB	DR	2002	2012	$d_t \leq 70\%$	
GAB	BBR	2002	2005	$rev_t \geq ex_t$	
GNB	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
GNB	BBR	2000	2009	$bb_t < 3\%$	
GNB	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
KEN	DR	1997	2012	$d_t \leq 50\%$	$w_t \leq 35\%$
KEN	BBR	2013		$bb_t < 3\%$	$from \, 2020/21$
KEN	RR	1997	2012	$rev_t \leq 21 - 22\%$	
MLI	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
MLI	BBR	2000	2009	$bb_t < 3\%$	
MLI	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
MUS	DR	2008		$d_t \leq 60\%$	$d_t \leq 50\% \, from \, 2018$
NAM	DR	2001		$d_t \leq 25 - 30\%$	
NAM	ER	2010		$ex_t < 30\%$	
NER	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
NER	BBR	2000	2009	$bb_t < 3\%$	
NER	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
NGA	BBR	2007		$bb_t \leq 3\%$	
SEN	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
SEN	BBR	2000	2009	$bb_t < 3\%$	
SEN	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$
TGO	DR	2000	2003	$d_t \leq 70\%$	$w_t \leq 35\%$
TGO	BBR	2000	2009	$bb_t < 3\%$	
TGO	RR	2000	2015	$rev_t \leq 20\%$	$dinv_t \geq 20\% \, of \, tax \, revenue$

Notes: Source: IMF Fiscal Rules database

The data contains fiscal rules up to 2016. w_t is the wage bill, d_t is the debt level, rev_t refers to revenue, ex_t is government spending, bb_t denotes the balanced budget and $dinv_t$ denotes investment financed by domestic tax revenue.

We calculate the country's compliance as a dummy variable, according to the rules outlined in *Table 4.2* for the period between 1997 and 2016. We take careful attention in calculating the compliance level to match the numeric variables and the actual data over time, thus, the resulting compliance calculated in this paper matches the compliance target at national level. It is instructive to note that in estimation of the compliance rate our assumption is that SSA countries do not manipulate their fiscal data to show that they have complied when they have

not. If such a scenario were to happen, then the IMF and the World Bank has the capacity and experience accumulated over the years to detect such events. This is evident as the IMF over the years has conducted fiscal analysis and accumulated data and information that aid in signalling areas where the government maybe hiding or altering their fiscal data. Furthermore, during IMF missions to respective countries they meet with several stakeholders that include members of civil society, parliamentarians, business representatives and labour unions, among others. Thereafter, the report is made public to enhance transparency. We later employ the rule specific characteristics, economic variables, political and institutions factors in our analysis. The choice of this period is informed by the fact that, although fiscal rules were in place for many decades in SSA, they were only formally adopted from 1997.

The dataset, as shown in *Table A4.1* (Appendix A4.1) indicates that the average debt limit among countries with a debt rule is 55 percent of GDP. At the country and regional level, the highest debt limit is set at 70 percent of GDP as used in both CEMAC and WAEMU countries and the lowest being 40 percent of GDP in Botswana. Interestingly, Botswana turns out as the only country with an explicit numeric target for both domestic and foreign debt at 20 percent of GDP in each category. For the deficit, all the countries have set the limit to 3 percent of GDP, while tax revenue is at more than 20 percent. As mentioned earlier, numerous reforms have been undertaken to improve the efficiency of these rules. This has led to countries setting their wage bills below 35 percent of tax revenue for all WAEMU countries and Kenya. On the investment side, countries have committed to spend at least 20 percent of their tax revenue on investment.

4.7 Data

We utilise annual data to test the compliance of fiscal rules in SSA and the dataset covers the period 1997–2016[33]. The sample selection is based on data availability and countries that have fiscal rules in place during the study period.

Table 4. 4 Description and measurement of variables

Variable	Unit	Description	Source
Public debt[1]	Ratio	The ratio of total debt which includes domestic	IMF/WEO & WDI

[33] Appendix *Table A4.9* provides a detailed description of the variables.

		and foreign debt as a ratio of GDP	
Debt service	Ratio	The total sum of principal and interest payments on public debt as a ratio of total exports	WDI
GDP per capita[1]	Ratio	The ratio of real GDP to Population	IMF & WEO
Grants[1]	Ratio	The ratio of total foreign grants as a ratio of GDP	WDI
Statutory Laws	Index	Index between 1 and 5	IMF database & authors calculation
Monitoring	Index	Index between 1 and 3	IMF database & authors calculation
Central government	Index	1 in central government and 0 otherwise	IMF database & authors calculation
Political Commitment	Index	1 in central government and 0 otherwise	IMF database & authors calculation
Political Coalition	Index	1 in central government and 0 otherwise	IMF database & authors calculation
Non-compliance	Index	1 in central government and 0 otherwise	IMF database & authors calculation
Election dummy	Dummy	1 for election in a given year and 0 otherwise	NELDA
Low Corruption	Index	Index between -2.5 and 2.5	WB/WGI
Regulatory quality	Index	Index between -2.5 and 2.5	WB/WGI
Political violence	Index	Index between -2.5 and 2.5	WB/WGI
Fiscal Rules Index (FRI)[2]	Index	Index between 0 and 1 of the fiscal rule characteristics	IMF database & authors construction

Note: IMF – International Monetary Fund, WB – World Bank, WGI – World Governance Indicators, WEO – World Economic Outlook, WDI - World Development Indicators, NELDA – National Elections Across Democracies and Autocracy. [1] We use the logs of public debt, GDP per capita and grants in our analysis. [2] We follow Dirk Foremny (2014) to construct our FRI.

4.8 Compliance statistics for fiscal rules

This section provides information on the characteristics of compliance of fiscal rules in SSA. The average compliance of fiscal rules is provided at the country and supranational level including the time periods. The statistics show that, overall, combined rules have a compliance rate of 54 percent across all years and countries in the sample (see *Table 4.4*). In addition, the data shows that debt rules are more complied at 73 percent compared to balanced budget and revenue rules at 54 and 33 percent, respectively. The reason might be that much attention has been deployed to contain a debt surge especially after the debt crisis in the 1990's followed by HIPC and the current Greece debt crisis. The continued IMF and other multilateral lending partner's surveillance and advice may have also contributed to enhanced compliance of debt rules.

Interestingly, compliance seems to have increased with time. The reason is that countries have revised their rules over time as shown in *Table A4.1* and initiated reforms aimed at improving the performance of fiscal rules and make them more specific to the target variables. However, there is significant heterogeneity at both country and individual fiscal rules level. At the regional level, fiscal rules seem to be highly complied with. However, a look at country level paints a different picture. While Kenya was the first country to adopt fiscal rules in SSA, it has only complied 37 percent on overall fiscal rules and has not complied with the revenue rule since adoption in 1997. Similarly, Cape Verde has the least compliance rate in our sample at 10 percent and performs dismally on debt rule. The history of Cape Verde is not surprising, as it is a beneficiary of the HIPC programme: HIPC was used to mitigate the surging debt levels and create fiscal space for debt distressed countries. A look at Cape Verde's current debt to GDP ratio seems to be on the rise, and currently stands at 124 percent of GDP.

Table 4. 5 Average compliance with National and Supranational Fiscal Rules in Sample

Rule Type:	Combined Rules	DR	BBR	RR
Avg. Compliance	54%	73%	54%	33%
Observations	339	317	287	156
Legal basis:	*SL-C*	*PC*	*CA*	
Avg. Compliance	66%	47%	88%	
Observations	58	59	16	
Coverage:	*CG*	*GG*	*SNG*	
Avg. Compliance	54%	78%	62%	
Observations	85	09	238	
Non-Compliance:				
Avg. Compliance	*63%*			
Observations	136			
Time Periods:	*1996-2000*	*2001-2004*	*2005-2010*	*2011-2016*
Avg. Compliance	17%	44%	58%	72%
Observations	25	72	97	120
Regional and Selected Country Individual Fiscal Rules Compliance				
WAEMU:	*Combined Rules*	*DR*	*BBR*	*RR*
Avg. Compliance	57%	71%	62%	38%
Observations	136	136	136	136
CEMAC:				
Avg. Compliance	67%	83%	50%	
Observations	102	102	102	
Kenya:				
Avg. Compliance	37%	50%	60%	0%
Observations	20	20	20	20
Cape Verde:				
Avg. Compliance	10%	5%	15%	
Observations	19	19	19	

Botswana:			
Avg. Compliance	100%	100%	
Observations	12	12	
Nigeria:			
Avg. Compliance	70%		70%
Observations	10		10

Source: IMF Database

Notes: The average compliance in percent of years in subsample. The DR - Debt Rule; BBR – Balanced Budget Rules; RR – Revenue Rule; CG – Central Government; GG – General Government; SNG – Supranational and National Government; SL – Statutory Law; PC – Political Commitment; CA – Coalition Agreement; C - Constitution; WAEMU Countries: Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, Togo; CEMAC Countries: Cameroon, Chad, Central Africa Republic, Republic of Congo, Equatorial Guinea, Gabon.

4.9. Methodology

4.9.1 Theoretical framework

The modelling technique used in this chapter is a logistic regression model. In our case we shall use the binomial logistic regression where the outcome is binary. Therefore, the dependent variable will be binary, and we test whether a country has complied or not. In the logistic regression the probability of compliance of fiscal rules, P_i is given as follows:

$$P_i = P(Y = 1) = \frac{exp(c_i)}{1 + exp(c_i)} \qquad 4.1$$

Where c_i denotes dependent variable that is the compliance of fiscal rules and therefore:

$$c_i = \alpha + \sum_{j=1}^{k} \beta_j X_i \qquad 4.2$$

Where X_i denotes a set of independent variables in the model and α, β refers to constant and parameters to be estimated. Therefore, subtracting Eqn. 4.1 from 1 we get the following:

$$1 - P_i = P(Y = 0) = \frac{1}{1 + exp(c_i)} \qquad 4.3$$

Dividing Eqn. 4.1 by Eqn. 4.3 and taking the logarithm from both sides of the equation results to the log of odds ratio as follows:

$$ln(c_i) = \alpha + \beta_i X_i \qquad 4.4$$

Equation 4.4 is our empirical estimated via the Maximum Likelihood Methods. In the analytical framework, we use the logit model as it exhibits better computational abilities relative to the probit model (Maddala, 1988).

4.9.2 Estimation Strategy

To estimate the compliance to fiscal rules, we employ a logistic model. In this case, a binary variable defined as follows:

$$c_{i,j,t} = \alpha + \beta FR_{i,j,t} + \gamma X_{i,t} + \varepsilon_{i,j,t} \qquad 4.3$$

Where $c_{i,j,t}$ is the binary of compliance; one for country i for complying with fiscal rule j in year t and zero otherwise. $FR_{i,j,t}$ denotes the characteristics of the fiscal rule j of country i in year t , $X_{i,j,t}$ denotes the political and social economic factors of country i in year t and. $\varepsilon_{i,j,t}$ is an idiosyncratic error term.

We employ panel logistic regression model and control for rule and country specific properties. Endogeneity is a major concern in the regression of this kind, and we must control for it. From the fiscal policy point of view, voters may favour compliance to fiscal rules and elect leaders that implement sanctions for non-compliance. Krogstrup and Wälti (2008) argue that voter preference is time invariant, thus, by including country fixed effects we control voter preference. Moreover, we follow Reuter (2018) and introduce political and institutional variables. In our analytical framework, we do not include country fixed effects. As such, an effort will constitute attainment of conditional effects. Further, in this chapter our interest is to establish determinants of rules complied with and not those complied with at least once. Moreover, the features of fiscal rules utilized and institutions supporting implementation of this rules are time invariant. Thus, use of country effects in our modelling framework maybe problematic.

The government may introduce reforms on the features of fiscal rules because they want to comply with the rule. There is no reverse causality, as any change to rules enshrined in the constitution is a long and tedious process that may take a long period before implementation, and the process includes a careful assessment of the reasons for non-compliance, drafting the bill and presenting to parliament. We further argue as in Reuter (2018) that any change on a fiscal rule or introduction of a new fiscal rule leads to a new set of rules for country i and the non-compliance cannot be observed without introduction of a new rule, thus, there is no reverse causality. Further, we argue that good governance helps to improve government institutions. As such, following Martí and Kasperskaya (2015), we measure public financial management (PFM) using institutional variables relating to good governance such as governance

effectiveness, voice and accountability and control of corruption. It is also important to note that external factors can influence compliance of fiscal rules. However, in our modelling process we have included control variables that can account for key external influences, e.g. grants which forms a major component of the budget process in developing countries.

4.10 Correlation of potential determinants of fiscal rules compliance

Table *A4.8* in the Appendices presents the correlation matrix of rules characteristics and other potential determinants of fiscal rules compliance. The upper panel shows the rule specific characteristics correlations for SSA. There are some large correlations among some of the characteristics and this could be because of various reforms at country level enhanced the features of these rules. As noted in *Table 4.2*, numerous reforms have been undertaken, and our sample indicates that 80 percent of countries with fiscal rules have improved the features of rules through reforms and majority were undertaken from 2009.

Rules covering the central government are correlated more with statutory (0.9), monitoring (0.87) and non-compliance sanctions. This might be the reason why rules covering the general government are significantly less complied with as shown in *Table 2.6*. This also suggests that government operating rules at central level have mechanisms to enhance compliance: The governments use the available limited capacity and resources at the central government for monitoring compliance of rules. Similarly, rules with statutory support or under a constitutional framework seems correlated with monitoring and non-compliance sanctions. This therefore suggests that countries with rules on a higher legal basis seems also to introduce monitoring and sanctions in case of non-compliance. On the other hand, political commitment seems to have a negative correlation with non-compliance and a low correlation with rules at central government. This might suggest that politicians are averse to deficit bias, as such, they may spend beyond the numeric target as long as they can be assured of re-election and therefore will not be willing to enforce sanctions. In the case of rules in central government, politicians are willing to comply in order to win the confidence of voters and secure re-election.

In the lower panel of the correlation between country specific (macroeconomic, social, and political), the correlations vary from positive to negative among variables. Looking at the correlation with rules specific characteristics, interest payments seem to be negatively correlated with the rule specific characteristics. Higher interest payments are associated with a

smaller coverage of the central government (-0.45), less statutory laws (-0.42), less non-compliance sanctions and monitoring both at (-0.38). A similar situation is reflected in debt, such that, higher debt is associated with less coverage at central government (-0.31), less statutory laws (-0.24) and less monitoring (-0.21). This points to a loophole that allows the central government debt to rise leading to increased interest payments. On the other hand, GDP per capita seems correlated with political commitment and general government. This explains the reasons why politicians will endeavour to enhance voter's welfare for continuous re-election and most importantly the focus is on general government for a wider reach of the citizens. Regulatory quality is also correlated with political commitment (0.32) and general government (0.33). All this point to the fact that in a political commitment, parties agree to work together while checking each other to ensure compliance. Surprisingly, corruption seems correlated with political commitment (0.34), this could help explain the reason why there is high corruption in SSA countries.

4.10.1. Summary statistics

Table 4.5 provides information on the summary statistics of variables used in this chapter. The data shows that an average of 10 percent of countries have rules under a political commitment, with less than 5 percent of rules employed under a coalition agreement and at the general government level. This is particularly important as only Namibia has embraced its fiscal policy rules under a coalition agreement, while only Mauritius and Liberia have their rules at the general government levels. About 60 percent of the rules are under the central government and 85% of rules have mechanisms on monitoring. Additionally, 44 percent of countries have escape clauses and 42 percent have non-compliance mechanisms.

Table 4. 6 Summary statistics

	(1)	(2)	(3)	(4)	(5)	
VARIABLES	Obs	Mean	Std.Dev.	Min	Max	
Political commitment	540	0.0981	0.298	0	1	IMF
Political coalition	540	0.0296	0.170	0	1	IMF
General government	540	0.0167	0.128	0	1	IMF
Central government	540	0.589	0.492	0	1	IMF
Statutory Laws	540	2.133	1.863	0	4	IMF
Enforcement	540	1.037	0.935	0	2	IMF
Non-compliance	540	1.252	1.238	0	3	IMF
Escape clause	540	0.435	0.496	0	1	IMF

Investment adjustment	540	0.419	0.494	0	1	IMF
Monitoring	540	1.493	1.415	0	3	IMF
All Rules	339	0.853	0.355	0	1	IMF
Debt compliance	317	0.726	0.447	0	1	IMF
BBR compliance	287	0.547	0.499	0	1	IMF
RR compliance	156	0.333	0.473	0	1	IMF
Election dummy	540	0.150	0.357	0	1	NELDA
Checks & balances	506	2.314	0.992	1	5	DPI
Democracy	540	0.0315	18.69	-88	10	Polity IV
Debt service	540	4.648	6.741	0	105.288	WDI
Regulatory quality	540	-0.551	0.629	-2.633	1.127	WGI
GDP Per capita	540	8.033	0.998	6.352	10.87	IMF/WEO

Note: Source - IMF database (2017), IMF; International Monetary Fund; WDI – World Development Indicators.
WDI - World Governance Indicators; WEO – World Economic Outlook.

4.11. Results

This section presents the results of compliance with fiscal rules on fiscal targets and rule characteristics. We estimate columns 1 to 9 in *Table 4.7* and our results can be interpreted as 'effects of rule specific legal characteristics on compliance to the rules'. As noted in *Table 4.7*, column 1 includes the full vector of rule-specific characteristics as our variables, while columns 2 to 9 contain each variable separately. Following the general-to-specific approach of Campos et al. (2005) and Lütkepohl (2007), we select variables by excluding insignificant variables.

Our results suggest that the probability of compliance increases when there is effective monitoring of rules. Therefore, a 1 percent higher monitoring level is associated with 0.12 percent higher probability of compliance. As noted earlier, there is consensus in the fiscal literature that compliance is correlated with monitoring, as it forms a major component of government enforcement. Rule coverage also has a significant impact on compliance. An estimated 1 percent larger coverage of total general government is associated with 0.13 percent higher probability of compliance, while a 1 percent larger coverage of central government finances is associated with 0.67 percent higher probability of compliance. This result is in contrast with Reuter (2018) on the compliance of fiscal rules in EU member states. Their findings show that fiscal rules at the general government level have a higher compliance rate. The stark contrast manifests from the fact that 59 percent of countries in our sample have their fiscal rules implemented at the central government level, and only about 2 percent have rules at the general government level. This therefore means that governments find it easier to implement and monitor fiscal rules at central government levels. Similarly, governments may

find it convenient at the central government level to use the limited capacity to evaluate ex-post effectiveness of rules.

Statutory provisions do not increase the probability of compliance. 1 percent use of statutory laws is associated with a 0.12 percent decrease in the probability of compliance. This result show that political will in the implementation of fiscal rules plays a crucial role of ensuring compliance. At the same time ownership of fiscal rules seems important, such that, if elected governments are willing and committed to compliance of the existing rules then this objective shall be achieved. For example, Chile has been touted as a classic example of political leaders influence in implementing statutory provisions of the fiscal rules and reduced public debt and enhanced fiscal prudence (Frankel et al. (2013); Solimano and Guajardo (2017)). Further, with the evidence that fiscal rules enshrined in statutory law do not enhance compliance, there is need to strengthen monitoring and enforcement mechanisms of these rules as well as oversight institutions. At the supranational level, the treaty with the fiscal rule provides an avenue for enhancing fiscal prudence in a monetary union. Therefore, the negative compliance when fiscal rules are outlined in a treaty calls for urgent action to strengthen institutions and political will among monetary union member countries, as has been the case with the European union fiscal rules. This means political will and support may be crucial for countries to comply with these rules, compared to rules enshrined in the constitution. Our results are similar to Reuter (2018), who find that countries with fiscal rules enshrined in their constitution have a 0.26 percent probability of noncompliance. Sanctions can play a role in enhancing compliance with fiscal rules. As noted, from the surveyed literature, stricter sanctions are introduced to induce compliance of rules. However, our results for sanctions are insignificant when considering other factors. We are not the only ones to find these kind of results, as Reuter (2018) also finds insignificant results among European member countries.

Table 4.8 presents results for 'country specific variables with both political, economic and institutional variables in the first part and the second part with Fiscal Rules Index (FRI)'. Debt accumulation appears to significantly affect compliance rates. In fact, a 1 percent higher debt level is associated with 0.1 percent probability of non-compliance, and this trend is similar even in the presence of FRI. Among individual rules, it is evident that a DR exhibits a higher rate of non-compliance with an increase in public debt. As such, a 1 percent increase in debt is associated with 0.23 percent probability of non-compliance. By contrast, grants are positively correlated with higher compliance rate of fiscal rules. As shown from the results, a 1 percent

increase in grants is associated with 0.05 percent increase in the probability of compliance in presence of a debt rule. This is reflected in the fact that grants help to boost the recipient country's revenues and form part of the budget, thus reducing debt accumulations and deficits.

Compliance is significantly boosted with higher GDP per capita, such that a 1 percent increase in GDP per capita increases the probability of compliance by 0.17 percent in the presence of a BB rule. This is related to the fact that countries that have lower levels of inequality and are highly developed have elaborate tax collection systems; thus, their revenue levels are higher, reducing their borrowing costs. On the other hand, corruption significantly impedes compliance. As can be seen from the results, a 1 percent increase in corruption correlates with an increase of between 0.47 percent and 0.15 percent probability of non-compliance. The surprising corruption results relate to revenue rule, such that 1 percent higher corruption correlates with about 0.58 percent probability of compliance.

Election cycles also affect a country's compliance rate. Our findings show that, during election periods, the probability of non-compliance increases by 0.17 percent in the presence of a revenue rule; elections do not, however, appear to have any significant effect on compliance with other rules. Reuter (2018) finds that election periods do not significantly affect compliance of fiscal rules in Europe. Similarly, Delgado Tellez *et al.* (2016) also find that fiscal non-compliance increases in Spanish regions during periods of election years. In our case, it shows the influence of politics on fiscal rules. Regulatory quality significantly influences compliance. An increase in regulatory quality by 1 percent enhances 0.43 percent probability of compliance in presence of balanced budget rule.

Table 4.9 provides the results of an Instrumental Variable (IV) Probit model estimation. We instrument the fiscal rules index with a lagged fiscal rules index to address the problem of endogeneity in our earlier model. The results confirm to a larger extent the results in the logit model in *Tables 4.7 and 4.8*. The first stage results are significant across all the fiscal rules. Thus, 1 percent higher debt correlates with 0.95 percent and 2.9 percent probability of non-compliance in the presence of combined rules and a debt rule. Similarly, grants turn out to be correlated with compliance. A 1 percent higher grant is associated with 0.71 and 0.45 percent, respectively, of higher probability of compliance in presence of DR and RR, respectively. In fact, grants are associated a higher likelihood of compliance in presence of a debt rule. The

findings support the hypothesis that grants mitigate the deficit bias and enhance compliance. These results are consistent with Delgado Tellez *et al.* (2016) findings on compliance of fiscal targets in Spanish regions. They find that regions that receive higher fiscal transfers have lower non-compliance rates. GDP per capita is also correlated with higher compliance, such that, a 1 percent increase in GDP per capita is correlated with 0.43 percent higher likelihood of compliance in the presence of BBR. These results are in line with those in the literature. In particular, Delgado Tellez *et al.* (2016) finds that regions with higher GDP per capita exhibit higher compliance rates. Moreover, higher corruption seems to be associated with lower compliance rate, with 1 percent increase in corruption, the probability of non-compliance increases by 1.67 per cent and 1.09 percent, respectively, in presence of all rules and BBR's, respectively. These results are in line with the literature Hellman et al. (2003), Méon and Sekkat (2005), Dreher et al. (2009) and Bjørnskov (2011) suggesting that corruption constitutes a major problem among developing countries, as it aggravates underground economy and is an obstacle to both economic and political reforms. On the other hand, the quality of regulations seems to play a role on compliance. In the presence of higher quality regulations, the probability of compliance increases by 1.44 percent and 0.96 percent in presence of all rules and BBR's, respectively.

Table 4.7: Estimation Results for the probability of fiscal rules compliance based on legal characteristics of fiscal rules

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Probit	OLS
Statutory Laws	-0.133	0.060**							-0.116*	-0.128*	-0.164***
	(0.083)	(0.031)							(0.066)	(0.074)	(0.048)
Monitoring	0.125*		0.085**						0.124*	0.138*	0.192
	(0.066)		(0.043)						(0.064)	(0.074)	(0.050)
General Government	0.128***			-0.074					0.125***	0.135***	0.664**
	(0.040)			(0.051)					(0.040)	(0.039)	(0.221)
Central Government	0.759***				0.297**				0.673***	0.671***	0.590***
	(0.183)				(0.137)				(0.181)	(0.174)	(0.159)
Political Commitment	-0.156					-0.225			-0.138	-0.157	-0.189***
	(0.169)					(0.227)			(0.163)	(0.169)	(0.073)
Political Coalition	-0.059						0.027				
	(0.064)						(0.052)				
Non-Compliance Sanctions	0.010							0.087*	0.008	0.005	-0.003
	(0.078)							(0.046)	(0.076)	(0.077)	(0.038)
Wald Chi2											
Probability											
Pseudo R - Squared	0.16								0.16	0.16	0.18
Countries	20	20	20	20	20	20	20	20	20	20	20
Observations	332	332	332	332	332	332	332	332	332	332	332
Country FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Source: IMF Fiscal Rules database

Note: Each column presents a separate panel logistic regression with country *i* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Clustered standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent

Table 4.8: Estimation Results of fiscal rules compliance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Logit Model with Fiscal Rules Index as Independent Variable			
Variables	Rules	Debt	Balanced Budget	Revenue	All rules	Debt	Balanced Budget	Revenue
Fiscal Rules Index					0.191	0.192	-0.624*	1.038*
					(0.119)	(0.149)	(0.366)	(0.569)
Debt Service (lagged)	-0.001	-0.001	0.001	-0.005	-0.000	-0.000	0.001	-0.005
	(0.001)	(0.001)	(0.004)	(0.005)	(0.001)	(0.001)	(0.004)	(0.005)
Debt (lagged)	-0.110***	-0.233**	0.046	-0.174	-0.095***	-0.233**	0.025	-0.161
	(0.030)	(0.101)	(0.056)	(0.129)	(0.033)	(0.100)	(0.058)	(0.125)
Grants (lagged)	0.029	0.046*	0.106	0.126	0.026	0.050*	0.092	0.145
	(0.033)	(0.025)	(0.093)	(0.103)	(0.032)	(0.026)	(0.088)	(0.107)
GDP per capita (lagged)	0.036	0.031	0.168*	0.152	0.031	0.022	0.167**	0.143
	(0.037)	(0.021)	(0.091)	(0.219)	(0.034)	(0.021)	(0.084)	(0.218)
Control of Corruption (lagged)	-0.152**	-0.055	-0.473***	0.583**	-0.152*	-0.057	-0.423**	0.587**
	(0.077)	(0.045)	(0.182)	(0.277)	(0.084)	(0.043)	(0.168)	(0.282)
Election dummy	-0.028	-0.004	-0.022	-0.179***	-0.025	-0.005	-0.023	-0.170***
	(0.024)	(0.025)	(0.083)	(0.063)	(0.021)	(0.024)	(0.078)	(0.062)
Regulatory quality	0.120	0.013	0.437**	-0.607***	0.122	0.005	0.368*	-0.586**
	(0.089)	(0.056)	(0.210)	(0.232)	(0.102)	(0.055)	(0.206)	(0.241)
Wald Chi2	48.36	53.89	15.45	74.63	37.94	69.08	30.27	
Probability	0.00	0.00	0.03	0.00	0.00	0.00	0.00	
Pseudo R Squared	0.31	0.59	0.07	0.16	0.33	0.59	0.08	0.17
Observations	312	291	270	147	312	291	270	147
Country FE	NO	NO	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel logistic regression with country *i* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Clustered standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table 4.9: Estimation Results for fiscal rules compliance based on Macroeconomic Variables and FRI

Variables	(1) Rules	(2) Debt	(3) Balanced Budget	(4) Revenue
Fiscal rules index	2.104*	4.239***	-1.230	16.759**
	(1.181)	(1.534)	(1.298)	(7.827)
Debt service (lagged)	-0.001	-0.005	0.003	-0.012
	(0.011)	(0.009)	(0.010)	(0.015)
Debt (lagged)	-0.951***	-2.903***	0.067	-0.166
	(0.356)	(0.514)	(0.149)	(0.448)
Grants	0.417	0.707**	0.246	0.451*
	(0.281)	(0.315)	(0.233)	(0.240)
GDP per capita	0.359	0.257	0.430*	0.113
	(0.315)	(0.347)	(0.223)	(0.407)
Corruption	-1.666***	-0.875	-1.089**	1.554
	(0.458)	(0.634)	(0.435)	(1.253)
Election dummy	-0.177	-0.252	-0.052	-0.192
	(0.184)	(0.329)	(0.198)	(0.449)
Regulatory quality	1.440**	0.238	0.956*	-1.390
	(0.584)	(0.660)	(0.526)	(1.575)
Wald Chi2	30.15	124.48	24.05	13007.98
Probability	0.000	0.000	0.002	0.000
Countries	20	20	20	20
Observations	312	291	270	147
Country FE	NO	NO	NO	NO

Note: Each column presents a separate panel IV Probit regression with country *i* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Clustered standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent and * denotes significance at 10 percent.

4.12 Robustness checks

We assess the robustness of the models by undertaking several analyses. First, we account for resource-based countries in our sample. An economy being resource-based could have an influence on a nation's compliance with fiscal rules, and on other determinants of fiscal rules. Table *A4.2* reports the results of characteristics of fiscal rules compliance after accounting for resource-based countries. Interestingly, countries with resource-based economies tend, on average, to be more compliant with fiscal rules' characteristics compared to non-resource-based economies. The probability of compliance among resource-based countries increases by 0.23 percent compared to non-resource-based countries. Similarly, the probability of compliance for resource-based countries that embrace political commitment increases by 0.06 percent compared to non-resource-based countries under political commitment. At the same time, we find that non-compliance sanctions enhance compliance when we account for resource-based countries. These results differ from Reuter (2018) who finds insignificant results among non-compliance sanctions. However,

we find that after accounting for resource-based countries the macroeconomic characteristics of fiscal rules do not change significantly. In fact, the resource-based coefficient remains insignificant for macroeconomic characteristics in both the logit and probit modelling, as shown in Table *A4.3* and *A4.4*, respectively. In addition, we find that, at the individual fiscal rules level, a revenue rule reduces compliance after accounting for resource-based countries in the presence of both macroeconomic variables and fiscal rules index.

Second, we conduct robustness checks by implementing the probit and Ordinary Least Squares (OLS) models using similar variables as in our baseline approach. Similar, to the baseline results, we find that monitoring enhances the probability of compliance (see Table 4.6). Indeed, using a probit model, we find that a 1 percent higher monitoring level enhance probability of fiscal rule compliance by 0.14 percent. Furthermore, a 1 percent larger coverage of fiscal rules at general government and central government correlates with increased probability of compliance by 0.14 percent and 0.67 percent, respectively, in a probit model. In the OLS framework, we also find that fiscal rules implemented at general government enhance the likelihood of compliance by 0.66 percent, while a 1 percent larger coverage of central government is associated with 0.59 percent higher probability of compliance. Using the macroeconomic variables, we find similar results to the baseline. In both the probit and OLS frameworks, we find that public debt increases the likelihood for fiscal rules non-compliance ranging between 0.13 percent to 0.34 percent. On the other hand, both grants, GDP per capita and regulatory quality enhance probability of fiscal rules compliance between 0.07 percent and 0.44 percent. Additionally, we also find that increases in corruption and election cycles result in the likelihood of non-compliance with fiscal rules. Surprisingly, we find that probability for compliance in a resource-based economy reduces 0.24 percent compared to a non-resource-based country. Furthermore, our findings using the OLS model confirm our results in both the baseline and probit model.

Third, as part of our robustness tests, we change the compliance measure. In this case we capture compliance of fiscal rule as an event where fiscal outturns are below the numeric fiscal target. For example, when the debt limit is set at 60 percent of GDP and the current public debt is below 60 percent of GDP, the country is said to have complied. As such, we implement a strict compliance condition in our robustness check. It is important to note that the results from this robustness

exercise to a large extent confirm our baseline results. Indeed, from *Table A4.5*, we find that a 1 percent increase in public debt increases the probability of non-compliance in presence of a fiscal rule and debt rule by 0.23 percent and 0.60 percent, respectively. The results are similar when we use a fiscal rules index. Additionally, we find that increase in corruption and election cycles are associated with likelihood of fiscal rules non-compliance. For example, 1 percent increase in corruption is correlated with the probability of non-compliance of between 0.21 percent and 0.47 percent. Similarly, during election periods fiscal rule non-compliance increases by a probability of 0.18 in presence of the revenue rule. Furthermore, a 1 percent increase in regulatory quality enhances the probability of non-compliance by 0.44 percent in presence of balanced budget rule.

We also control membership to a monetary union that includes being a member of CEMAC and WAEMU. Interestingly, membership to a monetary union influences the compliance of fiscal rules. Table A4.7 reports results after accounting for monetary union. Our results show that being a member of a monetary union is associated with increased probability of compliance by 0.35 percent in presence of a fiscal rule. Moreover, being in a monetary union increases the likelihood of compliance by 0.19 percent in presence of debt rule. We also find similar results in presence of fiscal rules index. On the other hand, we find that 1 percent increase in GDP per capita, grants and regulatory quality enhance the probability of compliance by a range of 0.5 percent to 0.18 percent, 0.04 percent, and 0.14 percent and 0.49 percent. We also find that a 1 percent increase in public debt and corruption enhances the likelihood of non-compliance by between 0.08 percent and 0.15 percent and between 0.14 and 0.18 percent, respectively.

4.13 Conclusions and Policy Implications

Over the last two decades, there has been a growing appetite for adoption of fiscal rules like the trend of adopting inflation targeting. Both of these policies express a preference for a rules-based approach to policymaking as opposed to the traditional discretionary approach. This trend for fiscal rules is particularly prevalent at the regional level in SSA. Although many countries have adopted these rules, with some countries revising them numerous times, there has been little empirical evidence on the determinants of a country's fiscal rules. Based on a sample of 57 fiscal rules in 20 Sub-Sahara Africa countries from 1997 to 2016, the chapter is the first of its kind to provide an

explicit overview of fiscal rules in SSA and the determinants of fiscal rules compliance among specific characteristics.

Our results show that the overall compliance is high at 54 percent. However, significant heterogeneity exists among individual rules and country compliance rates. It is important to note that, despite the SSA countries exhibiting a higher compliance rate of 54 percent, this group of countries are susceptible to external shocks and do not have a robust monitoring framework like the European Union. While some countries have complied over 80 percent of the period, others have never complied with some individual rules since adoption. The worst compliance rate is on the revenue rule, which is not surprising as it is the least adopted rule in our sample. The various econometric analyses undertaken in this chapter show that monitoring and adoption of rules by central governments turn out to be significantly associated with higher probability of compliance. Similarly, institutional factors seem to affect compliance. Corruption turns out to be associated with lower probability of compliance, while regulatory quality is associated with higher probability of compliance. This therefore means that efforts within governments to mitigate rising corruption should be stepped up and countries should endeavour to enhance regulatory quality, as this gives them room for resource mobilisation through the taxation channel. Political economy variables via the election cycles also turn out to be associated with lower probability of compliance especially on tax revenue. Similarly, the quality of regulations seems crucial in the compliance agenda, as it increases the compliance rate when the quality is high.

Appendix: Chapter 4

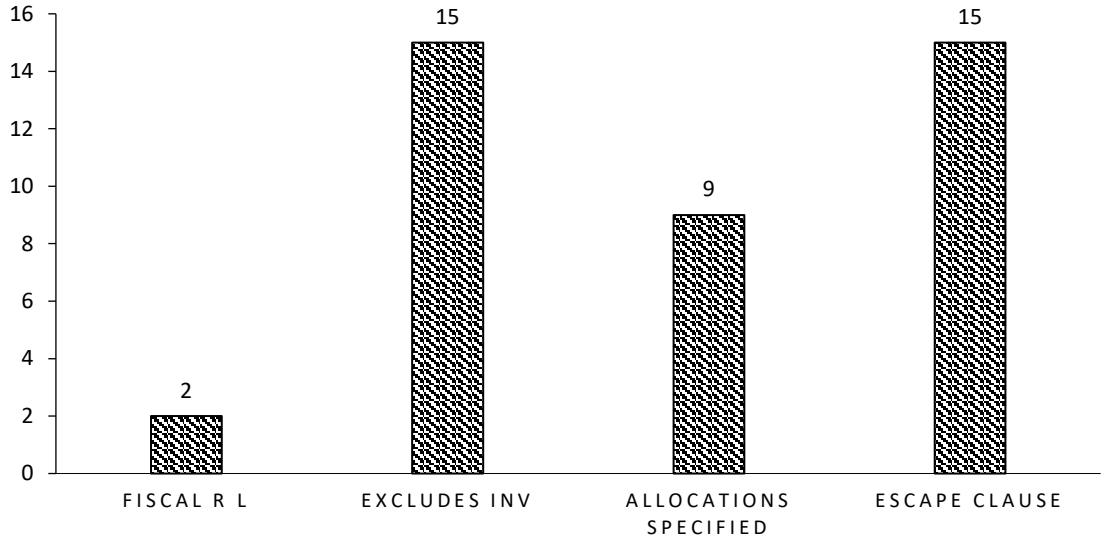


Figure A4. 1 Number of fiscal rules in SSA in 2016 by their characteristics

Table A4. 1 Complete list of SSA countries with Fiscal Rules, by year of adoption

	Debt Rule	BB Rule	Revenue Rule	Expenditure Rule
Benin	2000	2000	2000	
Botswana	2005			2006
Burkina Faso	2000	2000	2000	
Burundi	2013	2013		
Cameroon	2002	2002		
Cape Verde	1998			
Central Africa Republic	2002	2002		
Chad	2002	2002		
Congo Republic	2002	2002		
Cote D'Ivoire	2000	2000	2000	
Equatorial Guinea	2002	2002		
Gabon	2002	2002		
Guinea Bissau	2000	2000	2000	
Kenya	1997	2013	1997	
Liberia				
Mali	2000	2000	2000	
Mauritius	2008			
Namibia	2001		2010	
Niger	2000	2000	2000	
Nigeria		2007		
Rwanda	2013	2013		
Senegal	2000	2000	2000	
Tanzania	2013	2013		
Togo	2000	2000	2000	
Uganda	2013	2013		

Source: IMF Fiscal Rules Database

Note: The information in this table shows the years when countries adopted fiscal rules. In the following analysis, we exclude, Burundi, Rwanda, Tanzania, Uganda and Liberia. Abbreviations: BB – Balanced Budget Rules, SSA – Sub-Sahara Africa.

Table A4.2: Estimation Results of fiscal rules compliance (Resource based)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Logit Model with Fiscal Rules Index as Independent Variables			
Variables	Rules	Debt	Balanced Budget	Revenue	All rules	Debt	Balanced Budget	Revenue
Fiscal Rules Index					0.218*	0.198	-0.626*	1.020
					(0.127)	(0.162)	(0.368)	(0.625)
Debt Service (lagged)	-0.001	-0.001	0.001	-0.006	-0.000	-0.000	0.001	-0.006
	(0.001)	(0.001)	(0.004)	(0.004)	(0.001)	(0.001)	(0.004)	(0.004)
Debt (lagged)	-0.108***	-0.227**	0.048	-0.217**	-0.091***	-0.227**	0.027	-0.205**
	(0.028)	(0.094)	(0.054)	(0.106)	(0.028)	(0.094)	(0.056)	(0.102)
Grants (lagged)	0.033	0.044	0.110	0.132	0.033	0.048*	0.097	0.148*
	(0.036)	(0.028)	(0.094)	(0.088)	(0.038)	(0.029)	(0.089)	(0.088)
GDP per capita (lagged)	0.032	0.026	0.158*	0.143	0.025	0.017	0.157**	0.134
	(0.033)	(0.024)	(0.087)	(0.202)	(0.027)	(0.026)	(0.079)	(0.200)
Control of Corruption (lagged)	-0.151**	-0.050	-0.456***	0.543*	-0.148*	-0.052	-0.408***	0.553*
	(0.075)	(0.054)	(0.169)	(0.290)	(0.081)	(0.051)	(0.152)	(0.298)
Election dummy	-0.031	-0.004	-0.023	-0.188***	-0.030	-0.005	-0.024	-0.179***
	(0.027)	(0.024)	(0.082)	(0.054)	(0.026)	(0.023)	(0.077)	(0.054)
Regulatory quality	0.127	0.015	0.451**	-0.666***	0.128	0.008	0.384*	-0.655**
	(0.092)	(0.048)	(0.197)	(0.253)	(0.102)	(0.046)	(0.196)	(0.265)
Resource based	0.023	0.011	0.075	-0.240**	0.037	0.013	0.074	-0.241**
	(0.043)	(0.035)	(0.154)	(0.116)	(0.049)	(0.036)	(0.149)	(0.116)
Wald Chi2	45.49	48.00	23.53	30.33	45.06	68.43	30.14	
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pseudo R Squared	0.31	0.58	0.07	0.21	0.34	0.59	0.08	0.22
Observations	312	291	270	147	312	291	270	147
Country FE	NO	NO	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel logistic regression with country *I* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Clustered standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table A4.3: Estimation Results of fiscal rules compliance in a Probit framework

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)
					Probit Model with Fiscal rules Index as independent variable			
Variables	All rules	Debt	Balanced Budget	Revenue	All rules	Debt	Balanced Budget	Revenue
Fiscal rules Index					0.276*	0.329	-0.548*	1.025*
					(0.156)	(0.203)	(0.291)	(0.565)
Debt Service (lagged)	-0.001	-0.001	0.001	-0.006	-0.000	-0.001	0.001	-0.006*
	(0.001)	(0.001)	(0.004)	(0.004)	(0.001)	(0.001)	(0.004)	(0.004)
Debt (lagged)	-0.131***	-0.344***	0.046	-0.224**	-0.116***	-0.335***	0.026	-0.213**
	(0.033)	(0.099)	(0.054)	(0.107)	(0.030)	(0.105)	(0.056)	(0.104)
Grants (lagged)	0.057	0.077**	0.111	0.121	0.062	0.081**	0.099	0.136
	(0.048)	(0.035)	(0.094)	(0.085)	(0.050)	(0.035)	(0.090)	(0.086)
GDP per capita	0.047	0.052	0.159*	0.133	0.037	0.033	0.158**	0.126
	(0.045)	(0.039)	(0.086)	(0.195)	(0.037)	(0.039)	(0.080)	(0.195)
Control of Corruption	-0.210**	-0.106	-0.447***	0.570**	-0.211**	-0.101	-0.407***	0.580**
	(0.092)	(0.071)	(0.159)	(0.288)	(0.095)	(0.064)	(0.146)	(0.294)
Election dummy	-0.032	-0.039	-0.021	-0.186***	-0.031	-0.035	-0.022	-0.176***
	(0.031)	(0.065)	(0.083)	(0.050)	(0.031)	(0.060)	(0.077)	(0.049)
Regulatory quality	0.196*	0.036	0.439**	-0.702***	0.199*	0.029	0.385**	-0.694***
	(0.107)	(0.073)	(0.185)	(0.235)	(0.115)	(0.065)	(0.185)	(0.248)
Resource-based	0.032	0.008	0.080	-0.245**	0.059	0.018	0.073	-0.248**
	(0.054)	(0.045)	(0.153)	(0.113)	(0.063)	(0.046)	(0.150)	(0.112)
Wald Chi2	51.3	84.69	17.60		41.47	104.15	39.32	
Probability	0.00	0.00	0.02		0.00	0.00	0.00	
Pseudo R Squared	0.29	0.57	0.07	0.21	0.32	0.58	0.08	0.22
Countries	20	20	20	20	20	20	20	20
Observations	312	291	270	147	312	291	270	147
Country FE	NO	NO	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel probit regression with country *i* compliance with its fiscal rules as the dependent variable. Clustered standard errors are in parentheses, *** denotes significance at 1 percent, ** denotes significance at 5 percent and * denote significance at 10 percent.

Table A4.4: OLS Robustness Estimation Results of fiscal rules compliance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					OLS Model with Fiscal Rules Index as independent variable			
Variables	Rules	Debt	Balanced Budget	Revenue	All rules	Debt	Balanced Budget	Revenue
Fiscal Rules Index					0.378*	0.537**	-0.490	1.124*
					(0.197)	(0.218)	(0.295)	(0.534)
Debt Service (lagged)	0.001	0.002	0.001	-0.005*	0.002	0.003	0.001	-0.005*
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Debt (lagged)	-0.141***	-0.351***	0.041	-0.180	-0.134***	-0.352***	0.022	-0.166
	(0.041)	(0.069)	(0.050)	(0.106)	(0.041)	(0.064)	(0.051)	(0.100)
Grants (lagged)	0.027	0.058	0.100	0.103	0.033	0.067	0.087	0.117
	(0.049)	(0.060)	(0.087)	(0.065)	(0.051)	(0.059)	(0.084)	(0.065)
GDP per capita (lagged)	-0.020	-0.051	0.140*	0.096	-0.029	-0.070	0.133*	0.082
	(0.060)	(0.083)	(0.075)	(0.157)	(0.057)	(0.077)	(0.069)	(0.157)
Control of Corruption	-0.302**	-0.172	-0.415***	0.468*	-0.314**	-0.175	-0.373***	0.495*
	(0.115)	(0.126)	(0.132)	(0.248)	(0.119)	(0.124)	(0.121)	(0.241)
Election dummy	-0.049	-0.040	-0.020	-0.169***	-0.049	-0.035	-0.017	-0.154**
	(0.035)	(0.044)	(0.074)	(0.050)	(0.035)	(0.045)	(0.071)	(0.048)
Regulatory quality	0.347***	0.241	0.398**	-0.521***	0.367***	0.264*	0.343**	-0.532***
	(0.111)	(0.142)	(0.152)	(0.136)	(0.117)	(0.131)	(0.154)	(0.149)
Resource-based	0.087	0.068	0.070	-0.252*	0.109	0.084	0.063	-0.245*
	(0.070)	(0.095)	(0.146)	(0.133)	(0.077)	(0.090)	(0.143)	(0.131)
Observations	312	291	270	147	312	291	270	147
F Statistics	3.86	13.96	3.13		2.94	20.33	11.33	
Probability	0.00	0.00	0.02		0.02	0.00	0.00	
R-squared	0.235	0.424	0.087	0.227	0.253	0.440	0.098	0.241
Country FE	NO	NO	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel OLS regression with country *i* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Clustered standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table A4.5: Robustness Estimation Results of fiscal rules compliance (for example debt < 60 threshold)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Logit Model with Fiscal Rules Index as independent variable			
Variables	Rules	Debt	Balanced Budget	Revenue	All rules	Debt	Balanced Budget	Revenue
Fiscal Rules Index					0.375*	0.192	-0.624*	1.038*
					(0.199)	(0.149)	(0.366)	(0.569)
Debt Service (lagged)	-0.003	-0.001	0.001	-0.005	-0.002	-0.000	0.001	-0.005
	(0.003)	(0.002)	(0.004)	(0.005)	(0.002)	(0.001)	(0.004)	(0.005)
Debt (lagged)	-0.228***	-0.603***	0.046	-0.174	-0.179***	-0.233**	0.025	-0.161
	(0.050)	(0.129)	(0.056)	(0.129)	(0.049)	(0.100)	(0.058)	(0.125)
Grants (lagged)	0.098	0.137	0.106	0.126	0.073	0.050*	0.092	0.145
	(0.071)	(0.111)	(0.093)	(0.103)	(0.050)	(0.026)	(0.088)	(0.107)
GDP per capita	0.084	0.014	0.168*	0.152	0.062	0.022	0.167**	0.143
	(0.063)	(0.061)	(0.091)	(0.219)	(0.049)	(0.021)	(0.084)	(0.218)
Control of Corruption	-0.214*	-0.158	-0.473***	0.583**	-0.225*	-0.057	-0.423**	0.587**
	(0.130)	(0.152)	(0.182)	(0.277)	(0.132)	(0.043)	(0.168)	(0.282)
Election dummy	-0.035	-0.028	-0.022	-0.179***	-0.021	-0.005	-0.023	-0.170***
	(0.029)	(0.066)	(0.083)	(0.063)	(0.025)	(0.024)	(0.078)	(0.062)
Regulatory quality	0.211	0.235	0.437**	-0.607***	0.243	0.005	0.368*	-0.586**
	(0.154)	(0.202)	(0.210)	(0.232)	(0.156)	(0.055)	(0.206)	(0.241)
Wald Chi2	52.88	62.40	15.45	74.63	51.97	69.08	30.27	
Probability	0.00	0.00	0.03	0.00	0.00	0.00	0.00	
Pseudo R Square	0.25	0.45	0.06	0.16	0.30	0.59	0.08	
Observations	380	361	270	147	380	291	270	147
Country FE	NO	NO	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel logistic regression with country *i* compliance with its fiscal rules as the dependent variable. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table A4.6: Robustness check estimation results of fiscal rules compliance controlling for Monetary union.

Variables	(1) Rules	(2) Debt	(3) Balanced Budget	(4) All rules	(5) Debt	(6) Balanced Budget
Fiscal Rules Index				0.159***	0.162	-0.575
				(0.058)	(0.108)	(0.366)
Debt Service (lagged)	-0.000	-0.001	0.002	-0.000	-0.000	0.002
	(0.001)	(0.000)	(0.004)	(0.000)	(0.000)	(0.004)
Debt (lagged)	-0.085***	-0.159*	0.050	-0.055*	-0.143	0.031
	(0.022)	(0.093)	(0.057)	(0.029)	(0.092)	(0.059)
Grants (lagged)	0.035*	0.039	0.094	0.024	0.038	0.083
	(0.019)	(0.027)	(0.100)	(0.017)	(0.027)	(0.092)
GDP per capita (lagged)	0.059**	0.030	0.177*	0.046**	0.019	0.174**
	(0.025)	(0.023)	(0.096)	(0.022)	(0.016)	(0.087)
Control of Corruption	-0.098**	-0.041	-0.453***	-0.075**	-0.036	-0.412***
	(0.039)	(0.036)	(0.136)	(0.037)	(0.030)	(0.129)
Election dummy	-0.022	-0.003	-0.020	-0.015	-0.005	-0.022
	(0.021)	(0.019)	(0.084)	(0.015)	(0.016)	(0.079)
Regulatory quality	0.136*	0.053	0.491***	0.107**	0.041	0.427**
	(0.070)	(0.045)	(0.185)	(0.053)	(0.042)	(0.193)
Monetary union	0.346**	0.199**	0.175	0.401**	0.211**	0.156
	(0.165)	(0.096)	(0.160)	(0.170)	(0.085)	(0.145)
Wald Chi2	171.8	42.74	26.40	64.9	110.9	39.8
Probability	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R Square	0.40	0.65	0.07	0.67	0.44	0.08
Observations	312	291	270	312	291	270
Country FE	NO	NO	NO	NO	NO	NO

Note: Each column presents a separate panel logistic regression with country *i* compliance with its fiscal rules as the dependent variable. Monetary union refers to countries that are in a monetary union and they include WAEMU and CEMAC countries. Clustered standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table A4. 8 Correlation between Rules characteristics and Macroeconomic and Political Variables

Table 4.7: Correlation Matrix of all variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Rule Characteristics Potential Determinants of Compliance														
1 Statutory	1.0000													
2 Monitoring	0.9572	1.0000												
4 Political commitment	0.1611	0.0644	1.0000											
5 General government	0.0614	-0.0455	-0.0456	1.0000										
6 Central government	0.9085	0.8702	0.2962	-0.1540	1.0000									
7 Non-comp Sanctions	0.9320	0.9359	-0.0717	-0.0273	0.8254	1.0000								
Macroeconomic, Social and Political Potential Determinants of Compliance														
8 Debt	-0.2496	-0.2173	-0.1021	-0.0368	-0.3128	-0.1851	1.0000							
9 Interest Payment	-0.4253	-0.3896	-0.1385	-0.0028	-0.4522	-0.3810	0.3742	1.0000						
10 GDP Per capita	-0.0753	-0.1856	0.2379	0.2687	-0.0034	-0.2340	-0.1272	0.2350	1.0000					
11 Grants	-0.0601	-0.0296	-0.1229	-0.1212	-0.1066	0.0388	0.3845	-0.0888	-0.5273	1.0000				
12 Regulatory quality	-0.0209	-0.1098	0.3233	0.3267	0.0750	-0.0745	-0.2073	-0.0552	0.4477	-0.2055	1.0000			
13 Political stability	-0.1759	-0.2602	0.1733	0.1655	-0.1085	-0.1697	-0.1316	-0.0435	0.3774	-0.0355	0.5237	1.0000		
14 Corruption	-0.1069	-0.2376	0.3410	0.1799	0.0106	-0.1528	-0.1766	-0.0685	0.3429	0.0218	0.5807	0.6656	1.0000	
15 Election dummy	-0.0311	-0.0226	-0.0361	-0.0120	-0.0319	-0.0205	0.0032	-0.0294	-0.0306	-0.0349	-0.0099	0.0050	-0.0427	1.0000

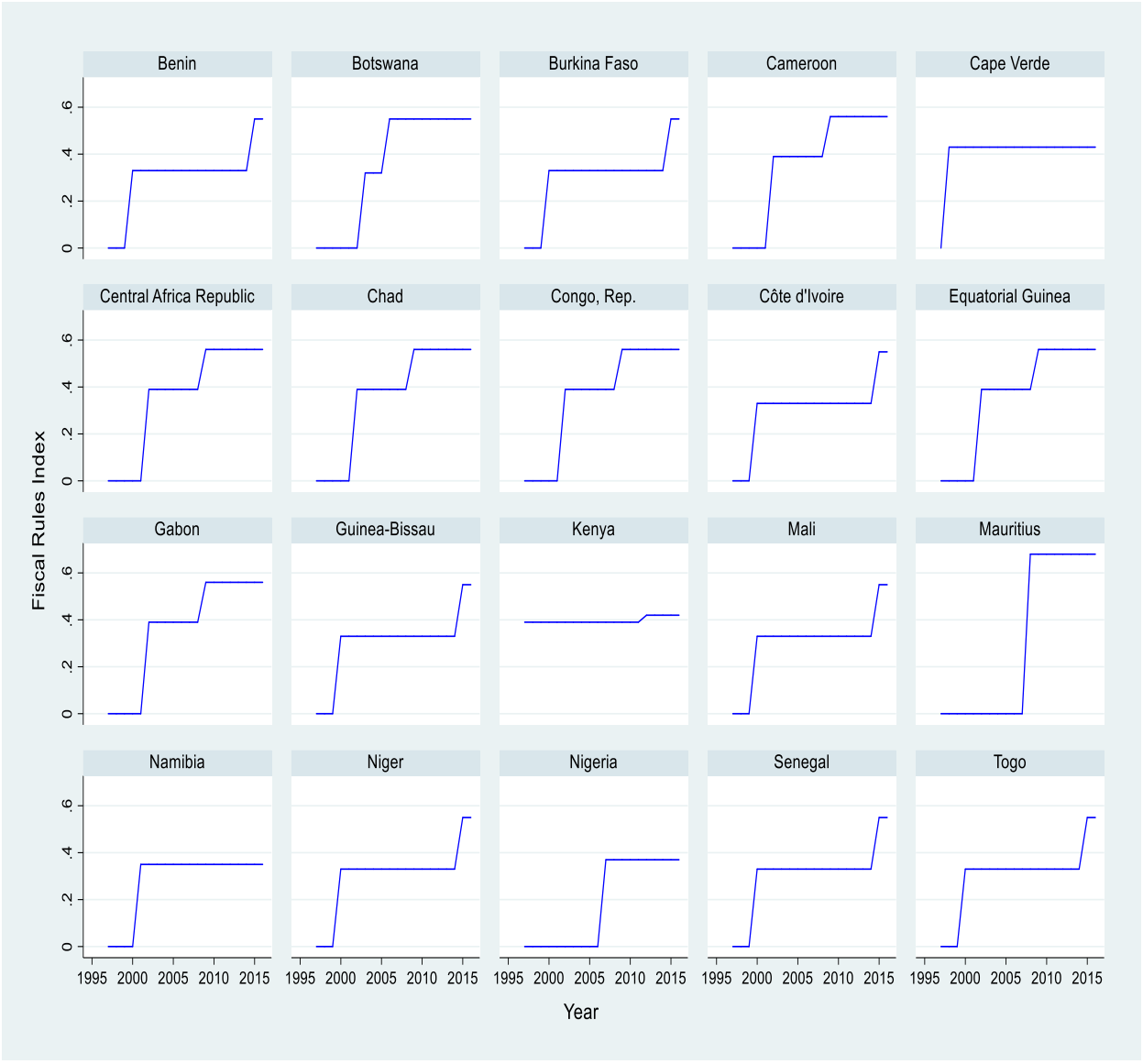
Notes: The correlation between variables described and numbered in rows and number columns. The sample includes 486 observations for which compliance data is available

Table A4. 9 Description and Measurement of variables

Variable	Description	Source
Public debt	The share of total debt that includes domestic and foreign debt as a share of GDP. We log public debt in our analysis. Debt levels put a constraint on the countries' development as they endeavour to meet their debt obligations. Further, with increased debt may find it difficult to comply with fiscal rules. We therefore expect public debt a priori to negatively affect fiscal rules compliance.	IMF/WEO & WDI
Debt service	The total sum of principal and interest payments on public debt as a ratio of total exports. Debt service shows a country's ability and burden in debt repayments. It also shows how a country's resources are constrained through repayment of debt obligations. We expect, a priori, that debt service will negatively affect compliance of rules.	WDI
GDP per capita	h. Real GDP (base year of 2011) per capita is a ratio real GDP to Population. We log GDP per capita. Countries that have improved GDP and the income level will find it easy to meet their debt obligations and generate more resources. We expect a priori that GDP per capita will enhance fiscal rules compliance.	IMF & WEO
Grants	They are measured as a ratio of GDP. We log grants in our analysis. Governments benefit from receipt of foreign grants as they form part of the National budget. It is expected that grants will not act as insurance but help fuel economic development. We therefore expect a priori grants to enhance compliance of fiscal rules.	WDI
Statutory Laws	An index ranging between 1 to 5, where: 5 when a rule is captured in the constitution, 4 under an international treaty, 3 fiscal rules is based on a legal Act, 2 a rule is under a coalition government and 1 when a rule is implemented under a political commitment.	IMF database & authors calculation
Monitoring	Index ranges between 1 and 3. Where: 3 when monitoring is under an independent body that is constitutionally sanctioned or an oversight body by parliament, 2 monitoring by the ministry of finance or any government body and 1 when there is no public monitoring of the fiscal rule.	IMF database & authors calculation
Central government	A dummy where 1 in central government and 0 otherwise.	IMF database & authors calculation
Political Commitment	A dummy where 1 in central government and 0 otherwise	IMF database & authors calculation
Political Coalition	A dummy where 1 in central government and 0 otherwise	IMF database & authors calculation
Non-compliance	A dummy 1 in central government and 0 otherwise	IMF database & authors calculation
Election dummy	Is a dummy variable. 1 for election year (of legislature) and 0 otherwise. We consider generation elections where a president or prime minister is elected.	NELDA
Control of Corruption[1]	Index between -2.5 and 2.5. It captures perception of the extent in which public power is exercised for private gain including petty and grand forms of corruption as well as *'capture'* by elites and private interests. Higher values indicate low corruption.	WB/WGI
Regulatory quality[1]	Index between -2.5 and 2.5. Reflects the ability of government to formulate and implement sound policies and regulations that permit and promote private sector development. Higher values indicate strong governance while low values show weak governance.	WB/WGI
Political violence[1]	Index between -2.5 and 2.5. Measure's perceptions of likelihood of political instability and/or politically motivated violence including terrorism. Higher values indicate low or no violence while low values indicate political violence.	WB/WGI
Fiscal Rules Index (FRI)[2]	Index between 0 and 1 of the fiscal rule characteristics. We construct the FRI's using the characteristics as outlined in the FR's database.	IMF database & authors construction

Note: IMF – International Monetary Fund, WB – World Bank, WGI – World Governance Indicators, WEO – World Economic Outlook, WDI - World Development Indicators, NELDA – National Elections Across Democracies and Autocracy. [1]We use linear interpolation to add years 1997, 1999 and 2001 which are missing from the data. [2]We follow Dirk Foremny (2014) to construct our FRI.

Figure A4. 2 Fiscal Rules Index in SSA from 1997-2016



Source: IMF Database and Authors Calculations

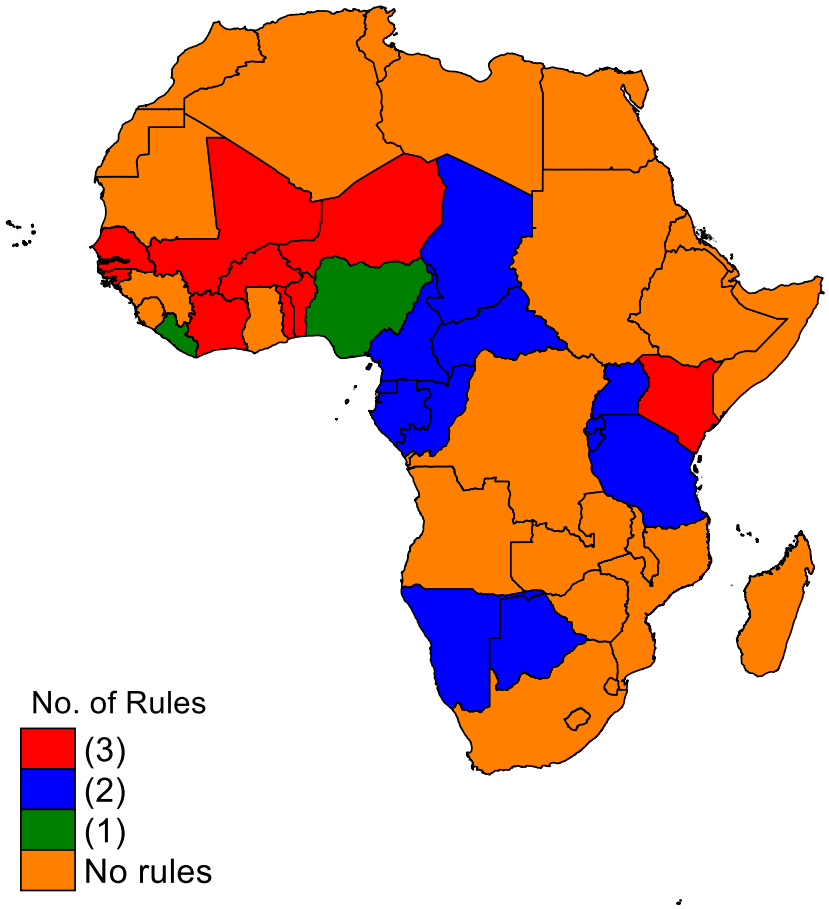


Figure A4. 3 Countries with Fiscal rules in Sub-Sahara Africa 1997-2016

Source: IMF Fiscal Rules Database

Table A4. 10 Summarised types of fiscal rules

Type of rule	Merits	Demerits
Debt rule (DR)	• They are easy to communicate by the policy makers • Are directly linked to fiscal and debt sustainability	• They can be pro-cyclical as they are not embedded with economic stabilization features • Highly susceptible to shocks outside the government control • Policy impact on debt is applicable in the long run.
Revenue rule (RR)	• Can improve revenue and resource mobilisation • Mitigates pro-cyclical spending and size of government	• Can be linked to debt sustainability by constraining spending of windfall revenue • There is no economic stabilization feature, thus, can be pro-cyclical
Balanced budget rule (BBR)	• Linked to debt sustainability • Provides a clear budget operational guidance • Easy to communicate and monitor	• Highly susceptible to developments outside government control like recession • There is no economic stabilization feature, thus, can be pro-cyclical
Expenditure rule (ER)	• Easy to communicate and monitor • Offers a clear budget operational guidance • Can be linked to debt sustainability with a constrain on revenue • Allows for economic stabilization	• If not linked to revenue, cannot lead to debt sustainability • Not linked to debt sustainability for lack of constrain on revenue
Sovereign wealth fund rule (SWF)	• Allows for economic stabilization • Relatively easy to communicate and monitor • Offers long-term policy impact, through savings	• Highly susceptible to political interference • Can be a source of corruption unless there is legislation to protect the funds

Selected features of fiscal rules	
Statutory base	There should be legal provisions that clearly specify the fiscal targets and institutions responsible for fiscal management. They can be contained in Constitutions, Legal Acts, or international treaty. The more the binding the statutory provision is, the stronger the rule. Political commitment and coalitions can be important to enhance compliance.
Monitoring	Rules should be subjected to frequent and independent monitoring. Constant updates and use of desirable statistical data should be used. Tasks assigned to monitoring unit should be explicitly stated with a clear mandate defined.
Sanctions and enforcement	Sanctions should be clear and punitive as it helps improve future policy implementation and policy makers are incentivised to act. The sanctions should be specific and simple to impose.
Flexibility	Rules should have room for flexibility in case of unexpected shocks. The flexibility gives policy makers adequate tools to respond whenever shocks arise. In developing countries, flexibility can be implemented in case of development

Source: Schaechter *et al.* (2012) and Authors compilation

Table A4. 11 Summary of Empirical studies on fiscal rules compliance

Author(s), Year	Case study	Study period	Model(s) or Estimation strategy	Variables included	Key findings
Reuter (2019)	EU 28 countries 51 fiscal rules	1995-2015	Logit regression model	**Dependent:** complied with fiscal rule: debt, deficit, and expenditure **Independent:** debt, output gap, inflation, government fragmentation, military expenditure, election year, statutory base, monitoring body, escape clause, alert mechanism, enforcement body, non-compliance mechanism, coverage, and media visibility.	• Average compliance rate is 50 percent • Independent monitoring and enforcement body are associated with higher compliance • Rules at general government have higher compliance rates. • Rules enshrine in constitution or statutory have low compliance rates. • Rules under a coalition have higher compliance • Government fragmentations have higher compliance rates • Macroeconomic environment does not influence compliance.
Reuter (2015)	Euro area 11 countries	1994-2012	Least Square Dummy Variable (LSDV)	**Dependent:** Constrained variable: debt, deficit, and expenditure **Independent:** public debt, output gap, inflation, dependency ratio, openness, population, government size, political ideology, election years, government fragmentation, rule under contract or delegation and run up to European Monetary Union (EMU)	• Even though fiscal rules are not complied with at some point, they tilt fiscal policy towards their numeric constraint • Fiscal policy is complied with 50 percent of the years under rules. • Introduction of rules changes the behaviour of policy makers towards compliance.
Delgado Tellez et al. (2016)	16 Spanish regions	2002-2015	First-Difference GMM	**Dependent**: difference between fiscal outturns and fiscal targets as a share of GDP **Independent:** Fiscal deficits, Investment as a share of spending, fiscal rules index, election years, and growth forecast errors, regional credit ratings, regional growth differential and regional seats in parliament.	• Political factors do not affect compliance of rules • Non-compliance increases during election years • Strong fiscal rules do not show to contain fiscal non-compliance
Friedrick et al. (2016)	16 Germany states	Survey study 639 politicians	Probit model	**Dependent:** Compliance expectation of budget deficits **Independent:** Tertiary degree, economic degree, member of budget committee, age in years, preference for fiscal consolidation, political party affiliation,	• States with lower GDP per capita are less optimistic to comply with fiscal rules • Over confidence states have a higher compliance rate • Weak fiscal situation in a state reduces compliance rates

				GDP per capita, fiscal equalisation transfers and debt rule index	• Sub-national rules are a complement to national rules
Cordes et al. (2015)	Global: 35 countries with ER	1985-2013	Dynamic model	**Dependent:** primary balance & primary expenditure **Independent:** lagged primary balance, lagged primary expenditure, debt, output gap, expenditure rule dummy and expenditure rule index	• ER leads to spending control • ER leads to countercyclical fiscal policy and improved fiscal discipline • Improves fiscal performance like primary balance • They foster better spending behaviour in presence of PFM and associated with lower public investments

Source: Authors compilation

Notes: Abbreviations: GMM – Generalised Method of Moments, GDP – Gross Domestic Product, EU – European Union, ER – Expenditure Rule, PFM – Public Finance Management

Chapter Five

Fiscal Rules and Fiscal Space in Sub-Sahara Africa: An Empirical Approach[34]

5.0 Introduction

The events of the debt crisis that engulfed the developed and developing economies in the past has triggered a lively policy debate raising concerns on the need for a sustainable fiscal policy to enhance fiscal space. To this end, academics and policy makers have devised appropriate measures to mitigate the deficit bias. Therefore, establishment of fiscal rules appears a good candidate to contain the observed policy maker's penchant for excessive deficits. The public similarly wants to curb excessive fiscal deficits and wants government fiscal policy to become more predictable and less discretionary. Indeed, fiscal rules have gained popularity going from 7 in 1990 to 96 in 2016. The key argument is that fiscal rules have turned into prevalent instruments that compel fiscal policy, as they increase the cost faced by policymakers and in turn anchor public finance discipline and fiscal space. The fiscal rules currently in use include: The Debt rule (DR), Expenditure rule (ER), Revenue rule (RR) and Balanced budget rule (BB), which are expressed as a percentage of GDP[35].

Fiscal rules are a long-lasting constraint on the fiscal policy through numeric limits on the budgetary aggregates which sets boundaries that cannot be frequently changed. As such, the rules should be transparent, provide room for dialogue and encourage policy makers to recognize the broader fiscal consequences of their decisions and be enhanced by good watchdogs (Calmfors & Wren-Lewis, 2011). The literature on fiscal policy indicates that the debt rule is predominant in developing economies whereas the budget balance and expenditure rules are more prevalent in

[34] Part of research on this chapter was undertaken while at the Africa Development Bank in 2018

[35] In this chapter, we follow the definition of fiscal rules as outlined in Chapter two and as such, fiscal rules refer to rules that set a numeric target, cannot be easily revised and are supported by legislation.

advanced economies[36]. The emerging countries use the debt rule, revenue rule, balanced budget rule or a combination of the above. However, those that use budget balance face output gap challenges and tend to use thresholds for actual economic activity (Schaechter *et al.*, 2012). The resource-based economies widely use a Permanent Income Rule to create a Sovereign Wealth Fund (SWF) to leave all generations with same benefit from non-renewable resource[37].

This chapter seeks to improve on the understanding of fiscal policy rules in Sub-Sahara Africa. We aim to answer the following research questions:

i) *What is the effect of fiscal rules on fiscal space in SSA?* and,

ii) *Do governance and institutional factors mediate the effect of fiscal rules on fiscal space in SSA?*

The theoretical framework for fiscal rules shows that they lead to fiscal discipline that reduces deficit bias and help smooth business cycles leading to fiscal credibility and enhanced fiscal space (Musgrave (1969); Fatas and Mihov (2003)). In recent years, countries have also employed the use of 'fiscal space' to help enhance fiscal sustainability and achieve macroeconomic stability. In fact, the theoretical framework on fiscal policy shows that there is a relationship between fiscal rules and fiscal space, that is, a reduction in public expenditure creates room to finance capital investments. Additionally, setting debt targets through the use of fiscal rules enhances growth while use of fiscal rules with the help of fiscal institutions reduces deficit bias and enhances countercyclical policy which in turn creates more fiscal space (see Ferreira and Nascimento (2005); Manasse (2006)). However, there is limited literature on the effect of fiscal rules on fiscal space, especially in developing economies. One such empirical evidence is Nerlich and Reuter (2016) who have investigated the effect of fiscal rules on fiscal space on 27 European countries.

[36] According to the fiscal rules database, there are 96 countries with fiscal rules globally and the adoption of rules varies across countries and regions. However, the debt rule is predominant in developing countries while balanced budget rules and expenditures rules are highly used in advanced countries. The database also shows that some countries use a combination of rules (for example, Kenya employs the debt rule, revenue rule and balanced budget rule) while others employ a single rule (e.g. Nigeria employs a deficit rule) see IMF (2017).

[37] Most resource abundant economies pursue a stabilization fund approach to smooth the impact of volatility to promote long term fiscal sustainability through a Sovereign Wealth Fund. The fund becomes the center piece to establish the fiscal rules to ensure stability and fiscal sustainability (Schaechter *et al.*, 2012).

Their findings show that fiscal rules enhance fiscal space and raise the primary balance. Several authors have also shown that the performance of fiscal rules depends on institutional and government effectiveness or *'institutional environment'* to enhance fiscal space. Wyplosz (2012) posit that fiscal rules and institutional quality in a country are instrumental in fiscal sustainability. At the same time, the debate on rules-based or discretionary fiscal policy regimes has persisted for a while, with a focus on adjustment properties of the economy and the effectiveness of the fiscal policy (Blinder, 1987). The proponents of discretionary policy argue that it provides room for policy prescriptions and flexibility when the economy is hit by adverse fiscal shocks, hence, fiscal policy is a powerful tool to control business cycles. However, there is a compelling case for fiscal rules because discretionary policy brings undesirable volatility and is affected by institutional constraints leading to large welfare costs. Similarly, fiscal policy is subject to the time inconsistency problem, which leads to deficit bias, where policies agreed to ex ante are not adhered to ex post (Bianchi and Menegatti (2012); Debrun et al. (2009)).

This chapter is closely related to the work of Nerlich and Reuter (2016), who investigate the effect of fiscal rules on fiscal space among European Union (EU) countries. However, Nerlich and Reuter (2016) do not consider the role of institutions for efficacy of fiscal rules. Moreover, their work does not consider developing countries characteristics including the use of foreign aid and grants to finance budgets. These sources of financing are critical to some developing countries and sometimes make over 10 percent of GDP. Others like Dahan and Strawczynski (2013) find a negative effect between fiscal rules and fiscal transfers which is due to a weak legal framework. Fatás and Mihov (2006) and Debrun *et al.* (2008) argues that strict fiscal rules lead to lower fiscal policy volatility. Further, fiscal rules help mitigate sovereign risk premia forming the legal basis of the rules and their enforcement mechanism are important for the efficiency of rules (Iara & Wolff, 2014). Similarly, the effect of rules depends on their constitutional structure, such that rules in a unitary state mitigate the deficit bias (Dirk Foremny, 2014). Whether rules are complied with or not, as long as they are captured in a legal framework, enhance fiscal policy and output stabilization (see Reuter (2015); Sacchi and Salotti (2015)).

This chapter deviates from the above literature by focusing on the effect of fiscal rules on fiscal space among SSA countries. Our sample only includes countries with fiscal rules in place[38]. We further include grants in our study, because in some SSA countries grants constitute a high level of budget financing thus form part of the fiscal space. Moreover, given the procyclical nature of fiscal policy in developing countries we include the cyclical adjusted budget balance. We further deviate from Nerlich and Reuter (2016) by using neighbours as instruments for fiscal rules. Most of the beneficiaries of HIPC came from SSA, which we use to shed more light on whether fiscal rules are binding and can mitigate the deficit bias.

The main contribution of this chapter is four-fold. Firstly, following chapter three, we improve on the Aizenman and Jinjarak (2010) measurement of fiscal space. Secondly, we combine the fiscal rules, government effectiveness and corruption literatures to determine whether fiscal rules alone can enhance fiscal space or whether fiscal rules supported with good governance enhances fiscal space. Thirdly, we investigate the specific rules that are most effective in enhancing fiscal space. Bergman *et al.* (2016), while assuming fiscal rules to be exogenous, find that the type of fiscal rule matters for improved fiscal space. Further, we investigate whether a combination of rules enhances fiscal space in SSA. Empirical evidence suggests that the number of countries that have adopted rules has risen as well as the number of countries employing a combination of rules (see Schaechter *et al.* (2012); IMF (2017)). Fourthly, the chapter constructs a fiscal rules index using the International Monetary Fund (IMF) fiscal rules database. The theoretical framework has established that rules can mitigate the deficit bias and constrain politicians' desire for discretionary policy.

[38] It is instructive to note that, in this chapter, we only consider countries that have utilized fiscal rules in their fiscal management. As such, we do not consider a mix of both countries with and without fiscal rules. We acknowledge that several studies have examined the effectiveness of fiscal rules (see for instance, Tapsoba (2012); Thornton and Vasilakis (2017)) using propensity score matching for treatment effect by mixing countries with fiscal rules and those without fiscal rules, consequently, exposing their studies to heterogeneity bias. Furthermore, the use of countries with and without fiscal rules will require implementation of sample selection techniques. Indeed, sample selection techniques like propensity score matching require a large sample with many observations. For example, Tapsoba (2012) uses 74 countries, we argue that by using 74 countries both developed and Low Income countries, exposes the analysis to aggregation bias. In this chapter, by focusing on countries with fiscal rules in SSA helps enrich the fiscal rules literature and assist policy makers to devise targeted fiscal policy to influence public finance management. Similarly, we argue that examination of countries with fiscal rules alone result in informative findings geared towards improving the efficacy of fiscal rules and institutions involved in implementation of the policy.

It is useful to note that the recent debt out-turn in Greece shows how increased debt can expose the economy's vulnerability in the event of a crisis (Featherstone, 2011). The experience showed that debt accumulation cannot go on forever and that independent institutions can play a significant role in fiscal management. In fact, in the Greek case, the increased deficit had been worse than reported to EU and an audit showed that fiscal balance had been over estimated as it did not meet the Maastricht convergence criteria of 3 percent deficit to GDP (De Grauwe, 2010).

Therefore, SSA just like other emerging and developing regions has experienced increased debt over time as some countries have had higher periods of both debt distress and banking crises (Reinhart & Rogoff, 2009). Importantly, some countries in SSA are in debt distress, having debt over 100 percent of GDP, and out of 39 Highly Indebted Poor Countries (HIPC) beneficiaries 36 came from SSA. The focus in this chapter is on the efficacy of individual fiscal rules to establish their effect on fiscal space and on the interaction between fiscal rules and governance to affect fiscal space. As noted earlier, the chapter improves on the Aizenman and Jinjarak (2010) definition of fiscal space as the ratio of debt to total tax revenue (i.e., tax years of debt) by replacing it with the difference between the group mean and the actual debt to tax revenue, the *hybrid fiscal space* hereafter. This refinement in the definition measures fiscal space rather than fiscal tightness. Moreover, the definition links fiscal space to tax revenue which is an important channel to create and enhance fiscal space. We therefore argue that a country may have a low debt to GDP ratio yet may find it difficult to service debt due to low capacity in tax collections. In most of the developing countries, tax revenue represents the main instrument for fiscal sustainability. Firstly, we test the hypothesis fiscal rules have no effect on fiscal space in SSA. Secondly, we test if governance and institutional factors mediate the effect of fiscal rules on fiscal space in Sub-Sahara Africa.

To meet the objectives of this chapter, we use a panel dataset for 20 SSA countries with fiscal rules in place from 1996 to 2016. Our main dependent variable is *hybrid fiscal space* which is the difference between group mean and country debt to tax revenue. The chapter employs a two stage least squares instrumental variable (2SLS-IV) model to investigate the effect of fiscal rules in the face of constrained fiscal space. The model is appropriate to help address the endogeneity problem that may arise due to reverse causality, that is, countries may adopt a fiscal rule due to having years of fiscal insolvency and at the same time omitted variable bias may arise due to voter preference for prudent fiscal management. We thus address potential reverse causality by use of geographical

location to instrument for adoption of fiscal rules. According to Pitlik (2007), the adoption of a fiscal rule in a nation increases with the number of neighboring nations with fiscal rules in place. We use the number of neighboring countries with rules to predict the probability of a country adopting a fiscal rule and use the predicted probability to instrument for fiscal rules in our model. In addressing omitted variable bias, we incorporate country fixed effects and country linear trends in our model specification.

The empirical evidence from this study using a sample of 20 SSA countries over the period 1997-2016 shows that fiscal rules enhance fiscal space. Specifically, institutional design plays a significant role in the efficacy of fiscal rules. That is, countries that have effective government structures and low corruption rates with fiscal rules in place have an enhanced fiscal space. Furthermore, the type of fiscal rules matters for fiscal management. The debt and balanced budget rules are most effective in enhancement of fiscal space in SSA. In addition, our results are also novel as they show that a combination of rules significantly influence fiscal space. In particular, a combination of two rules, debt and revenue rules or balanced budget and revenue rules yields higher fiscal space. Similarly, the data shows that grants are more volatile compared to revenue. Therefore, there is need for countries to broaden their tax and revenue sources given that grants are short term sources of financing the economy. The novelty of this results is that they clearly show that fiscal rules matter in fiscal management and are important to address the deficit bias and that the source of government financing also matters in the economy.

The remainder of the chapter is structured as follows; Section 5.1 motivates the research and presents the related literature. Section 5.2 explains the theoretical framework of the study. Section 5.3 presents the estimation strategy and Section 5.4 explains the data used in the study. Section 5.5 presents the empirical results and Section 5.6 presents robustness tests. Section 5.7 presents the conclusions.

5.1 Literature Review

The effect of fiscal rules in the literature has been examined by focusing on fiscal policy outcomes. Much of the work has revolved around developed countries, notably, the United States and the European Union. In general, the results of such studies support the hypothesis that fiscal rules

mitigate against deficit bias. On the other hand, authors argue that rules supported by institutions offer optimal results. Nevertheless, the debate on rules versus discretion rages on. Therefore, in this section we review the literature on fiscal rules and their effect on fiscal outcomes.

The term fiscal rules may be used broadly to refer to all legislated or procedural rules underpinning the conduct of a country's fiscal policy. In this chapter, we adopt a narrower definition by considering only fiscal rules that fix numeric targets or ceilings on budgetary aggregates. Fiscal rules may differ as they set their numerical targets on the fiscal aggregate variable being targeted, but mostly fix limits on government deficits, debt, revenue or expenditures. Inman (1996) opines that strong rules are characterized by statutory support that makes it difficult for policy makers to change or amend. Strong fiscal rules are enshrined in the constitution or by law, enforced by an independent body and sanctioned. Fiscal rules have been proposed to help constrain fiscal policy and enhance a country's fiscal space. Several authors, among them Schaechter *et al.* (2012), discuss the different types of fiscal rules and provide insights for each rule and their impact on fiscal policy.[39] At the same time, the literature on fiscal policy has expanded with a focus on showing whether fiscal rules have an impact on a country's fiscal policy. A number of these authors agree that fiscal rules can influence and affect the fiscal outcomes of a country. This effect is more elaborate when rules are stated in numerical form as they establish clear benchmark and targets on which the actual policies can be compared while acting as a focal point in fiscal adjustments. This rules having shown a positive effect to mitigate deficit bias, the number of countries adopting fiscal rules has steadily increased going from only 5 countries in 1990 to 96 countries by December 2016 (Lledó et al., 2017).

Interestingly, fiscal policy just like monetary policy is subject to time inconsistency. Given that the budget process is at the heart of the political process, this creates room for deficit bias. A number of authors have addressed themselves on the deficit bias issue under the political economy literature.

The theoretical framework provides several incentives for deficit bias. Among this is the *common pool hypothesis*, where the deficit bias arises when interest groups that benefit from a given category of public spending have a tendency to free ride on other contributions and over time leads

[39] See Appendix Table A4.10 in Chapter 4.

to large deficits (Debrun *et al.* (2008) and Velasco (1999)). Similarly, according to Velasco (2000), common pool problem can arise when individual politicians or political parties support an increase in government spending on projects that provide improved services to their constituencies, as the projects will be financed by general taxes while constituents only pay a fraction of the total cost. The occurrence of large deficits is further aggravated when countries are fragmented (Alesina & Perotti, 1995). On the other hand, when fiscal jurisdictions fail to internalize the consequences of their fiscal laxity, other jurisdictions will be affected as the increased deficits rises the interest payments that must be met by all jurisdictions (Faini, 2006). Moreover, from the literature, it is clear that governments are inherently *short-sighted*, that is they tend to overlook the long-term consequences of budgetary imbalances. It has been demonstrated by Alesina and Tabellini (1990) that governments anticipating the possibility of being replaced by their political competitors can increase current spending in order to widen the deficit. In this case, the incumbent governments strategically overspend by creating high deficits to tie the hands of the incoming government.

There is sufficient empirical evidence also showing that the use of fiscal rules enhances fiscal outcomes. As such, a few countries have employed the use of fiscal rules at both the national and regional level while others use fiscal rules at the sub-national level. For example, in European area the Stability Growth Pact (SGP) has helped co-ordinate the fiscal discipline for member countries. Numerous studies among them Debrun *et al.* (2008) finds that fiscal rules significantly improve fiscal performance. That is, having a stronger and more encompassing fiscal rules encourage higher cyclically adjusted primary balance and mitigate the deficit bias.

Further, the link between fiscal frameworks and budgetary outcomes has also been investigated. In particular, Nerlich and Reuter (2013) finds that fiscal rules improve primary balance and their impact is strengthened when the rules are supported by independent fiscal councils. Nerlich and Reuter (2016) examined the efficacy of fiscal rules and fiscal space in the European union countries. They find that fiscal rules are associated with higher fiscal space and the efficacy of fiscal rules depends on the type of the rule employed. In their analysis, they find that expenditure rule is associated with higher fiscal space among the countries under investigation. The effect of fiscal rules on fiscal outcomes has also been examined at the sub-national or federal governments. Dirk Foremny (2014) investigates the effect of rules and tax autonomy in subnational or federal governments in 15 European countries by employing an IV model. They find that the effect of

fiscal rules depends on their constitutional structure. Such that, fiscal rules decrease budget deficits in a unitary country compared to a sub-national state.

Accordingly, fiscal rules are associated with output stabilization of discretionary fiscal policy and lower risk premia on debt. Sacchi and Salotti (2015) investigates the relationship between discretionary fiscal policy and macroeconomic stability among OECD countries. They find that discretionary policy inform of increased consumption spending leads to higher volatility of output. Their findings indicate that with introduction of fiscal rules discretionary spending becomes output stabilizing and the effect is more under a balanced budget rule. Iara and Wolff (2014) examine the role of national fiscal governance and numeric fiscal rules on interest required on government bonds among Euro area member countries. They find that stronger fiscal rules are important in mitigating sovereign bond spreads in times of elevated market uncertainties and as such, the legal basis and enforcement mechanisms of rules are profoundly relevant. On the other hand, fiscal literature indicates that institutional mechanisms can be designed to constrain discretionary spending and achieve fiscal sustainability. In particular, Schuknecht (2000) investigates fiscal policy instruments by which the government influences election outcomes in 24 developing countries. They find that expansionary fiscal policy is the main driver for deficits around elections and conclude that institutional policies that constrain discretionary spending are important to contain opportunistic policy makers during election periods. Fatas and Mihov (2003) review theoretical and empirical literature on the merits and costs of fiscal policy restrictions among European countries. They find that fiscal rules in the Euro area have improved fiscal discipline and mitigated on discretionary spending. The effectiveness of the fiscal rules depends on the constitutional structure of government.

The institutional role on the effectiveness of rules has further been explored in literature by other authors. Muscatelli *et al.* (2012) argues that transparency in the decision-making process helps enhance fiscal solvency and fiscal space. Therefore, good governance and efficiency are helpful in promoting fiscal discipline. Hallerberg *et al.* (2007) investigates the effect of fiscal rules and budget procedures on public finances among 15 European countries. They find that fiscal policy has improved, especially countries with coalition governments have higher fiscal discipline. Further, outcomes improve under delegation of fiscal policy to a minister of finance with support of enforcement contracts among parties. They also find that institutional reforms especially on

fiscal rules has mitigated the deficit bias especially during election periods. Bergman and Hutchison (2015) investigate the effect of fiscal rules on fiscal policy procyclicality in both developed and developing countries. In their analysis, they construct fiscal rules indices and employ a dynamic modelling approach. They note that fiscal rules are effective in reducing procyclical fiscal policy in presence improved government efficiency and quality services. This analysis directly relates to debate in SSA on the design of fiscal rules and whether the fiscal rules are effective in countries with evidence of poor governance and high corruption like SSA.

Fiscal rules from a theoretical perspective may be a solution to deficit bias facing both developed and developing countries. Hallerberg and Von Hagen (1999) investigates the role of political economy on deficit bias in presence of fiscal restraints. They find that presence of rules helps to mitigate the deficit bias problem. They also conclude that delegation of the budget decision process also reduces deficit bias in a nation. Primo (2006) employs a distributive politics model to investigate the role of rules in deficit bias problem. They find that budget ceilings are important in mitigating a rise in budget deficits. These views are like other authors who also establish that institutions play a pivotal role on the effectiveness and efficiency of fiscal rules. Accordingly, Krogstrup and Wyplosz (2010) emphasizes the need to combine fiscal institutions with rules in order to contain deficit bias. The widespread evidence of fiscal indiscipline that constrained countries fiscal space has prompted policy makers to devise ways and incentives to improve on fiscal management using fiscal rules. The underlying idea is that well designed fiscal rules supported by institutions can effectively discourage deviations from desirable policies. Wyplosz (2005) argues that institutional reforms that grant political independence to monetary authorities can also play a greater role in fiscal policy management. The proponents of institutional reforms have argued in favour of high cost of varying policies to make them credible and reliable. (Posen, 1995) maintains that in a democratic society, the effectiveness of institutions can be felt when they reflect the social preferences of the political conditions. Thus, using the example of an independent central bank, they argue that in countries where there is political will to achieve low inflation, the monetary authorities can meet expectations.

To further investigate the role of fiscal rules in an economy, the legislative support for the effectiveness of rules has been investigated. In particular, Heinemann et al. (2014) argues that fiscal rules anchored into the constitution provide credible signals for investment that enhances

fiscal space. Badinger and Reuter (2017a) examines the effect of fiscal institutions on fiscal policy, using inflation targeting and government fragmentation as instruments for fiscal rules. They find that countries with stringent fiscal rules have higher fiscal balance and lower fiscal volatility. Eklou *et al.* (2017) estimates the causal effect of fiscal rules on political business cycles, using fiscal rules as a dummy and employing a two-step instrumental variable. They find that during the election years when fiscal rules are in place, public consumption reduces and infer that the effectiveness of rules depends on institutional designs. To address endogeneity in fiscal rules, geographical proximity to instrument for fiscal rules. Bergman *et al.* (2016), employing system GMM in their modelling approach, investigates whether fiscal rules can promote sustainable public finance in the EU in the presence of good governance. The authors find that rules are effective in reducing deficit bias when combined with government efficiency. In their analysis they construct a fiscal rules index using the IMF fiscal rules data base and assume the fiscal rules to be exogenous. They argue that fiscal rules are exogenous because the time it takes before a country identifies insolvency and design a policy rule is longer than one year.

Debrun and Kumar (2007) examines the role of fiscal institutions to enhance discipline using a dynamic model and find that optimal institutions lack credibility when the costs for violating the regulations are low and that transparency in budget setting and strong democratic accountability suffice to enhance credibility. They also find that when an incumbent government is accountable and transparent they increase their chances for re-election. Milesi-Ferretti (2004) make a case that, in the run up to Euro membership, the Maastricht fiscal rules led to significant fiscal consolidation and reduced the fiscal deficit in several countries. The authors conclude that fiscal rules have an effect on the targeted fiscal aggregates. Bergman and Hutchison (2015) employ a GMM model to investigate whether fiscal rules can be used for economic stabilization and procyclicality of fiscal policy in a dynamic panel framework. The authors construct fiscal rules indices in relation to government efficiency. They find that fiscal policy is effective in reducing procyclical fiscal policy once government efficiency is enhanced and that government efficiency combined with fiscal rules can enhance counter-cyclical fiscal policy. Calderón et al. (2016) explore the role of government administrative quality in shaping fiscal outcomes within a country. Using data from 1984 to 2008 in a large sample of countries, they find that institutional quality plays a significant role in a countries' ability to implement macroeconomic policies. Thus, countries with strong institutions are more likely to adopt counter- cyclical policies to achieve their macroeconomic objectives.

Galí and Perotti (2003) use panel data to estimate a set of fiscal rules that allow for deficits to respond to output, lagged deficits and public debt. Their analysis establishes a negative response of deficits to output, with some systematic consolidation in response to deficits and no response to public debt. Guerguil et al. (2017) assess the impact of flexible rules on the procyclicality of fiscal policy by employing a propensity score matching technique that mitigates traditional self-selection problems. They find that the design of the rules matters and not all fiscal rules have the same impact. Thus, rules that enhance investment have the effect of advancing countercyclical policy especially in an economic downturn when the rule is enacted. The introduction of escape clauses in fiscal rules does not seem to affect the cyclical stance of public spending. Badinger and Reuter (2017a) estimate the effects of fiscal institutions on policy outcomes using recently developed indices that employ a partially ordered sets in a two stage least squares on 74 countries. They identify the effects of institutions by using exogeneity checks and balances, government fragmentation and inflation targeting as variables, which they observe to be acceptable determinants of fiscal rules. They find that stringent fiscal rules significantly lead to higher fiscal balances and lower interest rate spreads on government bonds.

On the other hand, the role of fiscal rules and governance efficiency for sustainable public finance has been investigated by Bergman *et al.* (2016), who employed a dynamic model. They examine the effect of fiscal rules and government efficiency on public finances in 27 European Union countries and find that in the presence of fiscal rules and government efficiency, structural primary deficits are significantly reduced. They find that with an increase in government efficiency the effect of fiscal rules on structural primary balance is reduced, which indicates that fiscal rules and government efficiency are both institutional substitutes. Furthermore, they also find that balanced budget rules are the most effective and that multiple fiscal rules are found to enhance fiscal solvency. The work also finds that transparency of policies and commitment to implementation of fiscal programs enhances effectiveness of rules. For the supranational rules, the authors find that rules do not affect the effectiveness at the national level in reducing the deficit bias.

5.2 Theoretical framework

5.2.1 Two Stage Least Squares Estimator Instrumental Variable (2SLS IV) Model

An important assumption of the classical linear regression model is the independence of the explanatory variables and the random error term, which indicates that the explanatory variables are exogenous. If this assumption does not hold, it may lead to biased or inconsistent estimates of the parameters of interest. In many circumstances the assumption of independent explanatory variables and error terms independence is not satisfied and leads to an endogeneity problem, which may arise from omitted variables, measurement errors in the explanatory variables, self-selection problems, simultaneity and serially correlated errors in the presence of a lagged dependent variable in a set of explanatory variables. To address the endogeneity problem in our analysis, we employ the Two Stage Least Squares (2SLS) model (see Appendix A5.4 for a fuller explanation of Instrumental variables).

The 2SLS involves two steps in its approach; the first step involves, the instrument(s) being used to estimate the independent variables. In the second step, the estimate of the independent is used to approximate the dependent variable. As such, we use instruments to estimate independent variables, where the correlation between the independent variable and the error term is mitigated. Compared to Ordinary Least Squares (OLS) estimator, the 2SLS estimator is consistent (Antonakis et al., 2010). Greater consistency means that the 2SLS estimator is more likely to converge to the actual value of parameter estimate as the number of sample population increases. The estimator uses instruments that affect the dependent variable through the effect they have on independent variable. Indeed, in this chapter, we use neighbours as an instrument that affects fiscal space through their effect on adoption of fiscal rules in a country.

The 2SLS approach exhibits several shortcomings: (i) Its efficacy reduces in isolating the exogeneity based on the quality of instruments, and (ii) The choice of instruments is somewhat subjective which can compromise the validity of the instruments. Thus, it is possible that the choice of fiscal rules is due to a history of fiscal indiscipline. However, we argue that the selection of rules is objective as it is based on the policy diffusion theory and spill over effects among countries and should be unrelated to fiscal indiscipline. Additionally, 2SLS is weak if the instruments

selected have a small sample size, thus, the coefficient estimates will be biased towards OLS (Angrist & Krueger, 1995).

5.2.2 Construction of the instrumental variable strategy

This chapter utilizes a new instrumental variable strategy to test the efficacy of fiscal rules to influence fiscal space in developing countries. The instrumentation strategy used is premised on the assumption that ratification and operationalization of fiscal rules in a country will influence a neighbouring country to institute the usage of rules. Several authors have used a similar instrumentation strategy. For example, Persson and Tabellini (2009) use democracy in a neighbouring country to instrument for democratic capital in another country. Acemoglu et al. (2019) opine that the transition of democracy between countries is correlated with democratic transition taking place in the region. Altunbaş and Thornton (2017) posit that the increase in countries using fiscal rules influences the probability of adoption of rules by other countries. More specifically, Shipan and Volden (2008) identify five channels for policy diffusion among countries and regions, based on (i) learning, (ii) imitation, (iii) economic competition, (iv) coercion, and (v) socialization. As espoused by the Shipan and Volden (2008) hypothesis, these channels of policy diffusion are present in the contemporary setting. Moreover, in recent work Caselli and Reynaud (2020) use fiscal rules adoption as an instrument to examine the effect of fiscal rules on fiscal balances. They argue that adoption of fiscal rules in a country influences the neighbouring country's adoption of fiscal rules.

Weyland (2005) argues that policy diffusion takes place in waves across countries and regions over time, with a slow start before gaining momentum in the long run. Weyland (2005) argues that international policy diffusion is embedded with three characteristics that include (i) a temporal dimension where it takes a distinct pattern mapping the spread across countries and regions; (ii) a spatial effect where policy diffusion exhibits geographical concentration by having a higher spread in regions where it began, and (iii) a substantive effect where policy diffusion entails adoption of the same policy framework in substantively different countries. For example, Weyland (2005) argues that the pension and privatization policy in Chile resulted in other Latin American countries adopting the same policy framework.

5.3 Estimation Strategy

To achieve the objectives of this chapter, we improve on Aizenman and Jinjarak (2010) approach to estimate fiscal space and in our baseline model we follow the Nerlich and Reuter (2016) strategy. Because different countries differ in the length of their business cycles, we extract the business cycle component in the data by using the Band Pass filter (BP filter). BP filters are moving averages that are designed to determine the periodicities of the business cycles and eliminate the component of the data with frequencies out of pre-specified range see (Baxter & King, 1999). The filter also removes the unit roots, without altering the timing of the relation of variables, and isolates the business cycle without re-weighting (da Silva, 2002). We test the effect of fiscal rules on fiscal space and governance using a two-stage instrumental variable model. The set-up for our analysis is as follows:

$$FS_{it} = \beta_0 FR_{it} + \beta_1 G_{it} + \beta_2 FR_{it} * G_{it} + X_{it}\gamma + \mu_i + \eta_t + \varepsilon_{it}$$

Where FS_{it} is the fiscal space of country i at time t, FR_{it} is a dummy variable for a year when a specific fiscal rule was in place for country i at time t (based on the IMF fiscal rules database) and G_{it} to refer to government efficiency (based on World Bank Governance data)[40]. The set of control variables are captured by X_{it}, which are variables that can influence fiscal space and include: GDP per capita, trade openness, election year, grants and cyclically adjusted primary balance, inflation and Polity IV; η_t captures time; μ_t the country fixed effects that controls for country specific constant characteristics and ε_{it} is the error term. In order to address endogeneity in our model, we follow Eklou *et al.* (2017) by introducing geographical proximity as an instrumental variable for fiscal rules. The thesis uses annual data from 1997-2016 from numerous sources, including the World Bank, International Monetary Fund and Africa Development Bank. We use an estimation strategy that addresses the endogeneity problem, which may arise due to reverse causality. The coefficients β_1 and β_2 capture, respectively, the effect of fiscal rules institutions and on fiscal space in the presence of institutions. In this chapter we do not include time and country effects as

[40] The fiscal rule dummy includes a year in which the rules was in place and zero otherwise. The individual fiscal rules to be employed are Debt rule, Revenue rules, balanced budget rules. We do not consider the expenditure rule because it is only used by two countries and the period is too short.

the features embedded in the fiscal rule which is our variable of interest is time invariant and maybe problematic in the modelling framework.

There could be reverse causality in the case of the effect of fiscal rules on fiscal space, that is, fiscal indiscipline or fiscal distress may lead to adoption of fiscal rules. In this chapter, we only consider countries that have fiscal rules in SSA. According to Pitlik (2007), geographical proximity is a powerful channel for policy reform diffusion, as such, the likelihood of a country adopting a fiscal rule increases as the number of neighbouring countries using such rules increases. This proposition is supported by the sequence of fiscal rules adoption in SSA. It is evidently clear as shown in *Figure A4.3* in the Appendices, that adoption of rules is concentrated based on regional and geographical locations. We thus use the number of countries neighbouring each other with rules in the region as an instrument. To implement this approach, we use a probit model by regressing a fiscal rule on the instrument (number of neighbours in a year that has fiscal rules in place) and other covariates to predict a probability of having a fiscal rule in place. To predict our instrumental variable we follow the procedure by Wooldridge (2010) as it helps to examine the consistency of a binary variable.

$$\Pr(FR = 1|X_{it}, Neigh_{it}) = \vartheta(\delta_0 + \delta_1 Neigh_{it} + \delta_2 X_{it})$$

Where $\vartheta(.)$ is the cumulative density function for a standardised normal random distribution, $Neigh_{it}$ is the instrument (the number of neighbours that have fiscal rules in place in a given year), while X_{it} is the set of covariates. Thus, $\delta_1 > 0$ implies the likelihood of having a fiscal rule in place increases with the number of countries neighbouring with fiscal rules in place. We use the predicted probability as an instrument in our analysis.

We argue that our instrumental variable (the predicted probability of fiscal rules adoption) is correlated with adoption of fiscal rules. Therefore, in our identification assumption, the neighbours in the SSA region that adopt fiscal rules should have no effect on fiscal space except through their effect on fiscal rules in a country's sub-region. We also assume that the macroeconomic shocks to the sub-regions are exogenous for our identification strategy to be valid. Furthermore, to validate the exogeneity condition, we control for trade openness, debt service and inflation in our estimation approach. We also control for time varying omitted variables that may affect adoption of rules and fiscal space by including time and country fixed effects in our model specification.

In the application of the Instrumental variables second stage, we use the predicted probability as the instrument for fiscal rules. As earlier indicated, we are interested in also looking at the efficiency of fiscal rules and governance (government efficiency and corruption), and therefore include the interaction of fiscal rules with governance as a variable[41]. Thus, we have two endogenous variables: fiscal rules and the interaction of rules and governance. We therefore use instrument rules and governance interaction with the interaction of predicted probability (probit) with governance as follows:

$$FR_{it} * Gov = \beta_1 pprobit_{it} * Gov + \beta_2 Gov + \beta_3 pprobit_{it} + \beta_4 X_{it} + \mu_{it} + \eta_{it} + \varepsilon_{it}$$

This approach has advantages as it considers the binary nature of the endogenous fiscal rule variable does not require the probit model to be well specified (Wooldridge (2010)[42].

5.4 Data

We utilise annual data for the period 1997-2016. The sample selection is based on data availability in countries that have fiscal rules in place according to the IMF database. Table 5.1 summarises the data used in this chapter[43].

[41] We interact the fiscal rule with governance and the specific fiscal rules and governance.
[42] We employ a search and match model to get additional instruments, but some did not meet the test. The rule of law used by Debrun *et al.* (2008) was not significant in the first stage analysis; therefore, we dropped it. However, the checks and balances used as an IV in the Fixed effect model and the first stage results were significant.
[43] For detailed description of the data see Appendix *Table A5.10* in the Appendices.

Table 5. 1 Description and Measurement of variables

Variable	Unit	Description	Source
Fiscal space		The difference of the ratio of average debt to tax to the ratio of actual debt to tax.	IMF/WEO, UN-WIDER & authors calculation.
Public debt	Ratio	The ratio of total debt which includes domestic and foreign debt as a ratio of GDP	IMF/WEO & WDI
Debt service	Ratio	The total sum of principal and interest payments on public debt as a ratio of exports	WDI
GDP per capita	Ratio	The ratio of real GDP to Population	IMF & WEO
Real GDP	Ratio	Total GDP adjusted for inflation	IMF & WEO
Tax revenue	Ratio	The sum of total tax revenue as a ratio of GDP	UN-WIDER, (WoRLD)
Grants	Ratio	The ratio of total foreign grants as a ratio of GDP	WDI
Trade openness	Ratio	Total sum of exports and imports as a ratio of GDP	WDI
Inflation	Ratio	Average Consumer Price Change	IMF & WEO
Real interest rates	Index	Lending rate adjusted for inflation	WB & IMF
Fiscal rules	Dummy	1 for any fiscal rule in each year and 0 otherwise	IMF FR's database
Debt rules	Dummy	1 for a debt rule in each given year and 0 otherwise	IMF FR's database
BB rules	Dummy	1 for a BB rule in a given year and 0 otherwise	IMF FR's database
Revenue rules	Dummy	1 for a Revenue rule in a given year and 0 otherwise	IMF FR's database
DR + BBR		Total sum of the DR & BBR dummies	IMF FR's database
DR + RR		Total sum of the DR & RR dummies	IMF FR's database
BBR + RR		Total sum of BBR & RR dummies	IMF FR's database
DR + BBR + RR		Total sum of DR & BBR & RR dummies	IMF FR's database
Checks & Balances	Index	Index between 0 and 6	DPI
Democracy	Index	Index between 0 and 10	Polity IV Database
Polity IV	Index	The difference between Democracy and Autocracy	Polity IV Database
Prob. FR's adoption	Index	Probability of adopting a fiscal rule	Authors calculation
Election dummy	Dummy	1 for election in each applicable year and 0 otherwise	NELDA
Government efficiency	Index	Index between -2.5 and 2.5	WB/WGI
Low Corruption	Index	Index between -2.5 and 2.5	WB/WGI
Regulatory quality	Index	Index between -2.5 and 2.5	WB/WGI
Regulatory Law	Index	Index between -2.5 and 2.5	WB/WGI
Political violence	Index	Index between -2.5 and 2.5	WB/WGI
Fiscal Rules Index (FRI)	Index	Index between 0 and 1 of the fiscal rule characteristics	IMF database & authors construction

Note: IMF – International Monetary Fund, WB – World Bank, WGI – World Governance Indicators, WEO – World Economic Outlook, WDI - World Development Indicators, NELDA – National Elections Across Democracies and Autocracy, DPI – Database of Political Institutions, FR – Fiscal Rules, DR – Debt Rules, RR – Revenue Rule, BBR – Balanced Budget Rule, WoRLD – World Revenue Longitudinal Data.

5.5 Empirical Results

5.5.1 Summary Statistics

There is evidence that fiscal rules play a role to mitigate the deficit bias. *Table A5.1* in the Appendices reports summary statistics for countries with fiscal rules and variables used in this chapter. The cross-sectional dimension varies from 1 to 20 which represents the number of countries used in our study. Fiscal space has a mean of -0.58 across all the countries under the study with large variations between the maximum and minimum fiscal space (4.9 and -79.2). However, there is more of between variations (6.3) than within variation (5.6). Fiscal space tends to vary from one country to the other, thus, it becomes large from one country to the other. On the other hand, debt service exhibits more of within variation than between variation (3.1 and 2.3, respectively). This means that there are significant changes in debt payments within countries, as some pay more compared to others in different years.

The macroeconomic variables include GDP per capita, trade openness and real GDP. They exhibit significant within variations than between variations. This shows that there are significant differences of macroeconomic variables values within each group for each of the sample years. As such, each country displays differences in their macroeconomic set up. This is a clear indication of the difference in GDP per capita and real GDP growth rates for different developing countries. On the other hand, institutional variables, government effectiveness and corruption have more between variations (0.64 and 0.7) than within variations (0.2 and 0.1). The overall minimum and maximum for government effectiveness (-1.9 and 1.1) compared to (-1.8 and 1.2) for corruption. The low values for institutional variables show the low levels of institutions in SSA. As such, government effectiveness is lower, while corruption levels are high. In addition, the low quality of institutions negatively affects performance of other macroeconomic variables. Furthermore, grants seem to be time invariant variable as it exhibits little between and within variations. Fiscal rules and fiscal rules index have more within variations (0.4 and 0.2) than between variations (0.13 and 0.04) in our sample.

5.5.2 Baseline Results

In the first case we present results from the first step of our empirical analysis which provides us the determinants of fiscal rule adoption. Secondly, we turn to our baseline results that corresponds to a two stage least squares IV (2SLS-IV) model. Thirdly, we employ the 2SLS and Fixed Effect models using a fiscal rules index to test its effect on fiscal space. Lastly, we conduct robustness checks by employing other institutional variables.

Table 5.2 provides results for the probit model estimation. The results indicate that the number of neighbouring countries with rules influence the adoption of fiscal policy rules, because there is a positive and statistically significant effect on the likelihood of a country to have rules. Countries with neighbours employing fiscal rules have a high probability of adopting fiscal rules. Overall, the probability of a country employing fiscal rules when a neighbour has a fiscal rule in place and has 0.31 probability of adopting fiscal rules. However, there is significant heterogeneity on adoption of different fiscal rules. Countries with neighbours employing BB rules have a higher probability of adoption followed by Debt rule and Revenue rule, respectively, (0.50, 0.26 and 0.09). In fact, our results reflect the adoption of rules in SSA, as in WAEMU and CEMAC regions all member countries same rules. Similarly, in East Africa, after Kenya adopted rules, other members countries have employed them in fiscal management (these results are in line with Pitlik (2007)). The authors argue that geographical proximity is a powerful channel for policy reform diffusion and the results hold for the different types of fiscal rules.

Table 5. 2 Estimation Results for Determinants of fiscal rules Adoption in SSA as an Instrumental Variable (IV)

	(1)	(2)	(3)	(4)
VARIABLES	All Rules	Debt	Balanced Budget	Revenue
Neighbours	**0.310*** **	**0.261*** **	**0.501*** **	**0.088*** **
	(0.022)	**(0.022)**	**(0.045)**	**(0.012)**
Debt Service	-0.003	-0.002	-0.004	0.001
	(0.003)	(0.004)	(0.004)	(0.003)
GDP Per capita (logs)	0.081*	0.021	0.047	-0.264***
	(0.042)	(0.037)	(0.058)	(0.034)
Trade openness (logs)	0.047	0.265***	0.284**	0.185***
	(0.081)	(0.075)	(0.115)	(0.051)
Inflation	-0.026***	-0.037***	-0.061***	-0.010***
	(0.006)	(0.007)	(0.011)	(0.003)
Election dummy	-0.108	-0.150*	-0.187*	-0.028
	(0.080)	(0.079)	(0.105)	(0.043)

Polity IV	0.035***	0.038***	0.046***	0.042***
	(0.007)	(0.007)	(0.011)	(0.005)
Government efficiency	-0.079	-0.111	-0.480***	0.100*
	(0.071)	(0.073)	(0.122)	(0.051)
Control of corruption	0.002	0.018	0.317***	-0.166***
	(0.053)	(0.059)	(0.079)	(0.048)
Likelihood Ratio	410.09	344.54	519.56	297.51
Probability	0.000	0.000	0.000	0.000
Observations	528	528	528	528

Note: Each column presents a separate panel Probit regression with fiscal rules as the dependent variable. Robust standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively.

Table 5.3 provides the results of 2SLS-IV analysis. In our analysis the two instruments are statistically significant in the first stage estimates and the endogenous test is statistically significant with a *p* value of 0.000 for both instruments (see Table A5.9). The results for the analysis further show that Fiscal rules are strongly correlated with the size of available fiscal space[44]. We employ general to specific in our variable selection process[45]. The general specific approach assists in specifying a congruent unrestricted model that captures the main variables and features of the model which will be eliminated to obtain a parsimonious model for empirical analysis. Clarke (2014) notes that the general to specific helps the research to retain variables to influence optimal economic decision. Therefore, our interpretation in *Table 5.3* is based on columns 8 and 9 of our analysis, where we incorporate institutions (government effectiveness and corruption). Our results indicate that fiscal rules enhance fiscal space in SSA. For countries that have adopted the use of fiscal rules, their fiscal space increases by 18.6 in presence of low corruption, while fiscal space increases by 25.5 in presence of government effectiveness. Our results are consistent with those in available literature on similar analysis. In fact, Badinger and Reuter (2017a) finds that fiscal rules enhance fiscal balance. Bergman and Hutchison (2015) also finds that fiscal rules are effective in a country when government effectiveness is high. Debt service has a negative and significant effect on fiscal space. An increase in debt service by one unit reduces fiscal space by 0.24 and 0.45 in the presence of corruption and government effectiveness, respectively. Low corruption and government effectiveness alone have no effect in enhancing fiscal space as their results are

[44] We drop Liberia in our analysis for lack of data in most of the sample period. Rwanda, Uganda, Burundi and Tanzania are also dropped because their rules were only implemented in 2013.
[45] We do not consider the expenditure rule as it is only used in Namibia and Botswana and the period is short.

insignificant. However, a combination of rules with low corruption and government effectiveness are significant and enhances fiscal space. A country that employs fiscal rules in the presence of effective government, fiscal space increases by 14.7, while fiscal rules in presence of corruption fiscal space increases by 8.6.

The coefficients of the control variables are in line with the general expectations. Moreover, the analysis shows that the type of fiscal rules matters for fiscal space in a given country. In the SSA context, the strongest relationship is attributed to revenue rules followed by the balanced budget and debt rules, respectively. At the same time, we find a negative relationship between inflation and fiscal space. As indicated from the results in *Table 5.3*, inflation reduces fiscal space by 0.55 and 0.58 in the presence of corruption and government effectiveness, respectively. Polity IV has a significant negative effect on fiscal space, the effect increases in presence of the effectiveness of government and corruption (0.81 and 0.37)[46]. This reflects the nature of low democracy in SSA based on the data from WGI. The most surprising results are the grants, as they have a negative effect on fiscal space in SSA. Theoretically, grants which form part of the government budget are supposed to enhance fiscal space, as they help recipient government in reducing the fiscal deficits by availing resources for spending. We have also taken a step further to determine volatility of grants compared to government revenue. We find that grants are more volatile, as they average 17.6 percent compared to revenue 3.4 percent (see *Table A5.3*). From our sample, the grants are more volatile relative to tax revenue for about 92 percent of countries with fiscal rules.

Table 5.4 reports results of the fixed effect model. To examine institutional effect on fiscal space, the results are divided according to government effectiveness and corruption level in a country. The outcome confirms to a larger extend the results in *Table 5.3*. For countries that have employed fiscal rules in fiscal management, their fiscal space has increased by 21.9 and 18.5 in the presence of government effectiveness and low corruption, respectively. However, individual fiscal rules exhibit heterogeneous effect on fiscal space in presence of government effectiveness and low corruption. In fact, a country with higher government effectiveness, the revenue rule enhances higher fiscal space of 67 followed by balanced budget and debt rules of 21.8 and 19.5, respectively. Similarly, fiscal rules combined with low corruption, the revenue rule enhances higher fiscal space

[46] Polity IV is the difference between democracy and autocracy in a country.

followed by balanced budget and debt rules, respectively, (56, 17.6 and 17.3). Debt service reduces fiscal space in the overall fiscal rules and in the presence of debt rules, while in other individual rules, it remains insignificant. Our analysis shows that government effectiveness alone does not enhance fiscal space. However, when fiscal rules are supported by government effectiveness, fiscal space increases by 9.7 on overall fiscal rules, while on individual rules, revenue rules enhance higher fiscal space when combined with government effectiveness followed by balanced budget and debt rules (10 and 7.2). Our findings are in line with the previous studies. In fact, Nerlich and Reuter (2016) finds that fiscal rules enhance fiscal space in European Union (EU). They also find that expenditure rule has a higher effect on fiscal space followed by balanced budget rule among EU countries.

On the other hand, low corruption seems to enhance fiscal space although at a lower rate in presence of balanced budget and revenue rules compared to when combined with fiscal rules. When fiscal rules are combined with low corruption, fiscal space is enhanced by 5.5 in overall fiscal rules. Similarly, considering low corruption in presence of individual fiscal rules, we find that the revenue rule has a higher fiscal space at 10.9 followed by balanced budget and debt rules (4.8 and 4.2), respectively. Inflation seems to negatively affect fiscal space in the presence of government effectiveness and low corruption. We also find that Polity IV reduces fiscal space in presence of government effectiveness and low corruption. Political stability seems to enhance fiscal space across all individual fiscal rules in presence of government effectiveness and low corruption. Indeed, political stability enhances higher fiscal space when a revenue rule is employed in presence of government effectiveness and low corruption (9.9 and 8.6), while the lowest fiscal space in presence of balanced budget rules (2.5 and 2.9), respectively. Voice and accountability seem to enhance fiscal space in overall fiscal rules and debt rule for governments that are effective and have low corruption levels. However, voice and accountability reduce fiscal space in presence of revenue rules.

Table 5.5 reports the results of 2SLS estimation of the effect of individual fiscal rules on fiscal space. The results largely confirm results in *Tables 5.3* and *5.4*. The debt rule enhances fiscal space in presence of low corruption and government effectiveness (15.6 and 24.8). Similarly, the balanced budget rules enhance fiscal space (14.3 and 25.2) in presence of low corruption and

government effectiveness while revenue rule enhances fiscal space in presence of low corruption alone. From the 2SLS estimation, the debt rule and balanced budget rules have almost similar positive effect on fiscal space in presence of government effectiveness. In the presence of low corruption among individual rules, the revenue rule enhances higher fiscal space (51.4) followed by the debt rule and balanced budget rules (15.6 and 14.3). Debt service has a significantly negative effect on fiscal space in the presence of low corruption and government effectiveness. Trade openness enhances fiscal space in presence of debt rule when the government is effective and has a lower corruption level. Low corruption combined with fiscal rules enhances fiscal space in presence of revenue and debt rules (22.3 and 6.3). Corruption alone enhances fiscal space in presence of balanced budget and revenue rules. However, the effect is lower than when combined with fiscal rules. Higher inflation lowers fiscal space across all individual rules in presence of government effectiveness and low corruption except in revenue rule. Countries with higher levels of government effectiveness combined with fiscal rules enhances fiscal space than country with government effectiveness alone. Polity IV reduces fiscal space across all individual fiscal rules.

Table 5.6 reports the effect of combined fiscal rules on fiscal space. The results exhibit significant heterogeneity among a combination of fiscal rules in presence of both low corruption and government effectiveness. The results indicate that a combination of debt and revenue rules and debt and balanced rules have a higher effect on fiscal space. In fact, when a debt rule is combined with a revenue rule (see Table 5.6 column 1 and 2) in the presence of low corruption and government effectiveness, they enhance fiscal space 11.9 and 22.3, respectively. Similarly, a combination of balanced budget and revenue rules (see column 5 and 6) enhances fiscal space (11.2 and 22.7) in presence of low corruption and government effectiveness, respectively. The combination of debt and balanced budget rules offers the third highest enhancement of fiscal space (7.5 and 12.5) in presence of low corruption and government effectiveness. Additionally, our analysis on the combination of three fiscal rules (debt, balanced budget and revenue rules as shown in see column 7 and 8) shows that they offer the lowest effect on fiscal space (6.5 and 11.8). On the other hand, trade openness enhances fiscal space when fiscal rules are combined. Furthermore, inflation and polity IV reduce fiscal space even when fiscal rules are combined.

Table 5. 3 Estimation Results of the Effect of Fiscal Rules on Fiscal Space

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fiscal rules	26.520***	3.657***	0.368	0.461	1.236***	9.148***	6.385***	18.643***	25.524***
	(4.468)	(1.045)	(0.300)	(0.297)	(0.264)	(1.703)	(1.648)	(2.929)	(4.351)
Debt service (lagged)	-0.512**	-0.650***						-0.235**	-0.445**
	(0.211)	(0.194)						(0.108)	(0.184)
GDP Per capita	0.001		0.001***					0.001	0.001
	(0.003)		(0.000)					(0.002)	(0.003)
Trade openness	0.199*			-0.002				0.139	0.187
	(0.121)			(0.026)				(0.109)	(0.118)
Cyclically Adjusted balance	0.050				0.032***			0.138	0.072
	(0.152)				(0.012)			(0.155)	(0.151)
Election dummy	0.194							0.148	0.375
	(1.680)							(1.502)	(1.632)
Grants	-0.629***					-0.838***		-0.810***	-0.649***
	(0.159)					(0.168)		(0.151)	(0.160)
Government efficiency	2.979								3.019
	(2.690)								(2.760)
Fiscal rules x Gov efficiency	19.652***								14.726***
	(5.906)								(4.722)
Corruption	-0.235							1.241	
	(2.840)							(2.565)	
Fiscal rules x Corruption	-4.040							8.583***	
	(3.449)							(3.291)	
Polity IV	-0.841***							-0.371*	-0.811***
	(0.228)							(0.190)	(0.211)
Inflation	-0.592**						-0.752***	-0.549**	-0.578**
	(0.267)						(0.211)	(0.259)	(0.254)
F first stage	438.54	440.97	429.37	424.82	610.84	384.79	465.27	413.73	514.26
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Score Chi2 P value	0.000	0.000	0.392	0.006	0.012	0.000	0.000	0.000	0.000
Robust Score P value	0.000	0.001	0.391	0.334	0.009	0.000	0.000	0.000	0.000
Observations	323	447	512	512	389	495	506	323	323
Countries	20	20	20	20	20	20	20	20	20

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively.

Table 5. 4 Estimation Results of the Effect of Fiscal Rules on Fiscal Space using a Fixed Effect Model

		Fiscal Rules with Gov. Efficiency				Fiscal Rules with Corruption		
VARIABLES	All Rules	Debt Rules	BB Rules	Revenue Rules	All Rules	Debt Rules	BB Rules	Revenue Rules
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscal rules	21.964***				18.518***			
	(3.853)				(2.965)			
Debt service	-0.285*	-0.282*	-0.050	0.230	-0.130	-0.164	0.083	0.264
	(0.162)	(0.154)	(0.146)	(0.267)	(0.144)	(0.140)	(0.138)	(0.233)
Trade openness	0.085	0.080	0.058	0.116	0.083	0.080	0.062	0.118
	(0.075)	(0.071)	(0.071)	(0.128)	(0.071)	(0.069)	(0.068)	(0.111)
GDP Per capita	0.001	0.002	0.002	0.002	0.001	0.002	0.002	0.002
	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)
Government efficiency	-1.000	-0.090	1.818	-0.780				
	(2.347)	(2.171)	(2.067)	(3.952)				
Fiscal rules x Gov. efficiency	9.686***	7.212***	10.006***	16.340**				
	(3.015)	(2.523)	(2.902)	(6.885)				
Polity IV	-0.563**	-0.468**	-0.350*	-1.854***	-0.457**	-0.406**	-0.293*	-1.490***
	(0.222)	(0.202)	(0.189)	(0.684)	(0.190)	(0.181)	(0.169)	(0.485)
Inflation	-0.388***	-0.398***	-0.447***	-0.146	-0.393***	-0.399***	-0.444***	-0.195
	(0.070)	(0.066)	(0.064)	(0.155)	(0.066)	(0.064)	(0.061)	(0.127)
Political stability	4.134***	3.491***	2.534**	9.963***	4.157***	3.620***	2.972***	8.634***
	(1.229)	(1.139)	(1.114)	(3.095)	(1.159)	(1.100)	(1.067)	(2.376)
Violence and Accountability	4.241*	4.137*	1.304	-9.334**	3.548**	3.769**	2.042	-9.107**
	(2.297)	(2.181)	(2.023)	(4.215)	(1.796)	(1.748)	(1.675)	(3.641)
Debt rule		19.541***				17.256***		
		(3.298)				(2.695)		
Balanced budget rule			21.805***				17.656***	
			(3.616)				(2.693)	
Revenue rule				67.223***				56.128***
				(19.782)				(13.876)

Corruption					1.503	2.128	2.951*	9.726***
					(1.784)	(1.741)	(1.746)	(3.629)
Fiscal rules x Corruption					5.533***	4.160**	4.795**	10.967**
					(2.081)	(1.853)	(1.894)	(4.384)
Constant	-4.680***	-3.622**	-4.025**	-14.461***	-4.114**	-3.129**	-3.833**	-8.371***
	(1.796)	(1.630)	(1.656)	(5.119)	(1.664)	(1.571)	(1.578)	(3.069)
R squared	0.680	0.664	0.710	0.545	0.628	0.615	0.633	0.542
Observations	445	445	445	445	445	445	445	445
Number of id	18	18	18	18	18	18	18	18

Note: Each column presents a separate Fixed Effect regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules and checks and balances. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses. The significance levels are at *** 1 percent ** 5 percent and * 10 percent respectively.

Table 5. 5 Estimation Results of the Effect of Individual Fiscal Rules on Fiscal Space

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Debt Rule	Debt Rule	BB Rule	BB Rule	Revenue Rule	Revenue Rule
Debt rule	15.643***	24.795***				
	(2.725)	(4.511)				
Debt service (lagged)	-0.338***	-0.566***	-0.079	-0.151	0.200	-0.565
	(0.108)	(0.201)	(0.109)	(0.114)	(0.188)	(0.840)
GDP Per capita	0.002	0.002	0.002	0.002	0.000	-0.004
	(0.002)	(0.003)	(0.002)	(0.003)	(0.004)	(0.016)
Trade openness	0.244*	0.277*	0.205	0.210	0.203	0.352
	(0.132)	(0.143)	(0.128)	(0.128)	(0.189)	(0.726)
Cyclically Adjusted balance	0.109	0.026	0.103	0.019	0.752***	2.367
	(0.110)	(0.113)	(0.108)	(0.109)	(0.285)	(1.634)
Election dummy	-0.418	1.017	-0.935	0.658	0.460	5.110
	(1.741)	(1.978)	(1.720)	(1.844)	(3.354)	(12.718)
Corruption	3.917		4.567*		9.950***	
	(2.499)		(2.432)		(3.207)	
Fiscal rules x Corruption	6.317**		4.695		22.307***	
	(3.214)		(3.019)		(7.380)	
Polity IV	-0.522***	-1.073***	-0.361*	-0.963***	-1.954***	-8.717
	(0.199)	(0.235)	(0.199)	(0.224)	(0.633)	(5.655)
Inflation	-0.818***	-0.672**	-0.834***	-0.674**	-0.690**	-0.158
	(0.289)	(0.271)	(0.289)	(0.268)	(0.319)	(0.581)
Government efficiency		9.058***		10.793***		23.791*
		(2.584)		(2.469)		(13.190)
Fiscal rules x Gov efficiency		10.485**		10.680**		125.603
		(4.521)		(4.361)		(81.949)
Balanced Budget rule			14.320***	25.247***		
			(2.516)	(4.439)		
Revenue rule					51.366***	222.770

					(13.515)	(139.406)
F first stage	173.29	209.51	179.90	339.51	67.67	75.67
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000
Score Chi2 P value	0.000	0.000	0.000	0.000	0.000	0.000
Robust Score P value	0.000	0.000	0.000	0.000	0.000	0.000
Observations	336	336	336	336	336	336

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively.

Table 5. 6 Estimation Results of the Effect of Combined Fiscal Rules on Fiscal Space

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Debt & Rev	Debt & Rev	Debt & BB	Debt & BB	BB & Rev	BB & Rev	Debt & BB & Rev	Debt & BB & Rev
Debt & Rev Rules	11.991***	22.312***						
	(2.190)	(4.395)						
Debt service (lagged)	-0.213*	-0.566**	-0.203**	-0.361**	-0.018	-0.193	-0.152	-0.371**
	(0.111)	(0.242)	(0.101)	(0.148)	(0.115)	(0.149)	(0.104)	(0.167)
GDP Per capita	0.001	0.001	0.002	0.002	0.001	0.001	0.002	0.001
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Trade openness	0.235*	0.284*	0.224*	0.243*	0.205	0.224	0.221*	0.249*
	(0.136)	(0.170)	(0.129)	(0.133)	(0.130)	(0.148)	(0.130)	(0.142)
Cyclically Adjusted balance	0.259**	0.261*	0.106	0.023	0.244**	0.258*	0.188	0.147
	(0.127)	(0.150)	(0.108)	(0.110)	(0.124)	(0.144)	(0.115)	(0.121)
Election dummy	-0.213	1.427	-0.688	0.839	-0.631	1.111	-0.542	1.066
	(1.929)	(2.619)	(1.678)	(1.778)	(1.824)	(2.251)	(1.747)	(2.009)
Corruption	5.325**		4.256*		5.740**		4.979**	
	(2.526)		(2.457)		(2.465)		(2.469)	
Fiscal Rules x Corruption	10.050***		5.470*		8.534**		7.609**	
	(3.810)		(3.083)		(3.573)		(3.390)	
Polity IV	-0.856***	-1.839***	-0.438**	-1.019***	-0.708***	-1.752***	-0.630***	-1.428***
	(0.243)	(0.382)	(0.197)	(0.224)	(0.232)	(0.351)	(0.214)	(0.283)
Inflation	-0.788***	-0.621**	-0.827***	-0.673**	-0.803***	-0.622**	-0.809***	-0.646**
	(0.295)	(0.283)	(0.289)	(0.269)	(0.294)	(0.278)	(0.292)	(0.274)
Government efficiency		10.533***		9.917***		12.116***		10.655***
		(2.914)		(2.505)		(2.767)		(2.640)
Fiscal rules x Gov efficiency		22.015***		10.582**		22.379***		16.697***
		(6.833)		(4.335)		(6.511)		(5.400)
Debt & BB Rules			7.476***	12.509***				

			(1.298)	(2.192)				
BB & Rev Rules					11.198***	22.677***		
					(2.049)	(4.275)		
Debt & BB & Rev Rules							6.526***	11.844***
							(1.156)	(2.141)
F first stage	114.52	148.52	228.93	326.35	132.01	215.04	172.11	258.16
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Score Chi2 P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Robust Score P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	336	336	336	336	336	336	336	336

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. BB denotes Balanced Budget rules, Rev. denotes Revenue rules and Gov. denotes government efficiency. Robust standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively.

5.6 Robustness tests

The baseline model used in our study is the 2SLS method with fiscal rules as a dummy variable and a large set of control variables, with fiscal rules treated as endogenous variables. The estimation technique is well suited for this analysis and the control variables used are standard ones in the literature.

To check the robustness of the results we employ several techniques. Using both fixed effect and 2SLS models, we find that fiscal rules enhance fiscal space and our findings are comparable to the baseline. We check the robustness of the models by (i) controlling for oil producing countries, (ii) constructing a Fiscal Rules Strength Index (FRI) and using the index to test its efficacy to enhance fiscal space, (iii) controlling for countries in the monetary union that include WAEMU and CEMAC and (iv) using other measures of fiscal space as outlined in fiscal policy literature. We present these results in Table A5.2 to Table A5.8, respectively. It is important to note that our findings from the various robustness checks confirm the findings from our baseline specifications.

The results in Table *A5.2* are qualitatively very similar. We find the FRI to be positive and significant for enhancing fiscal space and similarly for the case of government efficiency and corruption. With fiscal rules in place and an efficient government, fiscal space increases by 13 percent of GDP and 11.6 percent of GDP based on the 2SLS estimation. Employing a Fixed Effect approach, we find that fiscal rules enhance fiscal space in presence of government effectiveness and corruption (7.9 and 6.6). We use an additional instrument, that is, a one-year lagged value of fiscal rules index. This helps us to capture the persistence and legislative process that takes time to implement fiscal policy. The inclusion of a third instrument allows us to check for over identification in our model.

Moreover, to validate whether our results hold for different variables, we include other institutional variables (in column 2): voice and accountability, political stability, regulatory quality and quality of laws in our analysis. Using our baseline estimation technique, the results also show that fiscal rules significantly influence fiscal space by 11.5 percent in a given year. However, additional institutional variables offer mixed results to the effect of fiscal rules on fiscal space. Regulatory

quality and quality of legislative laws positively enhance fiscal space (4.4 and 6.9 percent, respectively), while voice and accountability negatively affect fiscal space (3.6 percent).

Further robustness exercises are undertaken by controlling for commodity countries. We use oil prices to test their effect on fiscal space. Tables A5.4 and A5.5 report the results after accounting for oil producing countries. Those findings show that fiscal rules enhance fiscal space, and the role of institutions is also confirmed in enhancing the efficacy of fiscal rules. We find that the effect of the oil price is positive and significant on fiscal space in Table A5.4. This is logical as oil revenue is an important factor of financing in commodity producing countries, thus during a windfall it enhances fiscal space. However, other similar econometric exercises yield positive but insignificant results of the effect of oil price on fiscal space. Furthermore, after controlling for oil producing countries, we also establish that the combination of fiscal rules matters in fiscal policy management. Indeed, we find that a combination of balanced budget rule and revenue rule as well as debt rule and revenue rule have the largest impact on fiscal space, which ranges between 37.6 to 32.5. However, a combination of three fiscal rules was found to yield lower fiscal space. These findings are consistent with our baseline results that a combination of more than two rules has lower effect on fiscal space.

Due to the existence of supranational dynamics, we also control for countries that belong to the monetary union of WAEMU or CEMAC. The CEMAC and WAEMU member countries have had an interesting fiscal and monetary policy operational framework. Since post-World War II, France supported the use of the CFA franc in its colonies in West Africa (WAEMU) and Central Africa (CEMAC). The exchange rate was fixed to the French franc and guaranteed by the Central Bank of France in return for certain economic commitments made by the monetary union members. When the CFA countries gained independence in the 1960's, they maintained the CFA franc, and this helped them sustain stability, especially low inflation, and economic growth. However, in the mid-1980s, rising inflation caused an appreciation of the real CFA franc and member-countries' growth rates deteriorated (Iossifov et al., 2009).

As the economic fundamentals of the CFA region weakened, fiscal policy rules were strengthened in an effort to contain public debt and maintain a sustainable fiscal policy. The CFA countries

established fiscal convergence criteria to signify fiscal policy commitment and arrest politically motivated spending that would transmit fiscal unsustainability in the region. Furthermore, due to adoption of a fixed exchange rate in the framework of the CFA, increased fiscal spending may result to overvaluation of the real effective exchange rate in the long run. In 1994 the CFA franc was devalued by 100 percent with the support of the IMF. The monetary union has subsequently remained stable although it constrains monetary policy.

We thus, control for presence of countries in the monetary union of CEMAC and WAEMU. The results show that fiscal rules enhance fiscal space even after controlling for membership of a monetary union. Indeed, from our analysis we establish that the presence of a fiscal rule in a country increases fiscal space by 30 (see Table A5.6 column 5 – 8 in the Appendices). However, we find that being in a monetary union has no effect on fiscal space in the presence of fiscal rules, for example, the fiscal rule supersedes membership of the monetary union in importance. To further check on the effect of being in a monetary union, we undertake more analysis by controlling for individual monetary unions (WAEMU and CEMAC). Our findings at each of the individual monetary union reveals being in WAEMU or CEMAC does not influence fiscal space. However, the effect of fiscal rules on fiscal space remains robust as we find that in presence of fiscal rules, the level of fiscal space increases between 25 and 32.8 in a country after considering having a fiscal rule. Furthermore, we also control for country effects, but our findings still stands as we find that fiscal rules influence fiscal space.

We also check the robustness of our indicators on the measure of fiscal space by testing other measures of fiscal space outlined in the fiscal policy literature against the set of covariates used in our baseline analysis. In this regard we consider measure of fiscal space by Romer and Romer (2019) and tax revenue. As earlier noted in Chapter three, Romer defines fiscal space as the negative of debt as a share of GDP. Table A5.8 presents these results. In all specifications we find that fiscal rules enhance fiscal space. In particular, using Romer's measure of fiscal space, we establish that a country with any fiscal rule present enhances fiscal space by an average of 29, while at individual fiscal rules, fiscal space increases to 30 for the debt rule and 34.8 for the balanced budget rule. Further, using tax revenue as a measure of fiscal space, we establish that fiscal rules enhance fiscal space by 30 and for individual rules it increases fiscal space by 31 for

debt rule and 36 for balanced budget rule. These findings are consistent with the baseline specification that used hybrid fiscal space.

Further, we acknowledge that by not controlling for fiscal rules compliance may result to endogeneity problem in our analytical framework based on our measure of compliance variable as outlined in chapter four. The presence of endogeneity constitutes a major problem and may result in biased results drawing incorrect conclusions. According to Wooldridge (2010) endogeneity arises from the correlation of the independent variable and the error term. The various sources of this problem include omission of variables that is when the omitted variable is correlated with the dependent variable and the variable is associated with any of the independent variable(s) (Wooldridge (2010); Zaefarian et al. (2017)). Further, when variables are imperfectly measured and their values remain unobserved or measurement errors can result in endogeneity problem, which may be due to wrong aggregation or missing data (Wooldridge, 2002). However, Kennedy (2008) posits that measurement errors becomes ineffective if it is uncorrelated with the independent variable. Similarly, Wooldridge (2002) notes that simultaneous causality where the both the dependent variable and independent variables jointly cause each other results in endogeneity problem.

In our analytical framework, although no data source is perfectly accurate and without errors, our sources are sufficiently credible to escape the measurement error type of endogeneity. We are of the view that the measurement error problem, even if present, is very negligible to invalidate the results. Further, our evidence and specifications show no simultaneous causality between our compliance variable and the dependent variable. This is because the compliance of fiscal rules and attainment of fiscal space depends on other variables that include institutions. We believe for (non)compliance to influence fiscal space it takes a long time as there are other factors. For example, a country can comply with fiscal rules but fail to attain fiscal space as the later depend on other factors that include increase in revenue, receipt of grants, among others. Relatedly, we believe that there is no omitted variable bias in our framework and the compliance of fiscal rules is a function of institutions as noted in chapter four. In this regard, we have included several institutional variables that include governance effectiveness, corruption, democracy, and the lag of other variables such as GDP per capita, debt service, among others.

To this end, we include compliance variable as part of robustness check. Table A5.10 reports the results after controlling for compliance. Our analysis reveals that the effect of fiscal rules compliance on fiscal space is heterogeneous. The findings show that the overall compliance rate does not influence fiscal space. However, the increase in compliance of debt rule results in improvement of fiscal space by 4.7. These results show that enhancement of fiscal rules compliance especially the debt rule will enhance attainment of fiscal space. As noted in chapter four countries with higher fiscal rules compliance rates, for example, Botswana has the ability to enhance their fiscal space.

5.7 Conclusions

We have taken a closer look at the effect of fiscal rules on fiscal space in SSA. Moreover, we also examined geographical patterns in the adoption of fiscal rules to help empirically establish if adopted fiscal rules enhance fiscal space. Overall, our results make a strong case for the use of fiscal rules for fiscal policy and enhanced fiscal space. Using 20 SSA countries we find that fiscal rules enhance fiscal space and institutional design plays a significant role on the effectiveness of fiscal rules. The revenue and balanced budget rules seem to dominate in enhancing fiscal space thus policy transparency and commitment to effective governance can help scale up fiscal space in SSA. In addition, we find that the effect of a combination of rules varies across different rules. In particular, a combination of debt rule and revenue rules and balanced budget and revenue rules yields higher fiscal space. On the contrary, a combination of three rules has little effect on fiscal space.

We further find that geographical proximity influence adoption of fiscal rules and as such regional fiscal discipline can be achieved. Thus, policy diffusion can be an important factor for regional integration, enhanced credibility and fiscal discipline. We also augment our baseline empirical strategy by constructing a fiscal rules index. Using other techniques to augment our baseline approach we find that fiscal rules still enhance fiscal space.

Our findings bear interesting policy implications. The results suggest that strict fiscal rules can enhance fiscal space and should be complemented by independent bodies, that is, fiscal councils

which can help enforce and monitor fiscal rules. More precisely, targeted policies should be designed to support revenue and balanced budget rules. These policy targets will be instrumental in addressing deficit bias and will enhance fiscal space for investment and development. Similarly, a combination of rules matters for fiscal policy. As such, policies geared towards strengthening a combination of debt and revenue rules and balanced budget and revenue rules should be scaled up. More specifically, policies to enhance tax revenue will be important to enhance resource mobilisation and mitigate a debt surge.

Appendix A5.1: Summary statistics and Robustness Test Results

Table A5. 1 Summary Statistics of Fiscal Rules, Fiscal Space, and other Covariates

Variable		Mean	Std. Dev.	Min	Max	Observations
ID	overall	10,5	5,773503	1	20	N = 400
	between		5,91608	1	20	n = 20
	within		0	10,5	10,5	T = 20
Fiscal Space	overall	-0,5797	8,28993	-79,2308	4,929121	N = 400
	between		6,283936	-23,677	4,492858	n = 20
	within		5,578123	-56,1335	24,01667	T = 20
Debt service	overall	2,840334	3,88844	0,061987	29,77814	N = 360
	between		2,399585	0,943754	10,60323	n = 18
	within		3,109132	-6,22401	22,01525	T = 20
GDP Per capita	overall	-4,24035	882,8837	-7379,65	7508,557	N = 400
	between		31,22831	-123,92	46,72872	n = 20
	within		882,3575	-7259,97	7628,236	T = 20
Trade openness	overall	0,330383	13,38086	-86,6714	168,5493	N = 396
	between		1,11195	-0,84382	4,683899	n = 20
	within		13,3364	-91,0249	164,1958	T = 19.8
Cyclically adjusted balance	overall	-1,39229	6,916927	-43,6535	40,26973	N = 345
	between		2,72526	-7,19823	3,541883	n = 18
	within		6,378289	-47,2035	40,29448	T bar = 19.1667
Real GDP	overall	5,047455	10,64624	-36,7	147,973	N = 400
	between		4,52816	0,4847	23,32115	n = 20
	within		9,685797	-32,1373	129,6993	T = 20
Output gap	overall	0,136855	7,409892	-34,6702	97,3518	N = 400
	between		0,625951	-0,23747	2,751438	n = 20
	within		7,384669	-34,7346	94,73722	T = 20
Election dummy	overall	0,1425	0,35	0	1	N = 400
	between		0,033541	0,05	0,2	n = 20
	within		0,348466	-0,0575	1,0925	T = 20
Grants	overall	6,4248	6,766935	0,044165	49,31352	N = 380
	between		5,025466	0,734486	18,59719	n = 20
	within		4,662142	-4,07541	42,85733	T = 19
Government effectiveness	overall	-0,6667	0,644624	-1,84833	1,049441	N = 400
	between		0,635317	-1,49546	0,695691	n = 20
	within		0,176444	-1,09044	0,028217	T = 20
Fiscal rules x Government effectiveness	overall	-0,55237	0,629606	-1,84833	1,049441	N = 400
	between		0,487605	-1,15262	0,410217	n = 20

	within		0,412271	-1,24808	0,600257	T =	20
Corruption	overall	-0,61156	0,713749	-1,81344	1,216737	N =	400
	between		0,71563	-1,53478	0,930081	n =	20
	within		0,147304	-1,05599	-0,14401	T =	20
Fiscal rules x Corruption	overall	-0,4872	0,673638	-1,81344	1,216737	N =	400
	between		0,557614	-1,1821	0,711762	n =	20
	within		0,397066	-1,21242	0,694901	T =	20
Polity IV	overall	2,57	5,181914	-6	10	N =	400
	between		4,805326	-6	10	n =	20
	within		2,204689	-7,33	8,72	T =	20
Democracy	overall	0,795	17,58055	-88	10	N =	400
	between		10,38835	-38,7	10	n =	20
	within		14,36303	-86,805	44,495	T =	20
Inflation	overall	3,924223	4,470499	-8,447	49,065	N =	399
	between		2,586494	1,35115	11,3255	n =	20
	within		3,690488	-7,20513	48,12852	T =	19.95
Fiscal rules	overall	0,785	0,411337	0	1	N =	400
	between		0,128861	0,45	1	n =	20
	within		0,391642	-0,165	1,335	T =	20
Fiscal rules index	overall	0,325525	0,192362	0	0,68	N =	400
	between		0,049455	0,185	0,4085	n =	20
	within		0,186209	-0,08298	0,699525	T =	20
Probability of rules adoption	overall	0,545334	0,14615	0,002857	0,935273	N =	377
	between		0,11365	0,258493	0,757769	n =	20
	within		0,09477	-0,02267	0,84439	T =	18.85
Checks & Balances	overall	2,471545	0,938244	1	5	N =	369
	between		0,722387	1	3,526316	n =	20
	within		0,611945	-0,05477	4,576808	T =	18.45
Voice & accountability	overall	-0,42573	0,755367	-2,00014	1,015621	N =	400
	between		0,747347	-1,77285	0,880894	n =	20
	within		0,196591	-1,39379	0,204172	T =	20
Political Violence	overall	-0,35745	0,921215	-2,69919	1,219243	N =	400
	between		0,862724	-1,71073	1,021244	n =	20
	within		0,373881	-2,10198	0,900905	T =	20
Regulatory Quality	overall	-0,51105	0,580731	-1,67672	1,12727	N =	400
	between		0,572389	-1,43424	0,702437	n =	20
	within		0,158811	-1,05526	0,045443	T =	20
Regulatory Law	overall	-0,60445	0,73252	-1,84308	1,07713	N =	400
	between		0,732088	-1,42031	0,959757	n =	20
	within		0,161723	-1,0311	-0,06608	T =	20
Real interest rates	overall	7,176617	10,82418	-42,3102	78,27374	N =	271

	between	5,410215	0,733359	17,41631	n =	20
	within	9,643059	-41,311	72,43508	T bar =	13.55

Notes: Data includes the period 1997 – 2016, the source of the data is IMF: International Monetary Fund, WGI: World Governance Indicators, WB: World Bank, NELDA: National Elections across Democracy and Aristocracy.

Table A5. 2 Estimation Results of the Effect of Fiscal Rules Index on Fiscal Space

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Government efficiency	Institutions	Government efficiency	Corruption	Corruption	Institutions
Fiscal Rules Index	13.032***	11.471***	7.923**	11.608***	6.627**	11.471***
	(2.576)	(2.578)	(3.135)	(2.638)	(3.204)	(2.578)
Debt service (lagged)	-0.194**		-0.149	-0.146	-0.103	
	(0.098)		(0.121)	(0.099)	(0.113)	
GDP Per capita	0.001		0.003*	0.003**	0.004**	
	(0.001)		(0.002)	(0.002)	(0.002)	
Trade openness	-0.029		0.003	-0.004	-0.008	
	(0.063)		(0.059)	(0.088)	(0.059)	
Output gap	0.240					
	(0.231)					
Election dummy	0.576		1.016	0.761	0.886	
	(1.065)		(0.998)	(1.271)	(0.993)	
Grants	-0.450***		-0.276***	-0.528***	-0.291***	
	(0.156)		(0.080)	(0.149)	(0.080)	
Government efficiency	4.056***	0.205	6.219**			0.205
	(1.335)	(2.106)	(2.709)			(2.106)
Fiscal Rules x Gov. Eff	-1.120	-1.346	-3.890**			-1.346
	(1.895)	(1.954)	(1.517)			(1.954)
Polity IV	0.050	-0.197	0.176	0.217*	0.244	-0.197
	(0.108)	(0.153)	(0.169)	(0.118)	(0.168)	(0.153)
Inflation	0.012		0.068	-0.024	0.061	
	(0.073)		(0.094)	(0.077)	(0.094)	
Voice & accountability		-3.586*				-3.586*
		(1.923)				(1.923)
Political Violence		-1.228				-1.228
		(0.764)				(0.764)
Regulatory quality		4.384***				4.384***

		(1.457)				(1.457)
Regulatory laws		6.924***				6.924***
		(2.315)				(2.315)
Cyclically adjusted balance			0.251***	0.261**	0.260***	
			(0.073)	(0.115)	(0.073)	
Corruption				4.241**	-0.935	
				(1.806)	(2.691)	
Fiscal rules x Corruption				-1.933	-3.549**	
				(2.115)	(1.446)	
Constant			-0.370		-3.946**	
			(1.864)		(1.829)	
Observations	315	366	264	264	264	366
Countries	20	20	20	20	20	20
F first stage	271.95	415.3		427.04		415.3
P value first stage	0.0000	0.0000		0.0000		0.0000
Score Chi2 (2) P value	0.0000	0.0000		0.0000		0.0001
Robust Score (1) P value	0.0000	0.0001		0.0004		0.0003

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules, lag of fiscal rules index and Checks and balances. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Gov. Eff denotes Government Efficiency, the columns employ different techniques: 2SLS (1, 2, 4 & 6), while Fixed Effects (3 and 5). Robust standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively.

Table A5. 3 Volatility between Revenue and Grants in Africa

Country	Revenue	Grants
Benin	0.0042876	0.1123661
Botswana	0.005586	0.2184075
Burkina Faso	0.030004	0.0879211
Burundi	0.0491982	0.142339
Cape Verde	0.007141	0.0552053
Cameroon	0.0525327	0.2070277
Central African Republic	0.040664	0.1009383
Chad	0.0402787	0.0379259
Congo, Rep.	0.0248793	0.5206543
Cote d'Ivoire	0.0067983	0.243692
Equatorial Guinea	0.0396661	0.368093
Gabon	0.0172635	0.1264154
Guinea-Bissau	0.1187892	0.0900539
Kenya	0.0094305	0.0442056
Liberia	0.0322968	0.3975972
Mali	0.06509	0.0994617
Mauritius	0.0029564	0.1082171
Namibia	0.0039076	0.0300596
Niger	0.0627537	0.1364325
Nigeria	0.0820517	0.3387952
Rwanda	0.1090579	0.3199307
Senegal	0.0043441	0.1617444
Tanzania	0.0166875	0.1188591
Togo	0.0259188	0.201975
Uganda	0.0059651	0.1326565
Mean	0.03430195	0.17603896
Median	0.0259188	0.1326565

Table A5. 4: Estimation Results of the Effect of Fiscal Rules on Fiscal Space Controlling for Oil Price

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fiscal rules	39.221***	3.657***	0.368	0.461	1.236***	9.148***	6.385***	31.110***	38.987***
	(11.910)	(1.045)	(0.300)	(0.297)	(0.264)	(1.703)	(1.648)	(12.019)	(12.681)
Debt service (lagged)	-0.292*	-0.650***						-0.379**	-0.313
	(0.167)	(0.194)						(0.168)	(0.193)
GDP per capita	0.005***		0.001***					0.003	0.006***
	(0.002)		(0.000)					(0.002)	(0.002)
Trade openness	-0.042			-0.002				-0.050	-0.016
	(0.111)			(0.026)				(0.134)	(0.118)
Cyclically Adjusted balance	0.128				0.032***			0.131	0.169
	(0.116)				(0.012)			(0.140)	(0.119)
Election dummy	1.613							1.176	1.579
	(1.571)							(2.213)	(1.766)
Grants	-0.243					-0.838***		-0.664**	-0.251
	(0.237)					(0.168)		(0.297)	(0.268)
Government efficiency	9.024***								7.638***
	(2.108)								(2.184)
Rules x Gov. effectiveness	20.353***								34.244***
	(5.589)								(11.003)
Corruption	-0.896							1.508	
	(1.902)							(1.962)	
Rules x Corruption	15.324							29.292**	
	(10.355)							(11.402)	
Polity IV	0.526**							0.242	0.611***
	(0.247)							(0.244)	(0.220)
Inflation	0.173						-0.752***	0.057	0.207**
	(0.116)						(0.211)	(0.131)	(0.084)
Oil Price	0.080*							0.056	0.048
	(0.043)							(0.055)	(0.044)
Observations	78	447	512	512	389	495	506	78	78
Countries	20	20	20	20	20	20	20	20	20

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent

Table A5. 5: Estimation Results of the Effect of Combined Fiscal Rules on Fiscal Space controlling for oil price.

VARIABLES	(1) Debt & Rev	(2) Debt & Rev	(3) Debt & BB	(4) Debt & BB	(5) BB & Rev	(6) BB & Rev	(7) Debt & BB & Rev	(8) Debt & BB & Rev
Debt & Rev Rules	18.982**	32.509***						
	(7.395)	(12.410)						
Debt service (lagged)	-0.672***	-0.430**	-0.647***	-0.399**	-0.599***	-0.362**	-0.647***	-0.399**
	(0.177)	(0.189)	(0.172)	(0.167)	(0.178)	(0.182)	(0.172)	(0.167)
GDP per capita	0.003	0.007**	0.003	0.006***	0.002	0.005***	0.003	0.006***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Trade openness	0.065	0.051	0.048	0.031	0.014	0.008	0.048	0.031
	(0.182)	(0.176)	(0.171)	(0.145)	(0.158)	(0.124)	(0.171)	(0.145)
Cyclically Adjusted balance	-0.066	-0.102	-0.042	0.010	0.004	0.141	-0.042	0.010
	(0.122)	(0.144)	(0.116)	(0.108)	(0.114)	(0.107)	(0.116)	(0.108)
Election dummy	1.919	2.146	1.882	2.102	1.811	2.051	1.882	2.102
	(2.589)	(2.967)	(2.381)	(2.120)	(2.385)	(1.712)	(2.381)	(2.120)
Corruption	1.159		1.519		2.213		1.519	
	(2.262)		(2.127)		(2.102)		(2.127)	
Fiscal Rules x Corruption	13.711**		21.028**		35.132***		21.028**	
	(6.218)		(8.315)		(13.127)		(8.315)	
Polity IV	1.096***	1.750***	0.810***	1.227***	0.260	0.622***	0.810***	1.227***
	(0.385)	(0.547)	(0.304)	(0.314)	(0.247)	(0.203)	(0.304)	(0.314)
Inflation	0.128	0.527**	0.093	0.367**	0.027	0.181**	0.093	0.367**
	(0.151)	(0.234)	(0.138)	(0.144)	(0.132)	(0.085)	(0.138)	(0.144)
Oil Price	0.054	0.071	0.058	0.066	0.067	0.061	0.058	0.066
	(0.050)	(0.057)	(0.049)	(0.044)	(0.052)	(0.040)	(0.049)	(0.044)
Government efficiency		10.941***		9.788***		8.454***		9.788***
		(2.425)		(2.029)		(2.213)		(2.029)
Fiscal Rules x G. efficiency		18.542**		25.544***		33.644***		25.544***
		(7.992)		(8.556)		(10.606)		(8.556)
Debt & BB Rules			12.498***	17.436***				
			(4.647)	(5.576)				
BB & Rev Rules					36.588***	37.606***		
					(13.687)	(11.863)		
Debt & BB & Rev Rules							12.498***	17.436***
							(4.647)	(5.576)
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Score Chi2 P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Robust Score P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	80	80	80	80	80	80	80	80

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Selection of variables emerges after consecutive exclusion of insignificant variables following general to specific. Robust standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent

Table A5.6: Estimation Results of the Effect of Fiscal Rules on Fiscal Space controlling for Monetary Union

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					WAEMU & CEMAC			
Variables	All Rules	Debt Rule	BB Rule	Revenue Rule	All Rules	Debt Rule	BB Rule	Revenue Rule
Fiscal rules	35.885***				30.002***			
	(9.080)				(5.527)			
Debt service	-0.368	-0.351	-0.355*	-1.267	-0.491**	-0.569**	-0.188	-2.364
	(0.310)	(0.299)	(0.201)	(0.775)	(0.229)	(0.261)	(0.214)	(2.226)
GDP per capita	-0.000	0.000	0.001	-0.005	0.000	0.001	0.001	0.014
	(0.003)	(0.003)	(0.002)	(0.006)	(0.003)	(0.004)	(0.004)	(0.023)
Trade openness	0.226*	0.257**	0.185**	0.406	0.212*	0.234*	0.180	0.313
	(0.117)	(0.119)	(0.094)	(0.298)	(0.125)	(0.141)	(0.138)	(0.900)
Cyclically Adj. Bal.	-0.179	-0.293*	0.040	0.509*	0.029	0.045	-0.119	-3.419
	(0.145)	(0.158)	(0.109)	(0.310)	(0.153)	(0.170)	(0.183)	(3.571)
Election	0.665	1.660	0.754	4.912	0.223	1.632	0.381	-11.951
	(1.859)	(1.951)	(1.465)	(4.399)	(1.778)	(2.168)	(2.284)	(21.768)
Grants	0.048	0.118	-0.121	-0.345	-0.543***	-0.645***	-0.448**	1.820
	(0.182)	(0.180)	(0.157)	(0.274)	(0.181)	(0.193)	(0.200)	(2.562)
Gov. Effectiveness	5.491*	7.072**	4.525	-7.777	1.677	-1.449	-2.370	56.308
	(3.191)	(3.199)	(2.972)	(9.544)	(2.917)	(3.533)	(3.852)	(50.031)
FRs x Gov. Effectiveness	19.090***	16.614**	29.339***	56.850*	21.684***	23.773***	55.327***	-131.723
	(7.328)	(6.872)	(7.884)	(31.691)	(6.489)	(7.616)	(13.282)	(118.746)
Corruption	6.624*	9.944***	7.660**	30.441*	-1.131	-1.811	-2.996	-15.914
	(3.581)	(3.758)	(3.169)	(16.109)	(3.118)	(3.330)	(3.445)	(20.429)
FRs x Corruption	0.132	-1.832	-10.982**	-2.809	-3.658	-3.222	-25.875***	-49.188
	(5.666)	(5.169)	(4.691)	(8.389)	(3.728)	(4.330)	(6.882)	(59.582)
Polity IV	-1.029**	-1.147**	-0.557	-4.873*	-1.025***	-1.091***	-1.336***	11.076
	(0.469)	(0.499)	(0.344)	(2.823)	(0.272)	(0.304)	(0.366)	(9.512)
Inflation	-0.486*	-0.445*	-0.537**	-0.089	-0.642**	-0.552*	-0.647**	-1.772
	(0.270)	(0.270)	(0.253)	(0.452)	(0.284)	(0.287)	(0.307)	(1.230)
Debt rule		36.005***				35.572***		
		(9.018)				(7.268)		
BB rule			32.811***				49.033***	
			(7.261)				(9.901)	
Revenue rule				116.611*				-305.373
				(59.857)				(279.823)
Monetary Union					-3.790	-8.565**	-15.573***	72.600
					(2.539)	(3.730)	(4.821)	(60.207)
F first stage	427	345.9	379.5	284.4	395	269	298	96.6
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Robust Score Chi2	32.67	31.96	32.02	33.38	30.985	31.693	32.42	36.568
Robust Score P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

R square first stage					0.86	0.82	0.87	0.73
Countries	20	20	20	20	20	20	20	20
Observations	323	323	323	323	323	323	323	323
Country Effects	Yes	Yes	Yes	Yes	No	No	No	No

Note: Dependent variable is Fiscal space. Abbreviations: BB: Balanced Budget Rule, Cyclical Adj. Bal: Cyclically Adjusted Balance, FRs: Fiscal Rules, Gov. Effectiveness: Government Effectiveness. Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Robust standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent, and * denotes significance at 10 percent.

Table A5.7: Estimation Results of the Effect of Fiscal Rules on Fiscal Space with control for Individual Monetary Union

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		WAEMU				CEMAC		
Variables	Rules	Debt Rule	BB Rule	Rev. Rule	Rules	Debt Rule	BB Rule	Rev. Rule
Fiscal rules	25.427***				26.502***			
	(4.482)				(4.557)			
Debt service	-0.472**	-0.580**	-0.357**	0.529	-0.513**	-0.593***	-0.348**	1.287
	(0.214)	(0.230)	(0.171)	(0.882)	(0.211)	(0.222)	(0.169)	(1.615)
GDP per capita	0.001	0.002	0.002	0.017	0.001	0.002	0.002	-0.009
	(0.003)	(0.003)	(0.003)	(0.016)	(0.003)	(0.003)	(0.003)	(0.024)
Trade openness	0.186	0.200	0.153	-0.275	0.199*	0.205	0.157	-0.079
	(0.119)	(0.128)	(0.119)	(0.683)	(0.121)	(0.128)	(0.120)	(1.007)
Cyclically Adj. Bal.	0.090	0.094	-0.002	-1.287	0.050	0.083	-0.004	4.502
	(0.160)	(0.172)	(0.171)	(1.315)	(0.152)	(0.165)	(0.162)	(4.177)
Election dummy	0.176	1.235	0.237	-11.901	0.195	1.254	0.226	13.168
	(1.640)	(1.876)	(1.820)	(16.925)	(1.680)	(1.889)	(1.839)	(19.850)
Grants	-0.706***	-0.811***	-0.743***	-1.305*	-0.629***	-0.790***	-0.729***	-4.974
	(0.179)	(0.190)	(0.182)	(0.790)	(0.160)	(0.183)	(0.170)	(4.318)
Gov. Effectiveness	3.604	2.025	3.004	67.100	2.974	1.849	3.186	-24.644
	(2.639)	(2.795)	(2.644)	(43.468)	(2.689)	(2.743)	(2.633)	(29.807)
FRs x Gov. Effectiveness	19.272***	19.185***	37.358***	-109.978	19.639***	19.344***	38.539***	162.736
	(5.764)	(6.139)	(8.667)	(69.780)	(5.972)	(6.234)	(8.744)	(163.325)
Corruption	0.032	0.182	0.371	-15.629	-0.233	0.099	0.252	34.337
	(2.856)	(2.870)	(2.761)	(14.822)	(2.843)	(2.857)	(2.745)	(36.317)
FRs x Corruption	-4.322	-4.156	-19.230***	-56.789	-4.039	-4.080	-19.756***	38.263
	(3.400)	(3.600)	(4.795)	(45.857)	(3.449)	(3.635)	(4.873)	(42.371)
Polity IV	-0.820***	-0.709***	-0.671***	8.437	-0.841***	-0.715***	-0.690***	-11.023
	(0.224)	(0.230)	(0.239)	(5.277)	(0.227)	(0.230)	(0.242)	(11.221)
Inflation	-0.571**	-0.471*	-0.496*	-1.356*	-0.592**	-0.476*	-0.500*	1.674
	(0.270)	(0.267)	(0.266)	(0.776)	(0.268)	(0.264)	(0.263)	(2.213)
WAEMU	2.574	0.734	0.100	152.612				
	(1.608)	(1.938)	(1.975)	(97.086)				
Debt rule		27.110***				27.514***		
		(5.018)				(4.911)		
BB Rule			31.800***				32.831***	
			(5.673)				(5.610)	
Revenue Rule				-290.860				350.120
				(190.493)				(333.793)
CEMAC					0.005	-0.020	-0.210	-5.029
					(0.124)	(0.138)	(0.157)	(5.130)
F first stage	40.4	230	239	202	404	198	246	77.56
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Score Chi2	30.04	31.09	31.01	36.99	33.06	33.357	32.96	37.77
Robust score P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R square first stage	0.87	0.82	0.85	0.81	0.863	0.82	0.85	0.729
Countries	20	20	20	20	20	20	20	20
Observations	323	323	323	323	323	323	323	323

Note: Dependent variable is Fiscal space. Abbreviations: BB: Balanced Budget Rule, Cyclical Adj. Bal: Cyclically Adjusted Balance, FRs: Fiscal Rules, Gov. Effectiveness: Government Effectiveness. Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Robust standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent, and * denotes significance at 10 percent.

Table A5.8: Robustness checks for Estimation Results of the Effect of Fiscal Rules with other measures of Fiscal Space

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Romer Fiscal Space Measure				Tax Revenue Fiscal space measure		
Variables	All Rules	Debt Rule	BB Rule	Revenue Rule	All Rules	Debt Rule	BB Rule	Revenue Rule
Fiscal rules	29.003**				30.048***			
	(12.948)				(2.423)			
Debt service	-5.231***	-5.319***	-5.063***	-4.190***	0.169	0.077	0.343**	1.247*
	(0.554)	(0.584)	(0.509)	(0.803)	(0.179)	(0.180)	(0.143)	(0.738)
GDP per capita	0.012	0.013	0.013	0.008	-0.002	-0.001	-0.001	-0.007
	(0.009)	(0.009)	(0.008)	(0.017)	(0.002)	(0.002)	(0.002)	(0.014)
Trade openness	0.506	0.512	0.457	0.252	0.075	0.081	0.023	-0.188
	(0.501)	(0.506)	(0.493)	(0.722)	(0.070)	(0.080)	(0.077)	(0.645)
Cyclically Adj. Bal	1.753***	1.789***	1.694***	4.550**	-0.140	-0.103	-0.201**	2.758*
	(0.481)	(0.495)	(0.489)	(1.894)	(0.090)	(0.102)	(0.101)	(1.554)
Election dummy	-0.074	1.083	-0.026	8.292	0.029	1.228	0.078	8.696
	(6.861)	(6.971)	(6.706)	(13.028)	(1.258)	(1.561)	(1.614)	(12.371)
Grants	-2.650***	-2.827***	-2.772***	-5.605**	-0.019	-0.202**	-0.145*	-3.080*
	(0.466)	(0.514)	(0.491)	(2.192)	(0.074)	(0.096)	(0.085)	(1.806)
Gov. Effectiveness	31.523***	30.270***	31.524***	11.027	-1.216	-2.514	-1.215	-22.450
	(9.606)	(9.754)	(9.567)	(19.863)	(1.666)	(1.816)	(1.638)	(14.781)
FRs x Gov. Effectiveness	49.546**	49.149**	68.958***	130.729*	16.795***	16.384***	36.907***	100.903
	(20.011)	(20.157)	(26.517)	(77.555)	(3.274)	(3.609)	(5.096)	(62.965)
Corruption	21.508***	21.886***	22.161***	45.213***	-2.987	-2.595	-2.310	21.572
	(6.767)	(6.622)	(6.660)	(17.384)	(1.923)	(2.126)	(1.883)	(16.882)
FRs x Corruption	-49.718***	-49.757***	-66.346***	-22.408	3.760	3.720	-13.466***	32.053
	(9.468)	(9.564)	(12.686)	(22.403)	(2.814)	(3.086)	(4.012)	(21.083)
Polity IV	-2.111**	-1.972**	-1.926**	-8.170	-0.730***	-0.585***	-0.538***	-7.007
	(0.827)	(0.789)	(0.773)	(5.029)	(0.129)	(0.144)	(0.166)	(4.322)
Inflation	-1.004***	-0.876**	-0.899**	0.529	0.067	0.200**	0.176**	1.655*
	(0.374)	(0.375)	(0.366)	(1.075)	(0.068)	(0.083)	(0.076)	(0.949)
Debt rule		30.002**				31.082***		
		(13.541)				(2.730)		
BB rule			34.834**				36.088***	
			(15.130)				(3.013)	
Revenue rule				220.468				228.409*
				(143.506)				(120.613)
F first stage	438	213	258	78	438	213	258	78.1
P value first stage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Robust Score Chi2	6.64	8.76	4.12	4.64	62.87	77.25	85.58	90.38
Robust Score P value	0.009	0.003	0.04	0.03	0.000	0.000	0.000	0.000
R square first stage	0.86	0.83	0.86	0.71	0.86	0.83	0.85	0.72
Observations	323	323	323	323	323	323	323	323

Countries	20	20	20	20	20	20	20	20

Note: Dependent variable is Fiscal space. Abbreviations: BB: Balanced Budget Rule, Cyclical Adj. Bal: Cyclically Adjusted Balance, FRs: Fiscal Rules, Gov. Effectiveness: Government Effectiveness. Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules. Robust standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent, and * denotes significance at 10 percent.

Table A5.9: First Stage Estimation Neighbouring as the Instrument

Variables	(1) Rules	(2) Debt Rule	(3) BB Rule	(4) Revenue Rule	(5) FRs Index
PProbit	**0.870*** **	**0.841*** **	**0.725*** **	**0.114***	**0.428*** **
	(0.068)	**(0.073)**	**(0.062)**	**(0.062)**	**(0.038)**
Debt service	-0.001	0.002	-0.006*	-0.005	0.000
	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)
GDP per capita	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade openness	0.000	-0.000	0.002	0.001	-0.000
	(0.003)	(0.003)	(0.002)	(0.003)	(0.001)
Cyclically Adj. Bal.	0.002	0.000	0.003	-0.012***	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
Election	-0.007	-0.045	-0.007	-0.039	-0.005
	(0.045)	(0.054)	(0.045)	(0.058)	(0.022)
Grants	0.005*	0.010***	0.007***	0.014***	0.000
	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)
Government Effectiveness	0.133**	0.170***	0.111**	0.110**	0.051*
	(0.057)	(0.059)	(0.045)	(0.044)	(0.027)
FRs x Gov. Effectiveness	-0.628***	-0.594***	-1.080***	-0.451***	-0.150***
	(0.073)	(0.082)	(0.077)	(0.093)	(0.041)
Corruption	0.083	0.067	0.050	-0.097**	0.057**
	(0.055)	(0.059)	(0.044)	(0.044)	(0.025)
FRs x Corruption	-0.047	-0.044	0.438***	-0.130	-0.074*
	(0.086)	(0.093)	(0.083)	(0.094)	(0.043)
Polity IV	0.024***	0.019***	0.015***	0.031***	0.008***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.002)
Inflation	-0.001	-0.005**	-0.004**	-0.007***	0.000
	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)
Observations	323	323	323	323	323
R-squared	0.869	0.827	0.859	0.719	0.807
Countries	20	20	20	20	20

Note: Abbreviations: PProbit: is the neighbouring IV, BB: Balanced Budget Rule, FRs: Fiscal Rules, Cyclically Adj. Bal.: Cyclically Adjusted Balance, Gov.: Government. Each column presents results of the IV estimation of the first stage regression. Column one presents the neighbouring instrument when a country has a fiscal rule, column 2 – 5 presents results when the IV is used for each of the individual fiscal rule, while column five presents results when a fiscal rules index is used. Robust standard errors are in parentheses *** denotes significance at 1 percent, ** denotes significance at 5 percent and * denotes significance at 10 percent.

Table A5.10: Estimation Results of the Effect of Fiscal Rules on Fiscal Space after controlling for compliance

VARIABLES	(1) All rules	(2) Debt rule	(3) BBR	(4) Revenue rule
Fiscal rules	16.078***	9.313***	23.980***	39.686***
	(5.412)	(3.380)	(4.490)	(6.685)
Compliance (dummy)	-0.052			
	(2.568)			
Debt service (lagged)	-0.704***	-0.463***	-1.427***	-2.226***
	(0.197)	(0.165)	(0.419)	(0.587)
GDP per capita	-0.001	-0.001	-0.004	-0.004
	(0.003)	(0.002)	(0.006)	(0.016)
Trade openness	0.092	0.062	0.030	0.065
	(0.108)	(0.100)	(0.125)	(0.151)
Cyclically adjusted balance	0.232*	0.152	0.426***	1.135***
	(0.122)	(0.099)	(0.162)	(0.266)
Election dummy	-1.003	-0.896	0.305	-0.113
	(1.462)	(1.317)	(1.512)	(1.848)
Grants	-0.489***	-0.382***	-0.653***	-0.983***
	(0.157)	(0.137)	(0.170)	(0.257)
Gov. effectiveness	35.183***	13.824**	50.515***	20.085***
	(8.671)	(7.001)	(9.694)	(5.455)
Rules x Gov. effectiveness	-21.967**	-4.574	-32.775***	
	(9.610)	(6.118)	(9.698)	
Corruption	-22.044**	-0.620	-41.056***	3.907
	(8.605)	(5.130)	(9.896)	(3.221)
Rules x corruption	19.366**	0.041	40.650***	
	(8.846)	(5.718)	(10.100)	
Polity 2	-0.497**	-0.415**	-0.593***	-1.112***
	(0.232)	(0.195)	(0.222)	(0.345)
Inflation	-0.406**	-0.462**	-0.198	-0.416**
	(0.177)	(0.193)	(0.160)	(0.204)
Debt compliance (dummy)		4.774***		
		(0.882)		
Deficit compliance (dummy)			0.065	
			(1.364)	
Revenue compliance (dummy)				-1.328
				(1.576)
F first stage	45.491	193.000	163.620	78.403
P value first stage	0.000	0.000	0.000	0.000
Score Chi2 value	0.001	0.000	0.000	0.000
Robust Score P value	0.015	0.036	0.007	0.027
Observations	221	207	199	132
Countries	20	20	20	20

Note: Each column presents a separate 2SLS regression with fiscal space as the dependent variable. We instrument using probability of neighbours having rules and checks and balances. Robust standard errors are in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent.

Appendix A5.4: Instrumental Variables and Two Stage Least Squares

i. Omitted variable explanatory variables.

Judge et al. (1985) provides an omitted variable model given as,

$$E(y_i|x_i, w_i) = x_i'\beta + w_i'\gamma \qquad A5.1$$

Where w_i is an unobserved variable, thus, conditioning the variable on x_i but omitting w_i gives rise to:

$$E(y_i|x_i) = x_i'\beta + E(w_i'|x_i)\gamma \qquad A5.2$$

This is unequal to $x_i'\beta$ whenever $E(w_i'|x_i) \neq 0$, the case where omitted variable and regressors are not orthogonal and $\gamma \neq 0$ (when omitted explanatory variables are relevant) then the OLS estimator will be equal to $E(\hat{\beta}_n^{OLS} - \beta = \vartheta_\gamma$ where the magnitude and size depends on $\vartheta_\gamma = (X'X)'X'W$ and γ. Indeed, the estimated coefficients in β are affected by the omitted variable.

ii. Measurement error

The problem may arise when the variables specified in the regression model are not like in the observed measure. We use a simple bivariate approach to illustrate the measurement error problem.

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i \qquad A5.3$$

In this case X_i is the true unobserved construct and instead x_i is observed thus $x_i = X_i + v_i$, where $E(\epsilon_i) = E(v_i) = 0$. From above the OLS estimator for β_1 is biased towards zero.

iii. Self-selection problem

The problem arises when individuals select themselves to belong in a given group e.g. treated or control group (Heckman, 1990).

iv. Simultaneous equation model

The application of a classical regression model will not be appropriate when the explanatory variables are simultaneously determined along the dependent variables. The simple supply and demand model is given by:

$$y_t^d = \left(x_t^d\right)'^{\beta^d} + \gamma^d p_t + \epsilon_t^d \qquad A5.4$$

$$y_t^s = (x_t^s)'^{\beta^s} + \gamma^s p_t + \epsilon_t^s \qquad A5.5$$

Where x_t^d and x_t^s are factors that affect behaviour of consumers and producers, respectively, p_t is the price. Because price is determined simultaneously with demand and supply the OLS regression will lead to spurious results.

v. Assumptions of Instrumental Variables

Theoretically, the instruments should be valid such that they only affect fiscal space through their effect on fiscal rules. Moreover, we need to restrict the fiscal rules effect on heterogeneity and make some functional form assumptions. We therefor make the following assumptions: the relevance assumption where the instrument has a causal effect on the fiscal rules; the exclusion restriction where the instruments affect the fiscal space through fiscal rules and the exchangeability assumption such that the instrument does not make common causes with fiscal space.

vi. The Instrumental Variable Method

The Instrumental Variable (IV) approach assumes that the asset of instrumental variables Z is present. The instruments should be uncorrelated with the error term ε thus $E(\varepsilon|Z) = 0$. To obtain an IV model, the classical linear regression model is augmented as follows:

$$y = X\beta + e \qquad A5.6$$

$$X = Z\pi + V \qquad A5.7$$

For the IV model the βs are estimated by the 2SLS and the Limited Information Maximum Likelihood estimators.

vii. Instrument validity

The IV estimators are sometimes sensitive to the choice of valid instruments; thus, determining the weakness of instruments is important despite the sample size. Stock et al. (2002) argue that first stage F-statistics must be larger than 10 for the 2SLS inference to be reliable.

viii. Choice of number of instruments

Theoretical evidence suggest that the number of instruments should not be too many. Moreover, expanding the quantity of instrumental variables brings about loss of degrees of freedom and the first stage regression suffers from overfitting. Sargan (1958) contends that when the initial couple of instruments are all picked at that point there is typically no improvement on the results as they increase beyond three or four as estimates are biased with many instruments. Donald and Newey (2001) build up a mean squared error criterion that is minimised to choose a set of instrumental variables.

ix. Weak instrument solution

Weak instruments cause considerable inference problems using IV and other models for estimation; several of these challenges include:

Identification of Potential Instruments

In our theoretical framework we have identified fiscal rules as an independent variable that influences fiscal space. Based on the fiscal policy literature we have identified the following variables as possible candidates for use as instrumental variables: number of neighbouring countries with fiscal rules, checks and balances, rule of law and the lag of fiscal rules index. The suitability of these variables as instruments shall be assessed by; verifying if the variables are correlated with fiscal rules, verifying that instruments are not correlated with fiscal space and by verifying that there is no correlation between the instruments and the error term.

x. Number of Neighbouring Countries

Policy reforms across countries can be linked through the spread of new fiscal policies, the need to mitigate emerging issues and new innovative economic ideas. This has led to a wave of policy diffusion sweeping across regions of the world. Indeed, evidence shows that a policy adopted in one nation soon attracts the attention of other countries. A number of authors suggest that there is evidence of strategic interdependence among countries in corporate and capital taxes, (Pitlik, 2007).

Table A5. 10 Description and Measurement of variables

Variable	Description	Source
Fiscal space	We improve on Aizenman and Jinjarak (2010). We define our fiscal space as the difference between the group mean of debt to tax revenue and country actual debt to tax revenue. In this case fiscal space is used as an indicator for resource mobilisation. We calculate the fiscal space as follows: $FS_{it} = \begin{cases} Postive, & if\ dd_{gmean} - d_{it} \geq 0 \\ Negative, & if\ dd_{gmean} - d_{it} < 0 \end{cases}$ We therefore expect a priori that fiscal space reacts positively with macroeconomic or institutional variables and negatively with political variables.	IMF/WEO, UN-WIDER & authors calculation.
Public debt	The ratio of total debt which includes domestic and foreign debt as a ratio of GDP. Debt levels put a constraint on the countries development as they endeavour to meet their debt obligations. Further, with increased debt, countries may find it difficult to comply with fiscal rules. We therefore expect public debt a priori to negatively affect fiscal space.	IMF/WEO & WDI
Debt service	The total sum of principal and interest payments on public debt as a ratio of total exports. Debt service shows a country's ability and burden in debt repayments. It also shows how a country's resources are constraint through repayment of debt obligations. We expect a priori that debt service will negatively affect fiscal space.	WDI
GDP per capita	Real GDP per capita in per person is a ratio of real GDP (base year of 2011) to Population. Countries that have improved GDP and the income level will find it easy to meet their debt obligations and generate more resources. We expect a priori that GDP per capita will enhance fiscal space.	IMF & WEO
Real GDP	Total GDP adjusted for inflation	IMF & WEO
Tax revenue	The sum of total tax revenue as a ratio of GDP	UN-WIDER, (WoRLD)
Grants	They are measured as a ratio of GDP. Governments benefit from receipt of foreign grants as they form part of the National budget. It is expected that grants will not act as insurance but help fuel economic development. We therefore expect a priori grants to enhance fiscal space.	WDI
Trade openness	Total sum of exports and imports of goods and services measured as a share of GDP.	WDI
Inflation	Average Consumer Price Change	IMF & WEO
Real interest rates	Is an index of the government borrowing interest rate adjusted for inflation as measured by the GDP deflator.	WB & IMF
Fiscal rules	A dummy where 1 for any fiscal rule in a given year and 0 otherwise	IMF FR's database
Debt rules	A dummy where 1 for a debt rule in a given year and 0 otherwise	IMF FR's database
BB rules	A dummy where 1 for a BB rule in a given year and 0 otherwise	IMF FR's database
Revenue rules	A dummy where 1 for a Revenue rule in a given year and 0 otherwise	IMF FR's database
DR + BBR	Total sum of the DR & BBR dummies	IMF FR's database
DR + RR	Total sum of the DR & RR dummies	IMF FR's database
BBR + RR	Total sum of BBR & RR dummies	IMF FR's database
DR + BBR + RR	Total sum of DR & BBR & RR dummies	IMF FR's database
Checks & Balances	Index between 0 and 6. It is a measure of political constraint. It measures the institutional constraint faced by authorities with a country. Higher values show higher constraint and increased accountability.	DPI

Democracy	Index between 0 and 10. Is conceived of 3 independent elements: presence of institutions and procedures for expressions, existence of institutionalised constraints on exercise of power and guarantee for civil liberties to all citizens. Higher values indicate strong democracy.	Polity IV Database
Polity IV	Is Index derived by subtracting Autocracy from Democracy and ranges from +10 to -10. With +10 indicating strong democracy and -10 strong autocracy.	Polity IV Database
Prob. FR's adoption	Is an index ranging between 0 and 1. It is obtained through the probit model, by running a fiscal rules dummy as dependent variables against other covariates and number of neighbours.	Authors calculation
Election dummy	Is a dummy where 1 for legislative election in a given year and 0 otherwise. We consider general elections in which the president or prime minister is elected.	NELDA
Government efficiency[1]	Index ranges between -2.5 and 2.5. Reflects perceptions of the quality of public service, quality of the civil service and the degree of independence from political pressures, the quality of policy formulation and implementation and the credibility of governments commitment to such policies. Higher values indicate stronger governance and lower values indicate weaker quality services.	WB/WGI
Control of Corruption[1]	Index ranges between -2.5 and 2.5. It captures perception of the extent in which public power is exercised for private gain including petty and grand forms of corruption as well as *'capture'* of the state by elites and private interests. Higher values indicate low corruption.	WB/WGI
Regulatory quality[1]	Index ranges between -2.5 and 2.5. Reflects the ability of government to formulate and implement sound policies and regulations that permit and promote private sector development. Higher values indicate strong governance while low values show weak governance.	WB/WGI
Rule of Law[1]	Index ranges between -2.5 and 2.5. Reflects the perception to which agents have confidence in and abide by rules and have high quality of contract enforcement, property rights. The police abide by the laws and low levels of crime. Higher values indicate strong compliance with rule of law.	WB/WGI
Political violence[1]	Index ranges between -2.5 and 2.5. Measures perceptions of likelihood of political instability and/or politically motivated violence including terrorism. Higher values indicate low or no violence while low values indicate political violence.	WB/WGI
Neighbours	Number of country neighbours with fiscal rules in place in a given years. Its expected a priori that a country with neighbours having rules will positively be influenced to adopt fiscal rules.	Authors calculations
Fiscal Rules Index (FRI)	Index between 0 and 1 of the fiscal rule characteristics. We construct the FRI's using the characteristics outlined in the FR's database.	IMF database & authors construction

Note: IMF – International Monetary Fund, WB – World Bank, WGI – World Governance Indicators, WEO – World Economic Outlook, WDI - World Development Indicators, NELDA – National Elections Across Democracies and Autocracy, DPI – Database of Political Institutions, FR – Fiscal Rules, DR – Debt Rules, RR – Revenue Rule, BBR – Balanced Budget Rule, WoRLD – World Revenue Longitudinal Data. [1]We use linear interpolation to add years 1997,1999 and 2001 which are missing from the data.

Chapter Six

Fiscal policy and public debt sustainability: Is public debt sustainable in Sub-Sahara Africa?

6.0 Introduction

Since the 1990's, the nature of fiscal policy across countries has fundamentally shifted away from balanced budgets and resulted in numerous debt crisis and debt reliefs. A surge in public debt is a serious issue among countries. Concerns about the sustainability of increasing government debt have put various developed and developing countries in crisis and required multilateral institutions to initiate bailouts. At the same time, increasing debt has raised the cost of financing of troubled countries in need of financial support. Debt sustainability put Greece into a serious financial crisis between 2010 and 2011, and the International Monetary Fund (IMF) and other European countries had to bail them out. The widespread build-up in debt has broadly put in question the credibility of governments to manage their accumulated public debt. This is particularly true for developing countries as they endeavour to meet their financing needs. In this chapter, we empirically analyse debt and fiscal policy sustainability.

The chapter seeks to improve on the understanding of debt and fiscal sustainability. In particular, we aim to address the following questions:

Has debt been sustainable in Sub-Sahara Africa (SSA)?

How do governments in SSA respond to a rise in public debt?

To what extend can fiscal adjustments be deferred without compromising sustainability of public debt?

What is the effect of fiscal rules on debt and fiscal sustainability in different regime shifts? and

Do fiscal rules mediate the effect of the primary balance on public debt?

Developing countries, and in particular SSA countries, have experienced numerous debt distress episodes. Of the 39 countries that benefited from the Highly Indebted Poor Countries (HIPC) initiative and the Multilateral Development Relief (MDR), 36 came from SSA. In

addition, SSA countries are susceptible to negative shocks (see *Figure A6.1* in the Appendices)[47].

Similarly, fiscal policy in SSA countries tends to be procyclical (Thornton (2008); Frankel and Schreger (2013); Combes et al. (2017)) and in return limits fiscal authorities' stabilization and consolidation efforts[48]. Therefore, the study of fiscal and debt sustainability is important as it concerns both current and future expected fiscal policies.

The theoretical framework on debt sustainability shows that when budget deficits follow a stationary process, then this is a sign of fiscal sustainability (see Trehan and Walsh (1988); Trehan and Walsh (1991); Buiter and Patel (1992); Kremers (1988); Caporale (1995); Makrydakis (1999), Neaime (2015) and Afonso and Jalles (2016)). Similarly, a cointegrated relationship between government spending and revenue over the long-run signals debt sustainability. In this regard, government spending is within bound, thus government considers revenue being generated in its spending undertakings (Haug (1991); Ahmed and Rogers (1995); Payne (1997); Papadopoulos and Sidiropoulos (1999); Kia (2008)). The theoretical framework on the role of government in fiscal management and debt stabilization is fairly clear. Bohn (1998) argues that a positive relationship between the primary balance and lagged public debt enhances fiscal sustainability. In fact, fiscal policy follows a debt stabilizing rule when the primary balance responds positively and more than the real interest rates (see Bohn (1998); Daniel and Shiamptanis (2013))[49].

With the application of non-linear fiscal analysis, the literature has turned towards *regime switching* specifications. The argument among the authors is that regime switching has a better fitting policy behaviour and can provide evidence of sustainable and unsustainable regimes (see Favero and Monacelli (2005); Davig et al. (2006); Bianchi (2012); Ko and Morita (2015); Burger et al. (2016); Aldama and Creel (2018); Irungu et al. (2019)). The shifts between regimes in a country can be caused by several factors including financial crisis, political

[47] *Figure A6.1* shows before and after the global financial crisis of 2007. It is evident that the negative shock of the financial crisis affected the selected SSA countries. While before the global financial crisis several countries had fiscal surplus (e.g. Equatorial Guinea, Botswana) after the financial crisis the fiscal deficits widened for all countries except for Gabon.

[48] Both Frankel and Schreger (2013) and Combes *et al.* (2017) argue that institutions can mitigate procyclical fiscal policy in a country. The role of fiscal rules as an institution is emphasised by Combes *et al.* (2017) as a key deterrent to procyclical policy.

[49] According to Bohn (1998), a positive relationship between primary balance and debt provides reliable information of fiscal sustainability regardless of the difference between growth rate and interest rates.

instability, business cycles and other negative shocks to the economy that lead to a change in fiscal behaviour (Lenčuchová (2011); Camacho (2011)). Several of these factors are present in SSA countries and the use of a Markov switching model can help characterise fiscal policy by accounting for these factors.

Recent empirical evidence shows that fiscal sustainability has been examined using macroeconomic modelling techniques such as the dynamic stochastic general equilibrium models (DSGE). In this chapter we use a single equation estimation method against the simulations of DSGE. Although by construction, the interpretation in a DSGE model is straightforward, it imposes strict assumptions in order to obtain a unique equilibrium. At the same time calibration of these structural models may influence the end results (Ko & Morita, 2015).

This chapter focuses on countries with fiscal rules in SSA, based on their compliance rates. Secondly, we have a mix of resource based and non-resource based economies, as well as countries that were beneficiaries of HIPC. The SSA region has had the highest number of HIPC beneficiaries due to debt distress. We employ a suite of debt sustainability tests; to our knowledge this is the first study to carry out such an analysis under this framework. The stationarity of deficits and the cointegration of revenue and expenditure over time that are employed in this chapter provide reliable information on fiscal sustainability by considering the time series nature of fiscal variables and their behaviour over time[50]. In the context of SSA there has been limited studies on fiscal sustainability; Irungu *et al.* (2019) focuses on fiscal sustainability in Kenya using budget balance as the dependent variable in a Markov-switching framework. This chapter departs from Irungu *et al.* (2019) by employing a suite of methodologies, a broad set of countries and we include other variables (primary balance) that have valuable effect on fiscal policy. According to Bohn (1998), the primary balance offers a better view of government response to rising debt. Importantly, we include fiscal rules as a variable to help analyse fiscal policy response to regime shifts.

We focus on SSA and use Kenya, Botswana, Burkina Faso, Equatorial Guinea, Nigeria and Cape Verde as prototype examples for several reasons. Firstly, these countries have undergone

[50] The present value budget constraint provides valuable information on the stationarity of deficits and the cointegration of revenue and expenditure over time indicates debt sustainability (for details, see Trehan and Walsh (1991); Neaime (2015)).

fiscal management changes including adoption of fiscal rules for fiscal sustainability. Further, Burkina Faso is a beneficiary of HIPC and MDR thus acts as a rare inclusion to test for fiscal sustainability. Secondly, some of these countries (such as Kenya and Nigeria) have had numerous episodes of debt distress which have lasted for longer periods (Reinhart & Rogoff, 2009)[51]. Thirdly, these countries provide a wider regional representation of the application of fiscal rules in fiscal management and similarly the availability of a long data series for analysis[52,53]. Fourthly, following the analysis in chapter one, some countries had a higher overall compliance rate (Botswana 100 percent) compared to those with a lower compliance rate (Cape Verde 5 percent), while others had 0 percent compliance rate on some individual rules. As such, this chapter provides a unique avenue to test for debt sustainability and provide a comparison across these countries. Fifth, Nigeria is the largest economy in Africa and has significant footholds in several SSA countries, such that debt distress spillover could have a significant negative effect in the region. Similarly, Nigeria and Equatorial Guinea depend on oil revenue and provides an important case study for inclusion for resource-based economies.

Our contribution to the literature is three-fold. First is to establish the linkage between fiscal policy changes and fiscal rules in either sustainable or unsustainable regimes. As such, identify fiscal regime shifts and show the effectiveness of rules in each regime. To the best of our knowledge, this study is the first to employ a fiscal rule in a Markov switching process to test for fiscal sustainability. Second, using four types of methodologies—namely, Markov-switching, fiscal reaction function, cointegration tests and unit root tests—allows us to answer some of the important questions raised in the literature on the weaknesses of certain methodologies. In this chapter, we argue that subjecting a country's debt sustainability to a battery of techniques offers a wider assessment of the country's fiscal stance and an opportunity to initiate policy mitigation in specific areas that require interventions. Indeed, failure by one technique to detect or account for parameter shifts may be a form of misspecification that

[51] Kenya had 2 debt defaults between 1994-1998 and 2000-2001 with a total duration of 7 years, this was accompanied with 2 banking crises in 1985 and 1992-1994. At the same time Nigeria had 5 episodes of debt defaults between 1982-1992, 1986-1988, 1992, 2001 and 2004-2005 with a total cumulative duration of 18 years. There were also 2 banking crises in 1992 and 1995 respectively (Reinhart & Rogoff, 2009). Nigeria also had a currency crisis in 1983, 1989, 1997 and 2016 (Laeven & Valencia, 2018).

[52] Other countries had banking crisis as follows: Burkina Faso 1990-1994, Equatorial Guinea 1983, Cape Verde 1993, while Botswana had a currency crisis in 1984 (Laeven & Valencia, 2018).

[53] According to Laeven and Valencia (2018) the debt crisis increased public debt as percent of GDP as follows: Kenya 11 percent, Burkina Faso 8.9 percent, Nigeria 63.3 percent (1991-1995) & 8.4 percent (2009-2012) and Cape Verde 18.2 percent.

affects policy prescriptions and subjects a country to poor forecasting performance. Using the four methodologies enhances our ability to ascertain the underlying impact of fiscal rules.

Several features of this chapter distinguish it from much of the larger literature on debt and fiscal sustainability. Firstly, one of the main features is understanding the sustainability of debt and fiscal policy. In recent years, focus on fiscal policy has increased, with a growing recognition that unsustainable fiscal policy and a debt surge have negative spillover effects on the overall economy. In this regard, policy makers and scholars have endeavoured to foresee future financial crises prior to their happening given the potential harm to the world economy. In fact, great efforts are used to evaluate the robustness of the public sector and to predict the sustainability of debt. Developing economies are exposed to both domestic and external imbalances. The case of developing countries is particularly interesting, as a majority have gone through debt distress episodes including benefiting from debt relief initiatives[54].

Secondly, Trehan and Walsh (1991) argue that if budget deficits are stationary at level, that is, they are integrated of order zero $I(0)$, this is an adequate condition for debt sustainability. As such, the budget deficit will converge to zero over time and deficits shall grow within bounds. Therefore, as government deficits converges to zero, the intertemporal solvency condition is satisfied. Further, according to Hakkio and Rush (1991), for the sustainability condition to be met, revenue and government expenditure must have a long-run relationship. They argue that, without a long-run relation between spending and revenue, a country will have unsustainable debt. Following the approach of Trehan and Walsh (1988) and Trehan and Walsh (1991), this chapter finds presence of debt sustainability in SSA under stationarity and cointegration frameworks.

Third, we follow Bohn (1998) and perform a baseline specification of the fiscal reaction function to test fiscal sustainability in SSA. Our findings are heterogeneous among different specifications. Kenya and Nigeria display no feedback effect of public debt on primary balance, that is, with a rise in public debt, authorities do not necessarily increase primary balances. As such, there is evidence to suggest no fiscal sustainability in the two countries. On the other

[54] The HIPC initiative was launched in 1996 by the IMF and the World Bank to reduce bilateral debt and ensure poor countries have sustainable debt levels. The Multilateral Debt Relief (MDR) initiative was launched in 2005 to supplement the HIPC by IMF, WB, Africa Development Bank (AfDB) and the Inter-American Development Bank (IaDB) to reduce multilateral debt and help countries meet the Millennium Development Gaols (MDGs).

hand, Botswana, Burkina Faso, Equatorial Guinea and Cape Verde show that the primary balance responds positively to public debt. Interestingly, Burkina Faso and Nigeria show evidence of fiscal fatigue in their fiscal policy and present a worrying scenario of debt build up in the future[55].

Fourth, having found mixed results on sustainability of fiscal policy in SSA and no clear period of sustainability, we employ a Markov-switching approach. Our selected sample shows the presence of two regimes (sustainable and unsustainable), although the results are mixed across countries. Kenya and Nigeria have fiscal sustainability in regime 2, while the rest have sustainability in regime 1. Botswana and Burkina Faso have the shortest sustainable regime duration of 1 year, while Equatorial Guinea is persistent with a duration of 28.6 years. Burkina Faso also exhibits the same duration of 1 year in both the sustainable and unsustainable regimes.

Fifth, when we employ fiscal rules in our Markov-switching specification, our results improve further. Botswana and Cape Verde have both regimes 1 and 2 as sustainable, while Kenya, Nigeria and Equatorial Guinea have regime 2 as sustainable. Burkina Faso and Nigeria have regimes 2 and 1 as weakly sustainable, respectively. Our results also show that fiscal rules enhance primary balance's ability to respond to a rise in public debt.

The remainder of the chapter is structured as follows: Section 6.1 motivates the research by presenting fiscal policy developments in SSA. Sections 6.2 and 6.3 present a literature review and the theoretical framework. Section 6.4 presents the empirical strategy, while 6.5 presents the dataset. Section 6.6 provides the empirical results for the PVC tests, Bohn's sustainability tests and Markov-switching. The conclusion and policy implications of the study are provided in Section 6.7.

[55] Fiscal fatigue refers to a situation where the ability of a country's primary balance to increase with a raising public debt decline. According to Echevarria Icaza (2018), this happens when countries facing higher debt levels stop adjusting their primary balance once debt reaches a high level rendering long-term fiscal consolidation ineffective. Accordingly, Ghosh *et al.* (2013) argues that the process of raising the primary balance to meet higher interest rates cannot be indefinite. Therefore, in practice it becomes increasingly difficult to continuously cut government spending or increase tax rates. With a rising debt level and ineffective adjustment of the primary, balance fiscal fatigue will set in.

6.1 Fiscal and macroeconomic developments in Sub-Sahara Africa: 1980-2016

This section briefly highlights some key fiscal and macroeconomic developments in Kenya, Botswana, Burkina Faso, Equatorial Guinea, Nigeria and Cape Verde during this period. We focus on the dynamics of the following variables: primary balance, public debt, total revenue and government spending. *Figures 6.1-6.4* show the time profiles of these fiscal developments, by country, over the period 1980-2016.

Broadly speaking, high interest rates, growing public expenditure, elevated corruption and an overall worsening of economic growth over this period has contributed to a deterioration of the fiscal stance. For all the countries in the sample, there has been a large decrease in their primary balances, with the highest being Equatorial Guinea, with a primary balance decrease of over 500 percent of GDP in 1992 and 1994. Except for Burkina Faso and Cape Verde, all other countries have had a negative primary balance of over 50 percent of GDP. The primary balance is one of the key variables in analysing debt sustainability. A continued decrease in the primary balance will increase the likelihood of debt becoming unsustainable in several ways.

A continuous decrease in the primary balance due to lower tax revenues will render debt to be unsustainable. A reduction in the primary balance increases real interest rates because with increase in deficits, government's appetite for borrowing increases, which pushes up interest rates. A decrease in the primary balance (i.e. an increased primary deficit) increases the build-up in debt, negatively affects the growth of real GDP and constrains fiscal space. From 2000-2016, countries have improved their primary balance as it is oscillating between 16 and -20 percent of GDP. Burkina Faso stands out as an exception with a surplus of 16 percent of GDP in 2006. The case of Kenya with a negative primary balance of over 80 percent of GDP in 1985 signifies the effect of the banking crisis experienced at the time, with several banks closing due to liquidity shortages and the level of interest rates rising significantly. The primary balances of Kenya, Burkina Faso, Equatorial Guinea and Nigeria appear to oscillate between -5 and 15 percent of GDP since 2000, pointing to a relatively sustainable and sound fiscal path (see *Figures 6.1*). Botswana and Cape Verde have a slightly lower primary balance hovering around -20 and -10 percent of GDP over the same period (see *Figure 6.1*).

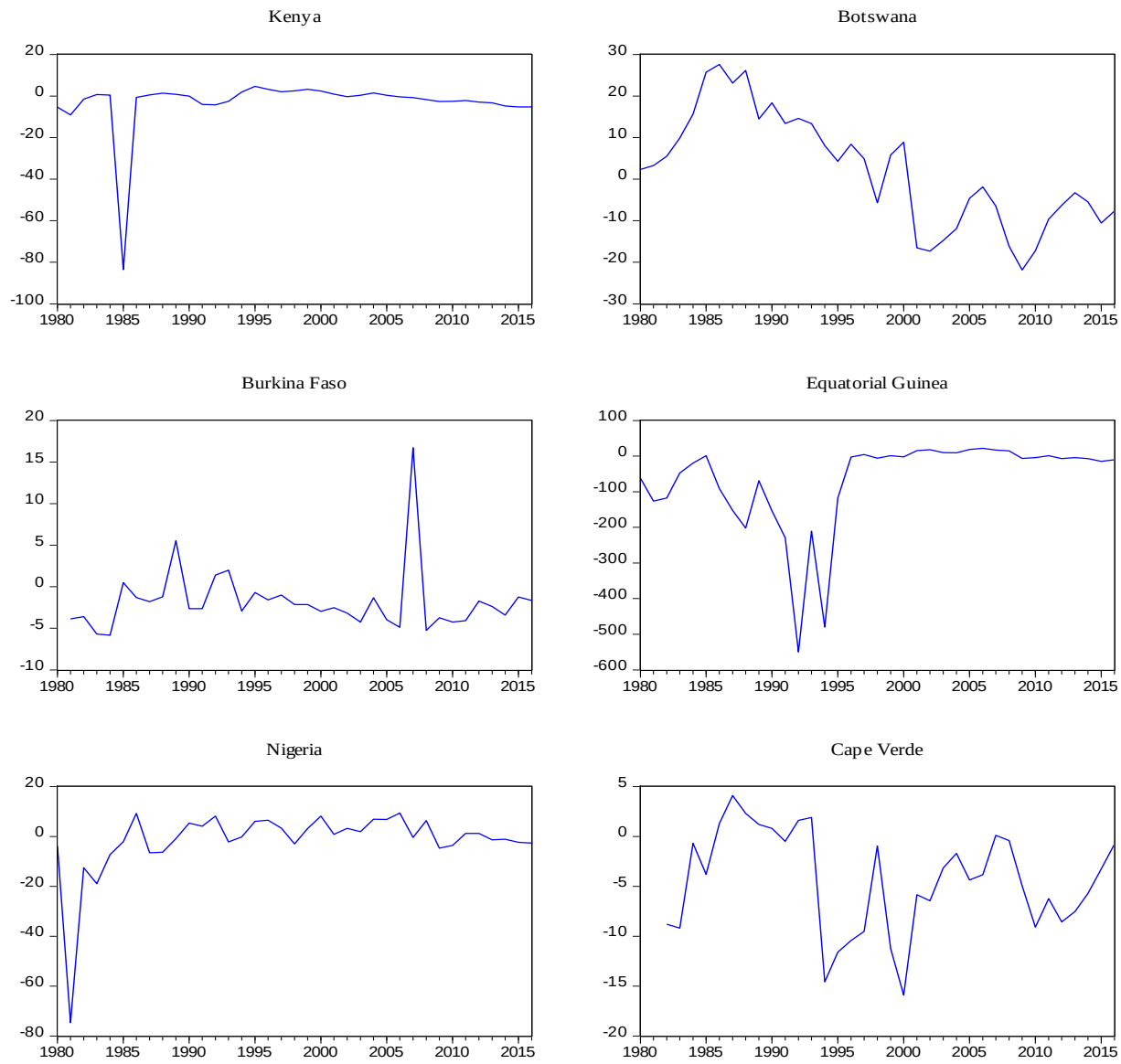


Figure 6. 1: Primary balance (% of GDP on the y - axis) in selected SSA countries

Source: IMF/WEO and Authors calculations

Total public debt has been increasing for all the selected SSA countries since 2005. While Botswana and Nigeria have had stable public debt around 25 percent of GDP between 2005 and 2016. Nigeria had a high public debt of 180 percent of GDP in 1993 but declined thanks to debt relief. In the case of Botswana, the peak of debt was only 40 percent of GDP in 1985 (see *Figure 6.2*). Burkina Faso's public debt declined significantly between 1995 and 2007, which was largely due to the HIPC and MDR initiatives[56]. The country received a total of USD

[56] In 2000 Burkina Faso reached HIPC decision point and the Multilateral lenders including the IMF, WB, AfDB, IDA and others had approved by then USD 398 million worth of debt relief equivalent to 50 percent of the

424 million between 1995 and 2012 in debt relief, which helped enhance the country's fiscal space. Public debt in Kenya has had a gradual reduction from 1992 to 2006, after which the debt levels have risen. The increase in public debt has been due to an elevated public investment drive and revenue shortfalls. The country has witnessed a faster debt surge since 2013 and it is expected to reach 60.7 percent of GDP, which has raised fiscal vulnerabilities and increased interest payments to nearly a fifth of total revenue (IMF 2018a). Equatorial Guinea's public debt has significantly reduced from over 300 percent of GDP in the 1980's to a low of 10 percent in 2007, which is attributed to enhanced a booming economy since the 1990's when oil exports began. During these years, buffers were built up, and public debt was dramatically reduced (IMF 2018b).

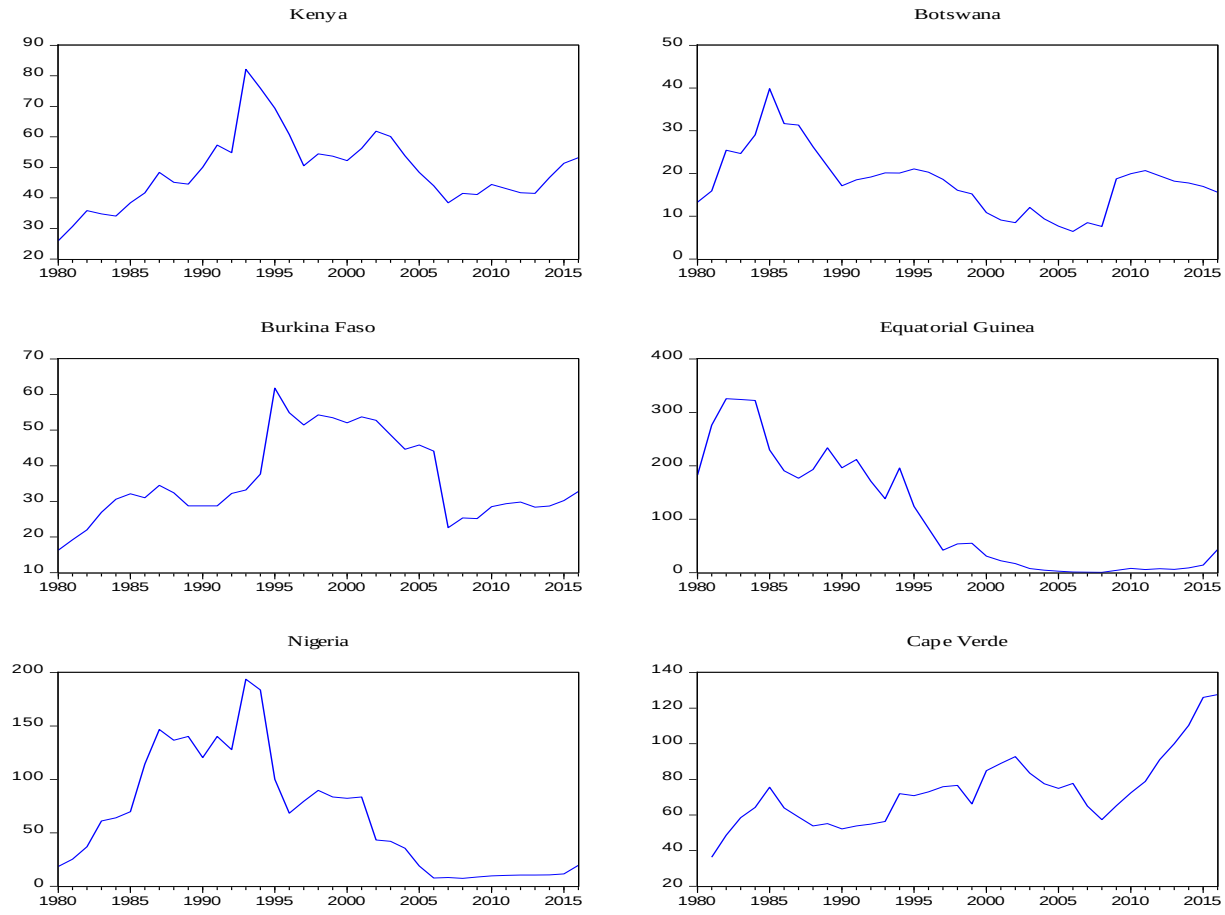


Figure 6. 2: Public debt (% of GDP on the y - axis) in selected SSA countries

Source: IMF/WEO and Authors Calculations

country's debt stock under the HIPC initiative. Subsequently, in 2002, Burkina Faso reached the completion point and in total the country received USD 424 million (AfDB and IMF HIPC documents 2002).

Total revenue as a share of GDP in our selected SSA countries has been on the decline between 1980 and 2016. In Kenya, total revenue has been steady at around 17 percent of GDP, although the country experienced a high of 26 percent of GDP in 1981 and a low of 13 percent in 1992. In Botswana, total revenue has declined significantly from a high of 60 percent of GDP in 1986 to 32 percent in 2015. However, Botswana stands out as a stable and sustainable economy in terms of total revenue generation. Among our selected group of countries, Botswana has consistently had the highest total revenue to GDP (see *Figure 6.3*).

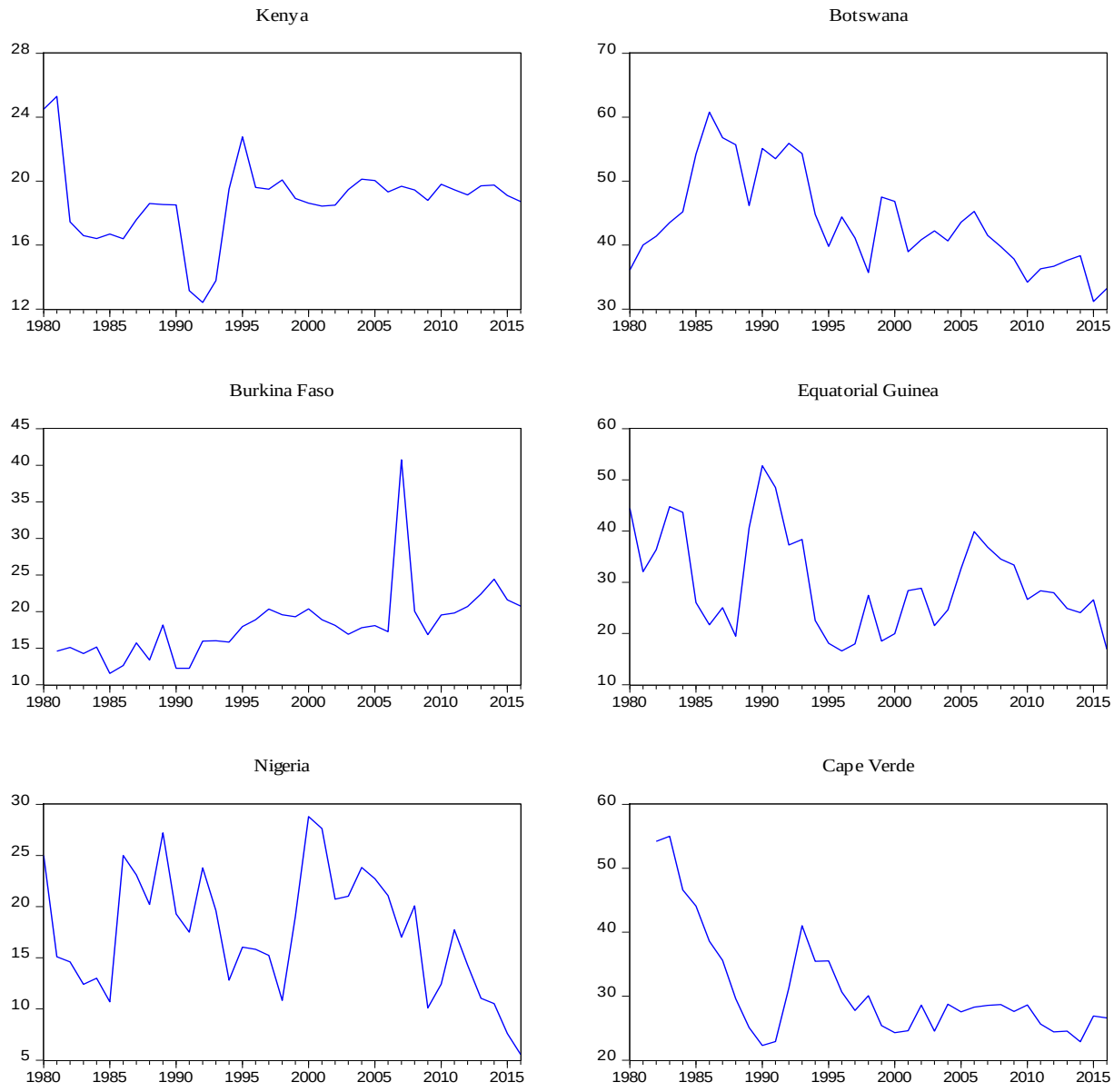


Figure 6. 3: Total revenue (% of GDP on the y - axis) in selected SSA countries

Source: IMF/WEO and Authors calculations

One of the main drivers of higher revenues is the numerous tax reforms undertaken and improvements in the resource sector. Burkina Faso has had a steady increase in total revenue between 1980 and 2016, which is due to several reforms including the Value Added Tax (VAT) in 1993[57]. Moreover, the increase is also attributed to the debt relief the country enjoyed between 1995 and 2012 that enhanced the fiscal space and growth. Total revenue for Nigeria and Equatorial Guinea has been erratic, which could be attributed to oil price shocks as these countries rely heavily on oil revenue. Cape Verde's total revenue has been on the decline since 1980 to 2016 with the exception of 1994.

There has been a steady rise in government for half the countries studied and a decline for the other half (see *Figure 6.4*). Government spending in Kenya has generally been on a gentle increase since the early 1980s and for over 80 percent of the period government spending has surpassed revenue. In Botswana, government spending has remained above 30 percent of GDP, but for a considerable period of time, expenditure has been below total revenue. Burkina Faso's, government spending has been on the rise from 1993 with a high of 27 percent of GDP in 2014.

[57] The VAT law introduced in 1990's led to increase in tax revenues from a low of 18.2 percent in 1994 to 41.8 percent in 2015 (for details see Houssa et al. (2017)).

Figure 6. 4: Total expenditure (% of GDP on the y - axis) for selected SSA countries

Source: IMF/WEO and Authors Calculations

Equatorial Guinea is unique because much of its high expenditure of over 500 percent of GDP was spending on oil sector investment before exports began. However, after oil exports started, the government spending reduced significantly from 141 percent in 1995 to 22.9 percent in 1996. This trend has continued up to 2016 with government spending below 50 percent of GDP. The oil discovery accompanied with IMF reform requirements led to enhanced fiscal discipline. In Nigeria government spending has remained below 25 percent of GDP. The expenditures have been stable and at a decreasing trend with a low of 9.5 percent of GDP in 2016. Cape Verde's government spending has been on the decline from 1993 and this is attributed to improve fiscal discipline.

From the literature, and explained in section 6.3, the difference between the real interest rate (r)and the growth rate of the economy (g) are underlying influences on the numerator and denominator of the debt/GDP ratio. When $r > g$, public debt tends to rise faster than GDP and requires higher primary budget surpluses to stabilise the debt. *Table 6.1* shows increases in real interest rates over time and economic growth have played catch up in the period 2010-2016 for the SSA countries. Although there is considerable variation among countries, we can see that Botwana and Burkina Faso have tended to have the lowest differential between real interest rates and growth. And over time, the average real interest rate growth differentials rose after 2011. Containing the primary deficit will tend to keep the real interest down and facilitate debt containment.

Table 6. 1 GDP growth and real interest rates in percent 2010-2016

Year	2010	2011	2012	2013	2014	2015	2016
Real interest rates (*r*)							
Kenya	12.0	3.8	9.5	11.5	7.8	5.5	7.8
Nigeria	1.1	5.7	6.2	11.2	11.4	13.6	6.7
Botswana	2.3	-2.6	10.8	7.7	-2.6	6.1	-4.3
Burkina Faso	-1.6	-1.4	-0.7	7.6	6.0	8.5	6.5
Cape Verde	10.5	6.9	9.3	9.0	11.1	8.5	9.9
Equatorial Guinea	5.8	5.8	10.3	5.9	4.5	0.8	1.1
Average real interest rates	5.0	3.0	7.6	8.8	6.4	7.2	4.6
Real GDP growth rates (*g*)							
Kenya	8.4	6.1	4.6	5.9	5.4	5.7	5.9
Nigeria	11.3	4.9	4.3	5.4	6.3	2.7	-1.6
Botswana	8.6	6.0	4.5	11.3	4.1	-1.7	4.3
Burkina Faso	8.4	6.6	6.5	5.8	4.3	3.9	5.9
Cape Verde	1.5	4.0	1.1	0.8	0.6	1.0	4.7
Equatorial Guinea	-8.9	6.5	8.3	-4.1	0.4	-9.0	-8.6
Average real GDP growth	4.9	5.7	4.9	4.2	3.5	2.6	1.8
[*r* – *g*]							
Kenya	3.6	-2.3	4.9	5.7	2.5	-0.2	1.9
Nigeria	-10.2	0.8	1.9	5.8	5.0	10.9	8.3
Botswana	-6.2	-8.6	6.3	-3.6	-6.7	7.8	-8.6
Burkina Faso	-10.0	-8.0	-7.2	1.8	1.7	4.6	0.6
Cape Verde	9.0	2.9	8.2	8.2	10.5	7.5	5.2
Equatorial Guinea	14.7	-0.7	2.0	10.0	4.1	9.9	9.7
Average [*r* - *g*]	0.1	-2.7	3.4	4.6	2.9	4.6	2.8

Source: IMF - International Monetary Fund, WEO - World Economic Outlook WDI – World Development Indicators

Countries like Kenya, Nigeria, and Cape Verde have high (*r-g*) differentials, and this compounds debt sustainability challenges over the long-run. Policy makers will need to devise mechanisms to accelerate growth and enhance downward real interest rate pressure and open more fiscal space. Fiscal and debt containment policies should ensure that the (*r*-g) differentials are low. This is a great challenge for government policies, for which there is no simple solution.

6.2 Literature Review

The theoretical underpinnings of debt sustainability are addressed by various authors. In general, the primary test of debt sustainability is by evaluating the probability that governments fail to comply with the intertemporal budget constraint by testing whether fiscal policy data meets the time series properties to support the theory of expected primary balance being equal to zero (for debt accumulation Eqns. see 6.2 – 6.7).

Another strand of literature tests debt sustainability following Bohn (1998) by checking the reaction of primary balance to a rise in public debt. In this case, sustainable fiscal policy is achieved when primary balance responds positively to a rise in public debt indicating debt sustainability. A number of studies by Hamilton (1989) have tested fiscal sustainability by characterising different fiscal regime shifts for which fiscal policy is either sustainable or unsustainable. These are the methodologies we follow in the present chapter.

There is abundant empirical literature with numerous approaches employed in testing fiscal sustainability and they include unit root tests and cointegration testing. For stationarity tests, when deficits are non-stationary then subsequently debt will rise and eventually lead to unsustainable fiscal policy, thus, violation of the present value budget constraint and NPG constraint. On the other hand, if the deficit is stationary, it indicates that deficits are mean reverting.

In the second case, the cointegration approach is employed to explore a long run relationship between revenue and expenditure. The presence of a long-run relationship between spending and revenue shows that the government considers the amount of revenues when undertaking expenditures. A cointegration means that there is a linear combination of revenue and expenditure that are stationary, or again the deficit is stationary. Thus, public debt will be sustainable.

Hamilton and Flavin (1986) investigates debt sustainability in the US using annual data from 1962 – 1984. The authors test the validity of the PVC and find that US debt was sustainable. Trehan and Walsh (1988); Trehan and Walsh (1991) investigates the stationarity of public debt and deficits in the US and finds that debt is sustainable. Kremers (1988) investigates the sustainability of the US public debt for the period between 1920-1985 and finds that public debt was sustainable. Several authors have evaluated debt sustainability applying the same framework to other countries. Using monthly data from 1964 - 1984 Smith and Zin (1991) investigated debt sustainability for Canada and find that debt was not sustainable. Following the same line for India, Buiter and Patel (1992) using annual data find debt to be unsustainable. Afonso and Jalles (2016) employs present budget constrain to investigate fiscal sustainability in OECD countries. Their findings show debt to be on unsustainable path in majority of the countries. In a similar framework, Neaime (2015) investigates present value constraint on selected European Union countries. The findings show that budget deficits for France, Greece, Ireland, Portugal and Spain are non-stationary thus he concludes that debt is unsustainable in those countries. Applying the same framework for selected Middle East and North Africa countries, Neaime and Gaysset (2017) finds external debt to be non-stationary and infers debt to be on unsustainable path.

Similarly, other studies utilised the cointegration approach to test the sustainability of debt. Haug (1991) investigates a long run relationship between revenue and spending in the US economy. The author finds no long run relationship and concludes that debt us not sustainable. Ahmed and Rogers (1995) investigates the existence of sustainable debt in the European union. They find that public debt is unsustainable. Neaime (2010) investigates the conduct of debt in selected Middle East countries and his findings are mixed across countries: Tunisia shows strong sustainable fiscal policy, Egypt shows a weak sustainability, Jordan and Turkey experience fiscal unsustainability. Mendoza and Ostry (2008) test the Bohn's sustainability among emerging countries and find debt to be sustainable in the selected group of countries.

It is instructive to note that the use of stationarity and cointegration tests to examine for PVC or Intertemporal Budget Constraint (IBC) has recently come under scrutiny. Bohn (2007) argues that the stationarity tests of budget deficits used by Hamilton and Flavin (1986), the cointegration between primary deficit and public debt by Trehan and Walsh (1991), and the cointegration test between revenue and expenditure by Quintos (1995) are being

mathematically sound but impose restrictions that invalidates their results. Bohn (2007) opines that despite variables not exhibiting cointegration attributes they can be integrated of arbitrarily higher order and still meet the IBC requirement of sustainability.

Bohn (1998) describes a fiscal reaction function (6.1) based on a cointegration between the primary balance and public debt, such that if a government follows this relationship, it will be implementing corrective measures on the primary balance in response to rising debt.

$$s_t = \gamma b_t + \mu_t \qquad 6.1$$

Where, s_t denotes primary surplus as a share of GDP, b_t public debt as a share of GDP and μ_t is the vector capturing all other effects on the primary surplus ratio. According to Bohn (2007), a strictly positive feedback effect, $\gamma > 0$, satisfies the No Ponzi Game (NPG) condition[58]. In the case of the strict sustainability condition of debt stabilisation policy rule, the feedback effect should be larger than the growth adjusted real average interest rate on public debt, such that 6.2 holds:

$$\gamma > (r - y)/(1 - y)^{59}\,. \qquad 6.2$$

Alternatively, fiscal rules may be polynomial functions of public debt and incorporate quadratic or cubic terms (Bohn, 1998). This representation is spurred by the possibility that the primary surplus may respond more to public debt or may become flatter at higher public level. According to Bohn (1998) a positive response of public debt to primary balance indicates that the government is on a sustainable path and satisfies the present value constraint[60].

Empirical evidence by Bohn (1998) and Bohn (2008) shows that governments act responsibly when faced with rising debt by raising the primary balance. Although this is the envisaged situation, several countries face difficulty in raising taxes or cutting government spending thus, the primary balance will be limited to respond to an increase in public debt. In the long-run, the increase in the primary balance will not catch up with debt related costs thus debt becomes

[58] The NPG condition states that the present value of debt tends to zero in the long run, indicating that government will meet its debt obligations.

[59] Bohn (2007) argues that the upper bound on the primary surplus, like the fiscal limit, requires that public debt be stationary. Recently, there has been a surge in upper bound research including: Bi (2012); Daniel and Shiamptanis (2013).

[60] Bohn (1998) posits that a positive coefficient of the relationship between public debt and primary balance offers reliable and sufficient information that public debt is sustainable. Therefore, a rise in public debt even in periods of negative shocks to an economy will be reversed by the primary balance.

explosive. Keynes (1923) posits that a government should run budget deficits in recessions, and surpluses accumulated in a boom can offset escalation of debt during fiscal expansion periods. Domar (1944) argues that constant government borrowing results in a rising public debt which can only be serviced through taxation. However, continued increases in taxes or introduction of new taxes leads to recessions and default. Burger *et al.* (2012) estimated the fiscal reaction function to test debt sustainability in South Africa. They employ a variety of techniques including, ordinary least square, Threshold Auto-regressive model, state space and vector error correction models. They find that fiscal policy was sustainable during the sample period and the South African government tightened fiscal policies during periods of negative shocks.

Ghosh *et al.* (2013) follows this approach to account for fiscal fatigue and estimate debt limits beyond which debt is unsustainable. Utilising the fiscal fatigue property (as explained below using Eqn. 6.9 and Eqn. 6.10), they estimate the debt limit and calculate the fiscal space. They find that most of the countries have higher fiscal space. Fournier and Fall (2017) following a similar approach to Ghosh *et al.* (2013) and find higher fiscal space in the US. Similarly, fiscal rules can be time varying, such that the assumption of constant policy rules does not hold in the face of multiple structural breaks or regime changes. On the other hand, (Afonso and Toffano (2013); Bianchi (2012); Favero and Monacelli (2005)) argue that regime switching fiscal rules have empirically proven that fiscal rules are well described by fiscal regimes.

Several definitions of fiscal fatigue have been advanced in literature where the relationship between public debt and the primary balance weakens over time. Ghosh *et al.* (2013) opines that fiscal fatigue arises when the primary balance does not respond positively to increasing public debt. To measure fiscal fatigue, they use a cubic lagged public debt variable and argue that a negative coefficient of lagged cubic debt indicates the presence of fiscal fatigue. Moreover, Ghosh et al. posits that at the initial stage, the primary balance responds positively to an increase in public debt, however, as debt increases the response of the primary balance weakens and eventually decreases with an increasing public debt. A similar approach is followed in Everaert and Jansen (2018) where they estimate a fiscal reaction function with a polynomial framework. Their findings show varied results for Denmark, Portugal and Japan, and exhibit the presence of fiscal fatigue among OECD countries. However, after controlling for cross-country heterogeneity they argue that fiscal fatigue is country specific as countries with high public debt like Japan influence the results.

Another strand of literature that follows a Markov switching approach in monetary and fiscal rules is based on Leeper's seminal paper (Leeper (1991) that sets the formal conditions for local equilibrium determinacy based on monetary and fiscal rules. According to Leeper, fiscal policy is passive or active[61]. Bi (2012) explores the Markov switching approach to derive an endogenous and stochastic fiscal debt limit. Therefore, the literature shows that fiscal sustainability is a sovereign default probability computed from the distribution of the fiscal debt limit rather than the generalised conditions on the regime switching fiscal rule. On the other hand, Canzoneri et al. (2001) investigates fiscal policy rules in a time varying framework. Their analysis shows that the primary surplus must react positively to public debt frequently and infinitely to meet the intertemporal budget constraint requirement.

Afonso and Jalles (2016) perform econometric tests on government spending, revenue, primary surplus and public debt of OECD countries and find that debt is unsustainable for all countries. While on the other hand, Chen (2016) finds that debt is sustainable in the US. Chen additionally, considers the nonlinearities in the connection between fiscal variables. Chen concludes that higher government spending decreases sustainability of US fiscal policy. Favero and Monacelli (2005) use the Markov switching dynamic model to investigate the stability of monetary and fiscal policy rules in the US. Their findings challenge the belief of a continuous, passive fiscal policy. They infer that Markov switching is a preferable fitting approach to test the conduct of policy behaviour over constant parameter specifications. Cassou et al. (2017) employ non-linear response of fiscal instruments to lagged debt and output gap that depend on boom or burst periods using the Markov switching Vector Autoregressive models (MSVAR) and find that good economic periods lead to sustainable regimes.

Ko and Morita (2015) investigate regime changes in Japan and employ the regime changing Structural Vector Autoregressive model on public debt. Their findings show the presence of three regimes in Japan spread between 1970 to 2011. They conclude that higher growth could lead Japan to sustainable fiscal policy. Similarly, employing a Ricardian regime could also enhance fiscal policy. Irungu *et al.* (2019) investigates the nature of fiscal policy regimes in Kenya by employing a Markov switching model and find that sustainable and unsustainable

[61] A monetary policy is active when it reacts aggressively to inflation and passive otherwise. On the other hand, fiscal policy is active when tax revenue does not increase with a rise in public debt (ENREF 94).

regimes were dominant, and the No-Ponzi game weakly holds in Kenya. Baharumshah *et al.* (2017) investigates fiscal sustainability in Malaysia using a Markov Switching intercept autoregressive heteroscedasticity error correction model (MSIAH-ECM) and find that fiscal policy has been sustainable in Malaysia and the government should cut deficits when it exceeds a specified level. Baharumshah *et al.* (2017) also find that public debt above 55 percent is negatively correlated with economic activity. Davig (2005) employs a Markov switching approach to debt sustainability and finds that expanded discounted debt is on a sustainable path. In the same line, Burger and Marinkov (2012) test a proposal for adoption of flexible fiscal rules in South Africa in a Markov-switching framework. They find that historically the government has pursued a sustainable fiscal policy, and fiscal rules under regime shifts will enhance the government's response during periods of recession. Fiscal sustainability in South Africa is also investigated by Burger *et al.* (2016) using a Markov switching model and finds that the primary balance does not respond to a rise in public debt 2010 as compared to earlier years. Their findings also show that low debt levels in periods prior to 2010 were accompanied with low capital investment; thus, no improvement in the country's balance sheet.

6.3 Theoretical framework

We use a Markov-switching model following Hamilton (1989). It is a nonlinear time series model that involves multiple equations that can be characterised into different regimes. The model's ability to switch between different regimes captures the complex dynamic patterns embedded in the data. The novelty of the model is in the switching mechanism as it is controlled by unobserved state variables that follow a first order Markov Chain. This model can be used to describe correlated data that possesses distinct dynamic patterns.

It is important to note that the Markov switching model performs better than other related models. The threshold model exhibits similar features to the Markov switching model but the latter is easy to implement and does not require a prior choice of thresholds. The emerging regimes in the Markov switching model are determined in a probabilistic way from the prevailing data. In relation to the random switching model of Quandt (1972), in a Markov switching model the data structure may be random, but the data shall be replaced when moving between regimes in the analytical framework. Markov switching also performs better relative to models of structural changes as it allows for frequent changes at random time points.

It is instructive to note that the Markov switching or regime switching model possesses important features compared to other structural models. First, the Markov switching model uses information on time series data to classify the economy into various states (e.g. sustainable and unsustainable state) without relying on exogeneous information that may not be relevant to the economy (Doğan & Bilgili, 2014). Second, the model is flexible, and allows for investigation of the long-run relationship of variables that are dynamic, linear and non-stationary. Third, the model works well even in presence of persistent extreme observations and non-linear variables. Fourth, the Markov switching model has the ability to consider the asymmetry of time series data, thus accounting for business cycle in time series data (for details see Doğan and Bilgili (2014); Anas et al. (2004); Kang (2010)).

In order to implement the Markov switching sustainability analysis, we briefly explain the theoretical framework of debt sustainability as noted in Bohn (1998) and Chalk and Hemming (2000). Equation 6.2 explains that current debt (B) is equal to debt last period plus interest, less the primary balance (pb) (a primary deficit would be negative).

$$B_t = (1+r)B_{t-1} - pb_t \qquad 6.2$$

Where B_t is debt in period t, r is the interest on government debt and pb_t is the primary balance. The equation explains the time path of public debt and may be expressed as a ratio to GDP as follows:

$$\frac{B_t}{GDP_t} = (1+r)\frac{B_{t-1}}{GDP_t}\frac{GDP_{t-1}}{GDP_{t-1}} - \frac{pb_t}{GDP_t} \qquad 6.3$$

After considering the growth rate of output, where $\frac{GDP_{t-1}}{GDP_t} = \frac{1}{1+g}$, our equations reduce to 6.4:

$$b_t = \left(\frac{1+r}{1+g}\right)b_{t-1} - pb_t \qquad 6.4$$

Where b_t is the debt to GDP ratio, g is the growth rate of GDP and pb_t is the primary balance as a ration to GDP. We can further normalise $\frac{1+r}{1+g} \approx 1 + r - g$ and obtain equation 6.5:

$$b_t = (1+r-g)b_{t-1} - pb_t \qquad 6.5$$

Simplifying equation 6.5 further with respect to change in debt we see that the change in debt depends on the real interest rate less growth differential (r-g) plus the primary deficit (or less the negative of the primary balance):

$$\Delta b_t = (r - g)b_{t-1} - pb_t \qquad 6.6$$

Similarly, we can also deduce from 6.5 that in order to stabilize debt at the current level, $b_t = b_{t-1}$ in 6.5 and therefore the primary balance is directly determined by the current debt to GDP level, given the level of the real interest less growth rate differential:

$$pb_t = (r - g)b_t \qquad 6.7$$

It becomes clear that when the growth rate is higher than the real interest rate, $r\text{-}g < 0$, it is easier to grow out of debt as economic growth inflates GDP faster than the interest rate inflates existing debt; the opposite is also true[62].

As noted earlier, we introduce fiscal rules to capture institutional effects in fiscal policy management that have changed over time. These institutional changes such as adoption of fiscal rules have led to improved fiscal policy management (Sacchi & Salotti, 2015).
Therefore, based on the above strengths, we fit the Hamilton (1989) model and estimate the following Markov-switching fiscal rule based on 6.6[63]:

$$pb_t = \beta_0(S_t) + \beta_1(S_t)b_{t-1} + X_t'\beta(S_t) + (S_t)\varepsilon_t \qquad 6.8$$

Where pb_t denotes the primary balance, b_{t-1} the lagged end of period public debt, S_t denotes the two-state Markov process, and X is a vector of control variables that include: the output gap, fiscal rules, real interest rates and expenditure gap. The coefficient β is subject to recurring and persistent switches between two regimes according to the hidden exogeneous two state Markov process S_t that consists of transition probabilities. The Markov switching model estimates the transitional probabilities and time-varying transition probability for a switch from one state to another (e.g. from i to j) where $i, j = 0, 1$. The states are assumed be constant and represented by the matrix $\begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix}$. Hamilton (2010); Davig (2005) and Aldama and Creel (2016) explain that the time varying probabilities identify the two policy regimes that are sustainable and unsustainable within an economy.

[62] See Aldama and Creel (2017) for a detailed theoretical proof of the sustainability framework and derivation of the No Ponzi Game and debt stabilisation framework.
[63] Appendix C6.1 provides in detail the Debt sustainability theoretical framework.

6.4 Empirical strategy

In this chapter we follow a four-step strategy for the empirical analysis. First, we undertake stationarity testing of budget deficits following (Trehan & Walsh, 1991). Second we undertake cointegration tests between government revenue and spending following (Hakkio & Rush, 1991)[64]. Third, we perform the Bohn (1998) sustainability test using the fiscal reaction functions. Fourth, we estimate a two-state Markov-switching to test the fiscal or debt sustainability in the country.

6.4.1 Bohn's Sustainability tests

Following Aldama and Creel (2018), the following fiscal reaction function is estimated:

$$pb_t = \alpha + \beta_1 b_{t-1} + \beta_i X_t' + u_t \qquad 6.9$$

Where X_t' denotes the covariates that include the output gap, expenditure gap, real interest rates and fiscal rules. We proceed by using first order autoregressive residuals. In this model we account for non-linearity by testing the quadratic and cubic terms as the primary balance reacts to lagged debt.

$$pb_t = \beta + \beta_{1_1} b_{t-1} + \beta_2 b_{t-1}^2 + \beta_i X_t' + u_t \qquad 6.10$$

$$pb_t = \beta + \beta_1 b_{t-1} + \beta_2 b_{t-1}^2 + \beta_3 b_{t-1}^3 + \beta_i X_t' + u_t \qquad 6.11$$

The polynomial specifications are included of quadratic and cubic terms to account for a rise or a fall of the primary balance when the level of debt increases. According to Eqn. 6.10 and Eqn. 6.10, a country experiences fiscal fatigue when $\beta_3 < 0$ or $\beta_2 < 0$ or $\beta_3 = 0$ in both the quadratic and cubic specifications of the fiscal reaction functions. This approach has been followed in Ghosh *et al.* (2013) and most recently by Everaert and Jansen (2018). In this chapter, we thus, refer to a country having fiscal fatigue when the primary balance fails to respond in a positive manner to an increase in debt. In this regard, a negative relationship of the coefficients of the squared (or cubic) lagged public debt indicates presence of fiscal fatigue.

[64] Appendix D6.1 and D6.2 provide detailed explanations of the theoretical framework for stationarity tests and cointegration tests.

6.4.2 Markov-Switching Sustainability tests

As stated earlier, we follow Hamilton (1989) to estimate a Markov-switching empirical model as follows:

$$pb_t = \beta_0(S_t) + \beta_1(S_t)b_{t-1} + \beta_2(S_t)X_t' + \varepsilon_t \qquad 6.12$$

Where the parameters shift between two regimes in a Markov two-state Markov process S_t. As noted earlier our control variables include output gap, fiscal rules, expenditure gap and real interest rates[65]. The error term is represented by ε_t, and $\varepsilon_t \sim i.i.d\ (0, \sigma_{fd}^2)$ as noted in (Aldama & Creel, 2017).

6.5 Dataset

We utilise historical data from various sources in order to build an annual time series database for the selected SSA countries on public debt, primary balance, real GDP, government spending, government revenue, real interest rates, budget deficits, fiscal rules and fiscal rules index. *Table A6.7* in the Appendices provides a detailed description of the data, the sources and transformations of the data used in this chapter. Following most studies on debt sustainability and fiscal policy, we use gross public debt and budget deficits. Using annual data, our study employs various techniques on fiscal sustainability and debt sustainability. Our selection of annual data is motivated due to characteristics of fiscal policy, which is set at annual frequency, and in most cases, fiscal policy or public finance data in developing countries are only available at annual frequency[66,67].

6.6 Empirical results

Table A6.1-A6.6 reports the stationarity test results using the ADF and PP stationarity tests ($H_0: \lambda_1 = \beta_2 = 0$). For Botswana, Burkina Faso, Nigeria and Cape Verde the ADF and PP

[65] We apply the use of fiscal rules dummy interchangeable e.g. the model without the fiscal rules and with fiscal rules.
[66] Appendix C6.1 provides detailed explanations and transformation of variables used in the study.
[67] Where data is missing for the variables of interest, we obtain from IMF Article IV as follows: Kenya – Real interest rates are used as interest payments from 1980-1984. Botswana, from 1980-1990, interest payments is provided in millions of SDR. We first convert to local currency and then as a ratio of GDP of which we use to calculate the primary balance. From 1991-1995, interest payments are provided as percentage of GDP while primary balance is provided for 1996-2000. Burkina Faso, from 1980-1986 the interest payments are provided in billions of local currency. We first convert to ratio of GDP and calculate the primary balance. For Equatorial Guinea, we obtain the primary balance data from 1980-1984. Nigeria, real interest rates are assumed for interest payments from 1980-1989. For Cape Verde, we assumed real interest rates as interest payments from 1982-1987 (IMF Article IV various issues).

tests point to stationarity of budget deficits (*Tables A6.2-A6.3* and *A6.5-A6.6*). For Kenya and Equatorial Guinea budget deficits, we fail to reject the null hypothesis thus conclude presence of a unit root in the series (*Table A6.1* and *A6.4*). After first differencing, the series becomes stationary suggesting our variables are *I(1)*. Further, we test the presence of stationarity in government spending and government revenue series and find that both exhibit a unit root at levels. After first differencing, the two series become stationary, and the null hypothesis is subsequently rejected, indicating that government expenditure and revenue are *I(1)*.

As argued earlier, the non-stationarity of the budget deficits is sufficient to infer that debt is unsustainable, which means that for Kenya and Equatorial Guinea, the budget deficit will continue to rise, and debt will be unsustainable in the long-run. As such, the intertemporal solvency condition will be violated. In the case of government expenditure and revenue, which are *I(1)*, one must establish the existence of a long-run relationship (see Hakkio and Rush (1991)).

Accordingly, we employ Johansen (1995) efficient maximisation likelihood to test the long-run cointegration among these variables, which would indicate a sustainable fiscal policy. Cointegration means that even if variables drift apart, they will converge in the long-run. *Tables 6.2-6.7* report the cointegration test results and show that there is cointegration between expenditure and revenue for our selected SSA countries, which indicates that fiscal policy (and public debt) is sustainable. Therefore, we infer that fiscal policy is sustainable in Kenya, Botswana, Burkina Faso, Equatorial Guinea, Nigeria and Cape Verde. It is important to note that our findings of non-stationary budget deficit tests for Kenya and Equatorial Guinea and the presence of a long run relationship between revenue and expenditure for all selected countries shows that results are sensitive to tests used. In particular, the unit root tests of budget deficit for Kenya and Equatorial Guinea are sensitive to use of the use of stationarity tests (ADF and PP). This may be related to the high public debt budget deficits experienced by these two countries in the 1990s and could have affected the mean reverting property of unit root tests.

Our argument above is in relation to the existing literature. The literature often examines whether the fiscal balance is statistically stationary around zero, as a test for fiscal sustainability. However, this is not the same as a *"stationary"* balance around a negative value (a deficit). In that event, there would have to be considerable evidence that the corresponding fiscal capital account was stationary around a corresponding surplus. Similarly, the strategy of revenues and expenditures being cointegrated would not guarantee fiscal stability unless they

are cointegrated with constant of zero. There is also some question regarding the time frame, as fiscal stability requires a balancing strategy over a short to medium term period.

Our baseline sustainability test for debt and fiscal policy under unit root and cointegration tests are similar to those in the literature. Neaime (2015) examines the sustainability of debt in selected Euro area countries and established that budget deficits were non-stationary and therefore their debts were unsustainability[68]. Kalyoncu (2005) investigates debt sustainability for South Korea, Mexico, Philippines, South Africa and Turkey under the intertemporal budget constraint. He finds that for South Korea and Turkey there exists a long-run relationship between revenue and expenditures; thus, the two countries' debts are sustainable. For Mexico, Philippines and South Africa, there is no long-run relationship thus the individual country's fiscal stance is unsustainable. Lusinyan and Thornton (2009) examines fiscal sustainability in South Africa by allowing for structural breaks and finds that revenue and expenditure are *I(1)* and cointegrated. However, the results support a weak deficit sustainability. Neaime (2015) finds varied cointegration results between government revenue and expenditure in the Euro area. They find that for Italy and Greece debt is unsustainable. For France, Spain, Portugal, Ireland and Germany they find debt to be sustainable. Trehan and Walsh (1991) find overall budget deficits for the US to be stationary and conclude that US debt is sustainable.

Table 6. 2 Cointegration test results for Kenya

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	16.4767	15.41	20.04	12.6715	14.07	18.63
$r \leq 1$	$r = 2$	3.8052	3.76	6.65	3.8052	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure; r denotes the number of co-integrating vectors. 1980-2016 data sample was used.

Table 6. 3 Cointegration test results for Nigeria

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	20.2555	15.41	20.04	14.7988	14.07	18.63
$r \leq 1$	$r = 2$	5.4567	3.76	6.65	5.4507	3.76	6.65

Source: Author's estimates

[68] They find that German debt was on a sustainable path.

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure.; *r* denotes the number of co-integrating vectors. 1980-2016 data sample was used.

Table 6. 4 Cointegration test results for Botswana

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	12.2202	15.41	20.04	7.8124	14.07	18.63
$r \leq 1$	$r = 2$	4.4078	3.76	6.65	4.4078	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure.; *r* denotes the number of co-integrating vectors. 1980-2016 data sample was used.

Table 6. 5 Cointegration test results for Equatorial Guinea

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	23.6940	15.41	20.04	18.0275	14.07	18.63
$r \leq 1$	$r = 2$	5.6665	3.76	6.65	5.6665	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure.; *r* denotes the number of co-integrating vectors. 1980-2016 data sample was used.

Table 6. 6 Cointegration test results for Burkina Faso

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	36.6651	15.41	20.04	31.7980	14.07	18.63
$r \leq 1$	$r = 2$	4.8671	3.76	6.65	4.8671	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure; *r* denotes the number of co-integrating vectors. 1981-2016 data sample was used.

Table 6. 7 Cointegration test results for Cape Verde

Hypothesis (Rev & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	19.4777	15.41	20.04	10.6410	14.07	18.63
$r \leq 1$	$r = 2$	8.8367	3.76	6.65	8.8367	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Rev – Revenue, Exp – Government expenditure; *r* denotes the number of co-integrating vectors. 1982-2016 data sample was used.

6.7 Bohn's Sustainability tests

The analysis under stationarity and cointegration tests above revealed that stationarity tests are susceptible to time series changes thus, there is a need to undertake further fiscal sustainability examination. As such, our aim is to determine whether fiscal rules play a role in improving the primary balance response to increasing public debt. In this regard, we improve our analysis by use of both the fiscal reaction function and Markov switching models to estimate the fiscal sustainability of public debt. This analysis provides additional insight into "regimes" of fiscal sustainability versus unsustainability.

Table 6.8 presents the baseline specification results for the fiscal reaction function in linear, quadratic and cubic forms. We present the results for each country in turn. For Kenya's case, the primary balance does not positively respond to a rise in public debt. As such, we would conclude that fiscal policy is unsustainable over the period under consideration. For the non-linear specifications, the results are only significant for the quadratic coefficient. Despite the results showing no effect of primary balance on public debt in a linear framework, in a quadratic framework the primary balance is able to catch up with increasing public debt, thus reveals evidence of fiscal sustainability in Kenya[69]. This is because, of recent, the primary balance has improved, and at the same time, despite increase in public expenditure to meet public investment demands, revenue sources have also improved over time via several reforms undertaken. Importantly, tax revenue has been the main source of revenue in Kenya accounting for over 90% of revenue and this is due to tax reforms that include (i) Revenue Administration Reform and Modernisation Program (RARMP) and (ii) digitization of tax through iTax system (Wawire, 2020). At the same time, Kenya has diversified the public debt sources, by increasing the uptake of domestic debt and the use of Euro bonds. In addition, Kenya has also undertaken other reforms that include change of the constitution in 2010, that brought in checks and balances on public expenditure. The establishment of the public financial management and other checks via parliament have mitigated against increase in budget deficits and public debt. Importantly, Kenya has also improved the export revenue especially via the East Africa

[69] The above explanation of fiscal fatigue where the coefficient in a quadratic and cubic specifications (Eqn. 6.9 and 6.10) is negative or equal to zero, it therefore follows that a positive coefficient in a similar set up indicates positive response of primary balance as part of nonlinear fiscal adjustments.

Community that has helped improve current account and mitigate against worsening of the primary balance.

For Botswana, Burkina Faso and Equatorial Guinea the primary balance responds positively to a rise in public debt for both the linear specification and quadratic specification, and in the cubic specification for Equatorial Guinea. It is important to note that this group of countries exhibits prudent fiscal management relative to other SSA countries. Botswana's case is interesting as it graduated from a Least Developed Country in 1994 to a Middle-Income Country. The level of public debt has remained low at an average of 30 percent of GDP. Similarly, although the country had a fiscal deficit of 5.8 percent of GDP in 2019, this had little impact on public debt as it was financed via drawdowns of fiscal buffers in the Sovereign Wealth Fund (IMF, 2020)[70]. Moreover, about 60 percent of Botswana's fiscal revenue come from mineral exports thus hedging the country against the effects of external debt. In terms of debt composition, the country has a higher external debt from multilateral lenders with long periods of maturity. The tax reforms have enhanced revenue collection efforts and have remained robust resulting in higher domestic resource mobilization, thus helping to scale back increases in public debt. The success of Botswana in stabilizing the economy hinges on leadership that has fostered good governance with a high degree of transparency, and this resulted to the country's enhancing fiscal savings, investment in infrastructure and human capital (Lewin, 2011).

Our findings of fiscal sustainability in Equatorial Guinea are in line with empirical evidence from the International Monetary Fund and other development partners. The country is largely dependent on oil revenue, and since the plunge in global oil prices in 2014, the country experienced high fiscal deficits, a reduction in international reserves, inadequate savings and weak public financial management[71]. To address these issues, the government of Equatorial Guinea through the support of the IMF, Africa Development Bank and other development partners, has initiated reforms to narrow the fiscal deficit, diversify the economy and invest in infrastructure and public institutions. The country's weak institutional capacity hampers the ability to effect economic and social transformation policies[72]. Despite the country initially

[70] IMF (2020) Article IV Consultation. IMF Country Report No. 20/78. March 2020.
[71] World Bank (2020). Available on: https://www.worldbank.org/en/country/equatorialguinea/overview. Last accessed in January 2021.
[72] Africa Development Bank (2019). Public finance modernisation support project (PAMFP) Appraisal report: https://www.afdb.org/en/documents/document/equatorial-guinea-public-finance-modernisation-support-project-pamfp-appraisal-report-109793. Last accessed in January 2021.

having weak institutions and high fiscal deficits, our analysis reveals that public debt is sustainable. This is largely attributed to the increased oil revenue that was used to payoff the country's external debt.

The negative and significant quadratic coefficient of Burkina Faso exhibits signs of *fiscal fatigue* and fiscal unsustainability. This negative sign means that as debt persists, the primary balance has downward pressure from fiscal fatigue so that debt sustainability may become untenable. Burkina Faso has gone through difficult times of fiscal policy management. As noted earlier, it is one of the countries that benefited from HIPC and MDR initiatives for debt relief, by which, the country's debt level was significantly reduced.[73] At the moment the country enjoys a modest public debt averaging about 30 percent of GDP. Most importantly, the country is susceptible to increases in public debt due to overreliance on agriculture and lack of diversification of the economy. Several other factors like the presence of terrorists have increased government spending and reduced productivity in the agricultural sector. For example, although public debt averaged 50 percent of GDP between 1995 to 2005 similar to Kenya's public debt during the same period, the country was unable to meet debt obligations and had to request debt relief. The findings in this chapter on Burkina Faso underscores the country's vulnerability to increased public debt and the need for diversification, for example, expanding the service sector to increase revenue sources to cushion the country from external borrowing.

In Nigeria we find unsustainable fiscal policy as there is no significant relationship between public debt and the primary balance. In fact, Nigeria presents evidence of weak sustainability and fiscal fatigue as the quadratic specification is negative and significant. This indicates that at very high public debt, the primary balance reduces at a higher rate compared to the increase in public debt. As earlier noted, the Nigerian economy is highly dependent on oil revenue that accounts for about 75 percent of total revenue. As such, the economy is exposed to oil price volatility and this has influenced the countries public spending, which has been procyclic with booms and declines in oil revenues. The overreliance on oil revenue has weakened the country's ability to diversify to cushion the economy. Similarly, the country experienced high fiscal deficits in the 1990s and early 2000s accompanied by exchange rate volatility. For Cape Verde, we find significant evidence of a positive feedback effect of public debt on primary

[73] Debt relief could have the peculiar effect of causing the apparent fiscal fatigue if the decline in debt from debt relief is accompanied by conditionality requiring a higher primary balance, which would not be the case under a normal decline of debt.

balance. Using the standard model-based sustainability analysis, we find evidence of unsustainable fiscal policy in Kenya and Nigeria. Botswana, Equatorial Guinea and Cape Verde exhibit sustainable fiscal policy while Burkina Faso's fiscal policy is sustainable but higher public debt creates fiscal fatigue and makes fiscal policy vulnerable.

These results are in line with those found in related literature. Aldama and Creel (2018) examine the Bohn's test in the US and find unsustainable fiscal policy as there is no significant positive feedback of public debt on primary balance. Semmler et al. (2007) investigate whether the Euro area countries (Germany, France, Italy and Portugal) passed the Bohn's test and found that the response of the primary balance to public debt was positive and significant, that is the countries were on a sustainable path.

Using the same line of debt and fiscal sustainability analysis, our results are similar to Bohn (1998). For Nigeria and Burkina Faso, we provide evidence of fiscal fatigue that are similar to other results in the literature see (Ghosh *et al.*, 2013). Ghatak and Sánchez-Fung (2007) investigate fiscal sustainability in selected developing economies by applying competing techniques. They find that the benchmark condition for a government budget surplus does not hold in Peru, South Africa, Thailand and Venezuela. Applying Bohn's tests, the findings indicate weak fiscal sustainability with mixed results among the countries under investigation. De Mello (2008) examines the conduct of Brazil's public debt by employing Bohn's sustainability test. They find debt to be sustainable for the period under investigation. Burger *et al.* (2012) investigates Bohn's test for fiscal sustainability in South Africa and find that fiscal policy has been sustainable with the primary balance responding positively to a rise in public debt.

6.8 Markov-switching Sustainability tests

We find two regimes in our estimation, see (*Table 6.9*). We report results for each country in turns. For Kenya, there is a strong and significant positive response of primary balance to lagged debt in regime 2, which in our case we label *sustainable*. While the response of primary balance to lagged debt is negative and non-significant in regime 1, which we label as *unsustainable*. A similar situation is experienced in Nigeria, where regime 2 is sustainable compared to regime 1. Equivalently, Botswana, Burkina Faso, Equatorial Guinea and Cape Verde have two regimes. However, regime 1 turns out to be sustainable compared to regime 2

in this group of countries. As such, there is a strong and significant positive response of primary balance to lagged debt in regime 1, while a non-significant primary balance response to lagged debt in regime 2. On the other hand, the expected duration between the sustainable and unsustainable regimes are heterogeneous. Equatorial Guinea has a persistent expected duration in a sustainable regime of 28.6 years compared to other selected countries (e.g. Kenya has expected duration of 2.5 years in sustainable regime, Botswana has 5.7 years in regime 1). Similarly, for Botswana the expected duration between the sustainable regime 1 and unsustainable regime 2 seem to be same at 1 year and 1.3 years respectively.

Table 6.10 presents the effect of fiscal rules on fiscal policy and debt sustainability. Evidently, fiscal rules are important in debt sustainability management. Our results indicate that in the presence of fiscal rules, we find that each country has two regimes consistent with regime identification in the baseline Markov-switching specification. However, with introduction of fiscal rules, we find some countries having both regimes as sustainable. This indicates that fiscal rules support the response of primary balance to a rising public debt (e.g. fiscal rules as a numeric constrain helps to stabilise the effect of a rising debt in order for primary balance to respond). In cases where the fiscal rules are significant but the relationship between primary balance and debt is not significant, the fiscal rules are still important to enhancing the efficacy of the primary balance. For Kenya, regime 2 is sustainable while regime 1 is unsustainable. Fiscal rules are positive and statistically significant for both regimes, as such, they always support an increase in primary balance in the event of a build-up in public debt. For Botswana and Cape Verde, both regimes 1 and 2 are sustainable. For Burkina Faso regime 1 is sustainable while regime 2 is weakly sustainable. However, fiscal rules are positive and statistically significant and seems to strengthen primary balance in the event of an increase in public debt. Such cases where fiscal rules are significant in unsustainable debt regimes point to the importance of other factors such as real interest rates, external shocks and corruption--for debt sustainability.

For Equatorial Guinea, regime 2 is sustainable while regime 1 is unsustainable. Our results are opposite of the baseline specification without the fiscal rules in terms of the duration. We find that it only takes about a 3-year period on average for fiscal policy consolidation as long as a 1-year period is used for policy consolidation for sustainability to be attained. This is contrary to the 29-year period we found in the baseline specification. For Nigeria, regime 2 is sustainable

while regime 1 is weakly sustainable. However, fiscal rules seem to support improvement of primary balance in case of increase in public debt in a weakly sustainable policy environment.

Figure 6.4 reports the filtered regime probabilities for each country under investigation. The filtered probabilities indicate changing regimes that are consistent with each country's historical events, which vary across countries. We briefly review some of the peculiarities of each country.

The Kenyan economy has had several regimes of fiscal unsustainability, including the banking crisis of 1985 where the government had to intervene through bailouts. At the same time, the country had a terrible famine that required government intervention. In the political space, governance has improved over time, with adoption of multi-party system in the early 1990's. Then during Moi's administration several fiscal challenges were experienced with significant flip-flopping on policies to either increase taxes or lowering them to stimulate the economy. Fiscal policy seemed aimless as the government got lost in a morass of political uncertainty, including political clashes in the general elections of 1992, 1997 and 2007 that led to the loss of lives and the rescheduling of debts in 1990's. Figure 6.5 shows that despite the effects of 1992, 1997 and 2007 political uncertainty, the country has maintained a sustainable fiscal path.

Botswana seems to have enjoyed a sustainable fiscal policy for long period of time. The events of the currency crisis in 1984, the drought of 1990's and the reduction in diamond prices in the 1990s led to fiscal unsustainability in the country. The weakening of diamond prices led to slowdown in production in the mining sector. Other negative events to economy include the housing corporation scandal of 1992, which had a major effect to the economy, and the concurrent loss of textile exports to Zimbabwe, owing to economic reforms in Zimbabwe. The devaluations of the Pula that occurred in 1991 and 1994 at 5 and 3.5 percent to the US dollar also had negative effects on the country (IMF 1994, 1996, 2001). The Botswana economy slowed down in 2014-2015 due to reduction in the mining sector and a drought in addition to a reduction in South African Customs Union receipts (IMF 2016).

Burkina Faso has gone through long periods of fiscal unsustainability that emanated from political instability that led to regime changes through coups. In the 1980s alone, Burkina Faso had some four successful coups. These frequent changes in governments negatively affected the economy including a large reduction in investment (IMF 1986). Furthermore, it has faced

a number of droughts that greatly affected the agricultural sector. The country had a banking crisis from 1990-1994 and during this period the nonperforming loans were estimated at 34 percent. Burkina Faso the CFA franc by 50 percent in 1994 (along with other CFA countries), which helped restore competitiveness and accelerate growth.

Equatorial Guinea has had a stable fiscal policy after the discovery of oil in the 1990s. The oil discovery led to initial large-scale borrowing and expenditure for infrastructure development before exports began. Export revenue later allowed debt repayment and created high foreign reserves in the country. However, a number of other events also led to fiscal unsustainability. As noted earlier, the banking crisis of 1983 led to liquidation of the country's two largest banks. There was also political instability during an unsuccessful coup in 2004 (IMF 1990, 1994, 2000, 2016). All these events are revealed in the regime switching framework as shown in *Figure 6.5*. The country has ultimately embraced a multiparty system of governance and elections, so the transfer of leadership has been smoothed over time.

Nigeria seems to have a sustainable path of fiscal policy especially after impressing democratic political space. Several events between 1980's to 2010 led to fiscal unsustainability. These events included debt defaults that affected the country's ratings and political instabilities in the country in the 1980's and 1990's. Other events include the banking crisis and oil price fluctuations affecting the fiscal revenue leading to bank financing (for example, the government had to borrow from domestic banks to finance expenditures) (IMF, 1989). The country has also faced higher fiscal imbalances in 2000's and an accelerated inflation from 6.9 percent to 18.9 percent around the same period (IMF 2003; 2004). Recently, in 2017, the country had a recession the worst after 25 years, which greatly affected the government's outlay. Our fiscal sustainability analysis in Markov switching framework reveal that from 2002, Nigeria has been on unsustainable path (Figure 6.5).

Cape Verde has introduced a number of policy changes to improve its fiscal policy and has had a long period of fiscal sustainability. The events of the early 1990's to late 2000's match the changes in the country. The country has had a stable political system, but its reliance on agriculture has greatly affected the country's growth. The country had a banking crisis in 1993 that resulted in large nonperforming loans (30 percent of the GDP) in the banking sector. Significant reforms were introduced in the country since the 1990's, including multiparty democracy and the ruling party losing the presidential election in 2001. A major Volcano

eruption in 2014 caused economic loss and the displacement of many people (IMF 1988; 1991; 1994; 2001; 2014).

Our Markov-switching regimes for fiscal sustainability follows those in literature. Aldama and Creel (2018) examine fiscal sustainability for the US by employing both the Bohn's test and Markov-switching models. They find a positive correlation between the primary balance and public debt in the sustainable fiscal regimes, although the expected durations of sustainable and unsustainable regimes differ. Irungu *et al.* (2019) examine fiscal regime shifts in Kenya and find a positive relationship between the primary balance and debt in sustainable regimes and the expected durations for both sustainable and unsustainable regimes are similar. Burger and Marinkov (2012) investigate the conduct of fiscal sustainability in South Africa in a Markov-switching framework. They find that if South Africa employs fiscal rules (e.g. the deficit and debt rules), the country will achieve fiscal sustainability and the primary balance will positively adjust to increase in public debt.

6.9 Robustness checks

We perform robustness checks by controlling for commodity-based countries in our sample. Commodity revenues (i.e. oil for Nigeria and Equatorial Guinea and minerals for Botswana) could influence fiscal and debt sustainability. It is also important to note that commodity revenues in some countries like Nigeria account for over 80 percent of exports. In our robustness checks we conduct a cointegration of oil and mineral revenues with expenditures as well as capturing the oil and mineral prices in the fiscal reaction function and Markov switching models.

Appendix *B6.1-B6.3* report the Johansen cointegration test results. From those, we observe a long-run correlation between government expenditures and oil revenues as well as mineral revenues, in our sample of commodity producing countries. Therefore, based on the cointegration results we can infer that fiscal policy is sustainable in Nigeria, Equatorial Guinea and Botswana.

To account for the commodity influence on fiscal sustainability in a fiscal reaction function, we use the average monthly oil price or mineral price. The results reported in *Table B6.4* show that both the oil price or the mineral price do not influence fiscal sustainability in Nigeria,

Equatorial Guinea and Botswana, as the coefficients for both prices are positive but insignificant. The results reported in *Table B6.5* show that the effect of commodity prices are heterogeneous among the selected countries. For Botswana, mineral rents are significant and positively correlated with the primary balance. We note that mineral rents support the primary balance to respond to a rise in public debt in a sustainable fiscal policy. For Nigeria, oil prices are significant and positively related to the primary balance in unsustainable regimes. As such, oil revenue is important for fiscal stabilisation as it can used for deficit financing and meet debt obligations even when the primary balance does not effectively respond to a rise in public debt. These results are in line Arezki and Bruckner (2012) who finds that increase in oil prices enhances a significant reduction in external debt.

Table 6. 8 Standard Model-Based Sustainability tests for selected SSA countries

	Kenya			Botswana			Burkina Faso			Equatorial Guinea		
VARIABLES	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
Lagged debt	0.114	0.139	0.156	0.679**	0.892**	1.085	0.302**	0.292**	0.004	1.341***	1.222**	-0.933
	(0.102)	(0.088)	(0.098)	(0.267)	(0.341)	(0.656)	(0.145)	(0.140)	(0.321)	(0.463)	(0.478)	(0.909)
Quadratic lagged debt		0.011**	0.016		-0.052	-0.036		-0.014**	-0.019**		-0.008	0.052***
		(0.004)	(0.014)		(0.045)	(0.066)		(0.007)	(0.008)		(0.010)	(0.019)
Cubic lagged debt			-0.000			-0.003			0.001			0.001***
			(0.000)			(0.010)			(0.001)			(0.000)
Output gap	0.326	0.351*	0.356*	0.235	0.341	0.343	0.588**	0.648**	0.619**	-0.689	-0.759	-0.647
	(0.224)	(0.195)	(0.198)	(0.272)	(0.277)	(0.281)	(0.263)	(0.257)	(0.264)	(0.521)	(0.524)	(0.643)
Expenditure gap	0.110	-0.244	-0.238	-0.433	-0.314	-0.318	-0.116	0.068	0.039	-1.532***	-1.578***	-0.877***
	(0.260)	(0.234)	(0.238)	(0.324)	(0.342)	(0.348)	(0.368)	(0.372)	(0.383)	(0.152)	(0.155)	(0.171)
Real interest rates	0.043	-0.016	-0.023	-0.239	-0.298	-0.287	0.050	-0.025	-0.083	0.072	0.460	-0.451
	(0.067)	(0.061)	(0.064)	(0.185)	(0.195)	(0.201)	(0.099)	(0.103)	(0.118)	(0.820)	(0.927)	(0.969)
Fiscal rules	-0.830	-0.138	-0.125	1.914	1.508	1.569	1.217	1.399	1.579	-35.923	-40.565	39.273
	(0.848)	(0.734)	(0.744)	(2.077)	(2.214)	(2.261)	(1.211)	(1.198)	(1.261)	(69.909)	(73.803)	(38.805)
Constant	0.107	-0.342	-0.424	-0.486	0.723	0.657	-0.999	-0.262	0.084	30.870	31.941	-40.022
	(0.743)	(0.628)	(0.664)	(1.261)	(1.681)	(1.721)	(0.862)	(0.922)	(1.007)	(57.857)	(63.712)	(31.326)
Observations	34	34	34	34	34	34	35	35	35	34	34	34
R-squared	0.154	0.341	0.347	0.366	0.385	0.388	0.282	0.374	0.399	0.795	0.807	0.636
DW Statistics	1.99	2.29	2.39	2.07	1.89	1.90	2.35	2.31	2.13	1.73	1.75	1.83

Note: Abbreviations: DW – Durbin Watson. Dependent variable is primary balance. Standard errors are reported in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively. In the modelling process we control for serially correlated residuals by using a Cochrane-Orcutt procedure.

Table 6.8: Model-Based sustainability tests continued

	Nigeria			Cape Verde		
VARIABLES	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
Lagged debt	0.018	-0.005	0.076	0.228**	0.142	0.168
	(0.045)	(0.045)	(0.080)	(0.093)	(0.105)	(0.196)
Quadratic lagged debt		-0.002*	-0.002**		0.017	0.019
		(0.001)	(0.001)		(0.010)	(0.014)
Cubic lagged debt			-0.000			-0.000
			(0.000)			(0.001)
Output gap	0.190	0.126	0.022	-0.018	-0.016	-0.013
	(0.319)	(0.303)	(0.303)	(0.325)	(0.321)	(0.329)
Expenditure gap	-0.420	-0.529*	-0.528*	-0.275**	-0.251*	-0.255*
	(0.276)	(0.266)	(0.262)	(0.122)	(0.123)	(0.128)
Real interest rates	-0.076	-0.140	-0.148	-0.295	-0.380*	-0.370
	(0.122)	(0.120)	(0.119)	(0.214)	(0.221)	(0.236)
Fiscal rules	-1.505	-2.300	-2.516	2.153	2.259	2.162
	(2.336)	(2.182)	(2.123)	(1.903)	(1.926)	(2.067)
Constant	1.099	2.465**	2.832**	0.260	-0.223	-0.312
	(1.078)	(1.179)	(1.168)	(1.118)	(1.183)	(1.334)
Observations	34	34	34	33	33	33
R-squared	0.148	0.250	0.298	0.345	0.405	0.405
DW Statistics	2.18	2.18	2.19	2.17	2.14	2.22

Note: Standard errors are reported in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively. In the modelling process we control for serially correlated residuals by using a Cochrane-Orcutt procedure

Table 6. 9 Estimated Markov-switching sustainability tests for selected SSA countries

	Kenya		Botswana		Burkina Faso		Equatorial Guinea		Nigeria		Cape Verde	
	Unsust.	Sustainable	Sustainable	Unsust.	Sustainable	Unsust.	Sustainable	Unsust.	Unsust.	Sustainable	Sustainable	Unsust.
VARIABLES	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2
Lagged debt	-0.114	0.223***	3.698***	0.164	0.253***	-0.299***	1.061***	-0.504	-0.200**	0.130***	0.307***	0.084
	(0.112)	(0.083)	(0.899)	(0.141)	(0.044)	(0.070)	(0.311)	(0.736)	(0.099)	(0.038)	(0.068)	(0.094)
Expenditure gap	1.839***	-0.816***	-1.366**	-0.479*	-0.028	0.578***	-0.811***	-2.294***	-1.832**	-0.413**	-0.231***	-0.304***
	(0.233)	(0.172)	(0.671)	(0.254)	(0.128)	(0.213)	(0.087)	(0.298)	(0.788)	(0.210)	(0.083)	(0.046)
Output gap	0.289	0.701***	1.045	-0.012	0.538***	0.500***	-0.128	-22.906***	0.706	0.076	0.279***	0.519***
	(0.183)	(0.169)	(0.715)	(0.167)	(0.087)	(0.150)	(0.254)	(3.524)	(0.461)	(0.251)	(0.109)	(0.196)
Real interest	-0.241	-0.007	-0.966**	-0.321**	-0.071***	-0.150*	-0.291	-1.350	-0.752***	-0.139	0.037	-0.195***
	(0.180)	(0.075)	(0.454)	(0.129)	(0.026)	(0.089)	(0.417)	(2.419)	(0.244)	(0.098)	(0.129)	(0.056)
Constant	-1.415**	-0.661	2.261	2.180*	-0.551**	4.989***	-11.542	-30.755	0.829	3.547***	-2.373**	3.655***
	(0.699)	(0.436)	(3.834)	(1.119)	(0.225)	(0.791)	(7.037)	(41.032)	(3.266)	(0.829)	(1.106)	(0.056)
Regime invariant parameters												
AR (1)	-0.311		0.439**		-0.799***		-0.020		-0.227***		-0.669***	
	(0.165)		(0.184)		(0.144)		(0.237)		0.066		(0.113)	
Standard error σ	0.152		1.205***				3.469***		1.169***		0.229*	
	(0.133)		(0.136)				(0.123)		(0.145)		(0.138)	
Regime properties												
Transition p_{11}	0.60		0.16		0.10		0.97		0.36		0.63	
p_{22}	0.68		0.82		0.23		0.71		0.72		0.73	
Duration d_1	2.5		1.2		1.0		28.6		1.6		2.7	
d_2	3.2		5.7		1.3		3.5		3.6		3.7	
Ergodic π_1	0.44		0.18		0.46		0.91		0.30		0.42	

π_2	0.56		0.82		0.54		0.09		0.70		0.58	
Observations	34	34	34	34	34	34	34	34	34	34	34	34

Note: We control for regime invariant first-order serial correlation in the residuals. Standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively. Abbreviations: Unsust. – Unsustainability.

Table 6. 10 Estimated Markov-switching sustainability tests for selected SSA countries

	Kenya		Botswana		Burkina		Equatorial Guinea		Nigeria		Cape Verde	
	Unsust.	Sustainable	Sustainable	Sustainable	Sustainable	Unsust.	Unsust.	Sustainable	Unsust.	Sustainable	Sustainable	Sustainable
VARIABLES	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2
Lagged debt	-0.077	0.358***	0.295**	2.085**	0.491***	-4.238***	0.193	0.496**	-0.158***	0.139***	0.585**	0.168***
	(0.052)	(0.073)	(0.140)	(0.964)	(0.099)	(0.878)	(0.337)	(0.193)	(0.057)	(0.036)	(0.257)	(0.058)
Real interest	-0.066	-0.037	-0.360***	-1.767***	0.115*	-0.785***	-0.857	-0.041	-0.874***	-0.047	-0.473	-0.078
	(0.046)	(0.033)	(0.115)	(0.436)	(0.063)	(0.282)	(0.662)	(0.271)	(0.189)	(0.108)	(0.825)	(0.114)
Output gap	1.009***	0.853***	-0.239*	3.000***	0.465**	2.084***	-0.007	0.024	0.735**	-0.104	-0.724	0.456**
	(0.168)	(0.125)	(0.136)	(0.313)	(0.220)	(0.596)	(0.043)	(0.028)	(0.343)	(0.262)	(0.770)	(0.229)
Expenditure gap	2.149***	-0.666***	-0.714***	3.214***	-0.319	0.851	0.001	-0.017**	-1.689***	-0.489**	-0.734**	-0.154
	(0.190)	(0.124)	(0.190)	(1.028)	(0.352)	(0.756)	(0.012)	(0.008)	(0.416)	(0.206)	(0.320)	(0.203)
Fiscal rules	3.439***	-0.846	1.525	11.808***	0.525	6.586**	-2.838	2.023	5.978**	-3.509**	4.544	-0.400
	(0.720)	(0.558)	(1.579)	(4.046)	(1.148)	(3.359)	(2.806)	(2.049)	(2.892)	(1.752)	(3.605)	(1.824)
Constant	-1.906***	0.351	0.277	5.713	-1.602*	5.188*	-3.033	0.739	-1.748	4.439***	-6.036	1.579
	(0.506)	(0.440)	(1.073)	(3.583)	(0.931)	(2.709)	(1.988)	(1.629)	(1.565)	(0.835)	(7.085)	(1.285)
Regime invariant parameters												
AR (1)	-0.579***		0.283		-0.532***		0.477**		-0.256***		-0.514	
	(0.149)		(0.184)		(0.164)		(0.199)		(0.061)		(0.403)	
Log (Sigma)	-0.107		1.035***		1.052***		1.138***		1.125***		0.784***	
	(0.138)		(0.129)		(0.135)		(0.136)		(0.141)		(0.193)	
Regime properties												
Transition p_{11}	0.45		0.87		0.84		0.17		0.47		0.11	
P_{22}	0.61		0.58		0.15		0.63		0.72		0.71	
Duration d_1	1.8		7.9		6.4		1		1.8		1	

	d_2	2.6		2.4		1		2.7		3.6		3.4	
Ergodic prob.	π_1	0.41		0.76		0.84		0.31		0.35		0.25	
	π_2	0.59		0.24		0.16		0.69		0.65		0.75	
Observations		34	34	34	34	35	35	34	34	34	34	33	33

Note: We control for regime invariant first-order serial correlation in residuals. Standard errors are in parentheses. The significance levels are at *** 1 percent, ** 5 percent and * 10 percent respectively. Abbreviations – Unsust. – Unsustainable.

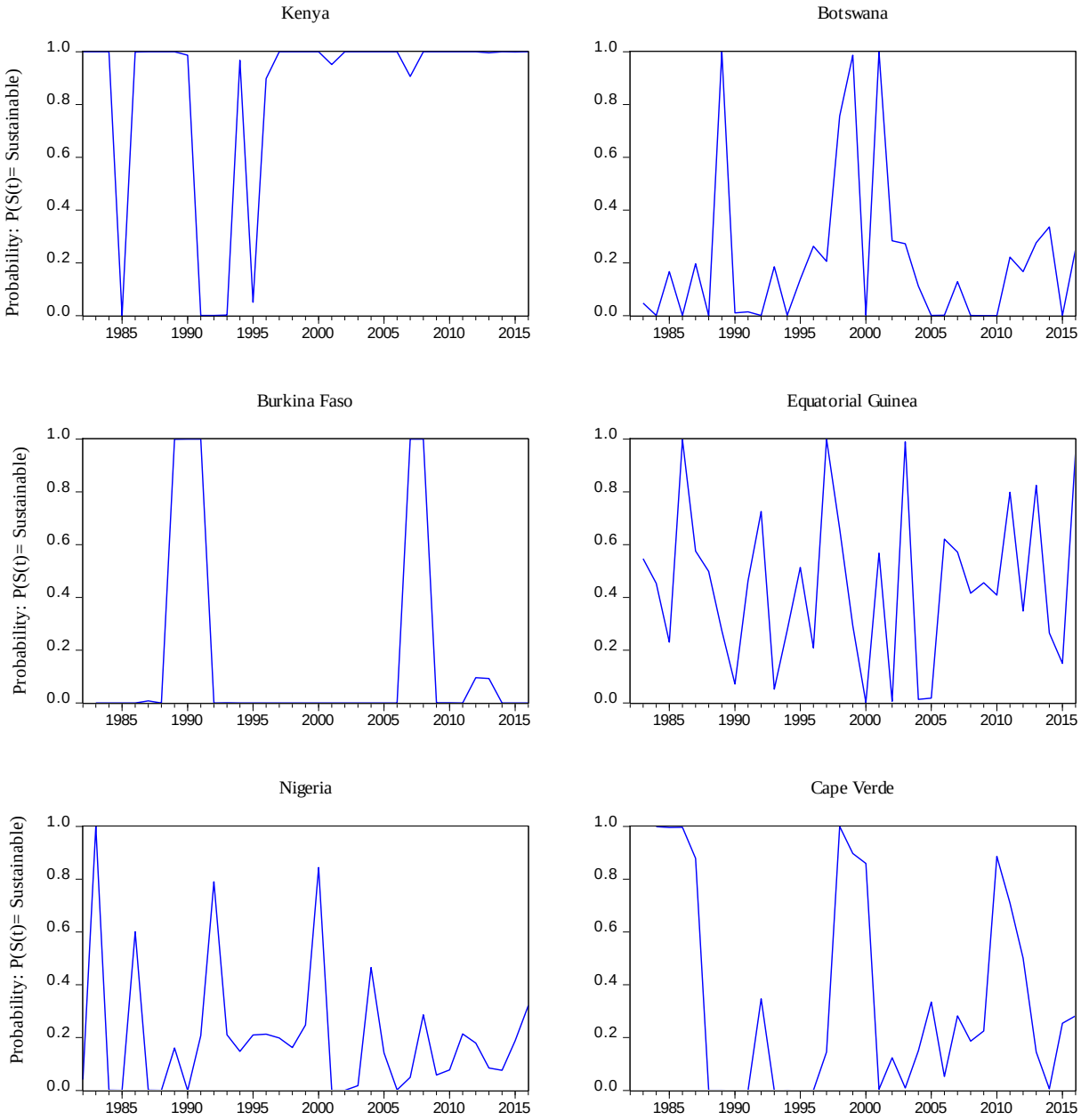


Figure 1.4. Regime filtered probabilities

Figure 6. 5: Regime filtered probabilities for selected SSA countries.

6.10 Conclusions

This study has investigated fiscal sustainability in a representative but diverse group of SSA countries using several technical approaches. The objective was to examine the sustainability of public debt and similarly fiscal sustainability. We also consider how long it is possible to delay fiscal consolidations efforts before public debt explodes? The paper has employed a four-strategy approach by: (i) conducting unit root tests for fiscal data in SSA; (ii) using the Present Value Constraint (PVC) to analyse whether SSA's debts are sustainable; (iii) employing Bohn's sustainability test; and (iv) estimating a two-state Markov-switching model of fiscal sustainability.

Firstly, the unit root tests have revealed, except for Kenya and Equatorial Guinea, that budget deficits are sustainable for all SSA countries. Secondly, we conduct cointegration tests to evaluate the cointegration of revenue and expenditure series. The empirical analysis reveals the presence of cointegration, thus, indicating debt sustainability in SSA. Thirdly, we estimate different specifications of Bohn's sustainability tests. The estimates reveal fiscal sustainability in Botswana, Burkina Faso, Equatorial Guinea and Cape Verde. For Kenya and Nigeria, the results do not allow rejection of fiscal unsustainability: the feedback coefficient on public debt is not significant. Further, for Nigeria and Burkina Faso, the results provide evidence of fiscal fatigue. Fourthly, we estimate a Markov-switching regime changes with fiscal rules and without. The Markov-switching allows us to identify the sustainable and unsustainable regimes for fiscal policy prescriptions.

The Markov-switching results without fiscal rules reveal that, there is an average 3-year period of fiscal policy deferral for Kenya, which does not prevent sustainability in Kenya as long as fiscal consolidation lasts for 3 years. For Botswana there is on average 6-year period of fiscal consolidation deferral that does not prevent future sustainability, and fiscal policy consolidation lasts for 1 year on average. For Burkina Faso there is a 1-year fiscal policy consolidation delay that does not affect future sustainability and fiscal consolidation takes 1 year. For Equatorial Guinea there is an average 29-year period of fiscal policy delay does not preclude future sustainability and fiscal policy consolidation takes about 4 years. In Nigeria there is a 2-year period of fiscal policy deferral and fiscal consolidation takes 4 years on average. For Cape Verde there is an average a 4-year period of fiscal policy consolidation delays and fiscal policy consolidation lasts for 3 years. We find that the introduction of fiscal rules in the Markov-switching specification improves our results significantly. As such, some

countries have both regimes as sustainable. In the case of unsustainable or a weakly sustainable regime fiscal policy rule plays a significant role to enhance the primary balance's response to increases in public debt.

The findings in this chapter provide important fiscal policy lessons across SSA and other developing countries. First the findings show that implementation of fiscal consolidation efforts vary across countries, for example, in Botswana it takes one year while in Nigeria it can take up to four years to realise positive effects of this efforts. This can also be explained by the country's exposure to external shocks. In particular, we find that countries that are oil rich thus exposed to external shocks via global oil prices (Nigeria and Equatorial Guinea) take longer periods to realise the benefits of fiscal consolidation efforts, that is four years on average. However, after fiscal consolidation efforts this group of countries have a longer period to enjoy the benefits of this policy framework. For example, in Equatorial Guinea, it takes about 29 years of fiscal policy delay without affecting fiscal sustainability. This may also be due to the efficacy of institutions and the type of the economy, this is because in Nigeria it takes about two years of fiscal policy delays without affecting the sustainability of the economy[74]. As noted earlier, institutions play an important role in advancing fiscal discipline. Despite Kenya being agriculture and service based economy, it takes a longer period fiscal policy delay after fiscal consolidation without affecting fiscal sustainability. This is because of improved institutions that offer oversight in public finance.

Our results have important policy implications for fiscal and debt sustainability. There is need for immediate fiscal reforms to ensure that observed deficits do not translate into explosive public debts leading to a call for debt relief. Fiscal policy reforms geared toward tax revenue enhance the effectiveness of fiscal policy responses to increased public debt. This should be pursued by SSA countries as it enhances their ability to respond to rising public debt. Spending should be undertaken in sectors that have long-term returns to guarantee future revenue in an environment of limited fiscal revenue.

Our findings support the view that adoption of fiscal rules made SSA countries' fiscal policy more sustainable. The steps taken by SSA countries to adopt fiscal rules, which have been

[74] World Bank (2020). Equatorial Guinea and Nigeria are classified as upper middle-income and lower middle-income. Available on: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. Last accessed in March 2021.

subsequently revised for years, is important for fiscal management going forward. These rules offer specified timelines and fiscal targets that countries must achieve to instil public finance discipline. Therefore, policy reforms to strengthen fiscal rules can help enhance the efficacy of these fiscal instruments. As noted earlier, well monitored fiscal rules can support compliance with fiscal rules and efficiency of rules in response to fiscal unsustainability. However, some countries' fiscal targets are quite ambitious given the history of their economies. In view of the current fiscal policy and political environment in SSA, it is hard to structure a sound fiscal consolidation to enhance both development and public debt reduction that could be actualised quickly and successfully. The improved political environment in SSA and measures to reform the tax system and create productive sectors to enhance revenue will help these countries grow out of debt. Further, there is need to strengthen revenue collection agencies and improve the oversight on government spending. This can be done through adoption and strengthening of fiscal councils in SSA, for example, use of parliamentary budget oversight committees. Similarly, there is need to build capacity of research in government ministries of finance to offer evidence based policy analysis to mitigate on fiscal indiscipline. In oil producing countries of Nigeria and Equatorial Guinea there is need to strengthen transparency on oil revenue and implement diversification policy to mitigate against oil price shocks.

Appendix A6.0: Unit root test results

Table A6. 1 Unit root tests for Kenya

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-2.682	-2.978	-0.942	-2.975	-1.900	-2.975	-2.232	-2.972
ADF & FD	-4.687	-2.978**	-8.923	-2.975**	-3.867	-2.978**	-3.711	-2.975**
Cst & TT								
ADF	-3.471	-3.564	-1.330	-3.564	-1.785	-3.564	-2.140	-4.288
ADF & FD	-4.588	-3.568**	-8.190	-3.564**	-3.862	-3.563**	-3.660	-3.564**
Cst								
PP	-3.487	-3.675	-3.086	-3.675	-2.010	-2.969	-2.333	-2.969
PP & FD	-5.083	-2.972**	-6.775	-2.972**	-3.504	-2.972**	-5.572	-2.972**
Cst & TT								
PP	-3.643	-3.556	-3.090	-3.556	-1.939	-3.556	-2.191	-3.556
PP & FD	-5.143	-3.560**	-7.428	-3.560**	-3.456	-3.216**	-5.559	-3.560**

Source: Author's estimates

Notes: ADF is the Augmented Dickey-Fuller test, PP is the Phillips Perron, FD is the First Difference: TS are the Test Statistics, CVs are Critical Values. For stationarity tests we assume existence of either a Constant (Cst) or a Constant and Time Trend (TT). The number of lags used are based on various lag length selection criterions. Unless otherwise stated all variables become stationary based on 5 percent level of significance. The significance levels are denoted by *, **, *** at 1%, 5% and 10%.

Table A6. 2 Unit root tests for Nigeria

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-2.201	-2.972	-2.180	-2.972	-2.919	-2.678***	-1.512	-2.972
ADF & FD	-6.127	-2.975**	-4.587	-2.975**	-5.711	-2.975**	-4.580	-2.975**
Cst & TT								
ADF	-2.440	-3.560	-3.083	-3.560	-3.135	-3.560	-2.784	-3.560
ADF & FD	-6.234	-3.564**	-4.531	-3.564**	-5.704	-3.564**	-4.728	-3.564**
Cst								
PP	-2.858	-2.969	-2.594	-2.969	-4.085	-2.969**	-1.414	-2.969
PP & FD	-7.120	-2.972**	-7.185	-3.682**	-11.385	-2.972**	-4.914	-2.972**
Cst & TT								
PP	-2.989	-3.556	-3.516	-3.556	-4.634	-3.556**	-2.474	-3.556
PP & FD	-7.137	-3.560**	-7.089	-3.560**	-11.605	-3.560**	-4.986	-3.560**

Source: Author's calculations

Notes: See Table A5.1.

Table A6. 3 Unit root tests for Botswana

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-1.618	-2.972	-2.703	-2.975	-2.984	-2.972**	-1.727	-2.972
ADF & FD	-5.100	-2.975**	-4.422	-2.978**	-5.708	-2.975**	-3.768	-2.975**
Cst & TT								
ADF	-3.298	-3.560	-2.547	-3.564	-4.553	-3.566**	-2.448	-3.560
ADF & FD	-5.265	-3.564**	-4.516	-3.568**	-5.574	-3.564**	-3.670	-3.564**
Cst								
PP	-1.916	-2.969	-2.953	-2.969	-2.582	-2.969	-1.752	-2.969
PP & FD	-6.419	-2.972**	-4.298	-2.972**	-5.306	-2.972**	-5.411	-2.972**
Cst & TT								
PP	-3.390	-3.556	-2.852	-3.556	-3.354	-3.214**	-2.431	-3.556
PP & FD	-6.503	-3.560**	-4.250	-3.560**	-5.247	-3.560**	-5.348	-3.560**

Source: Author's calculations

Notes: See Table A5.1.

Table A6. 4 Unit root tests for Equatorial Guinea

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-2.545	-2.975	-2.001	-2.975	-1.994	-2.975	-1.700	-2.972
ADF & FD	-3.549	-2.978**	-3.385	-2.978**	-3.494	-2.978**	-4.717	-2.975**
Cst & TT								
ADF	-2.771	-3.564	-2.615	-3.564	-2.571	-3.564	-1.647	-3.560
ADF & FD	-3.488	-3.221**	-3.328	-3.221**	-3.435	-3.221***	-5.022	-3.564**
Cst								
PP	-2.918	-2.969	-2.671	-2.969	-2.782	-2.969	-1.029	-2.969
PP & FD	-5.393	-2.972**	-9.393	-2.972**	-9.642	-2.972**	-5.721	-2.972**
Cst & TT								
PP	-3.049	-3.556	-3.428	-3.556	-3.552	-3.556	-2.365	-3.556
PP & FD	-5.280	-3.560**	-9.257	-3.560**	-9.503	-3.560**	-5.760	-3.560**

Source: Author's calculations

Notes: See Table A5.1.

Table A6. 5 Unit root tests for Burkina Faso

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-2.836	-2.975	-0.905	-2.980	-6.784	-2.975**	-2.031	-2.972
ADF & FD	-6.751	-2.978**	-3.710	-2.983**	-10.289	-2.978**	-4.237	-2.975**
Cst & TT								
ADF	-3.909	-4.306	-3.547	-3.572	-6.680	-3.564**	-1.943	-3.560
ADF & FD	-6.642	-3.568**	-3.341	-3.226**	-10.142	-3.568**	-4.270	-3.564**
Cst								
PP	-4.182	-2.972	-2.067	-2.972	-6.899	-2.975**	-2.100	-2.969
PP & FD	-9.685	-2.975**	-8.724	-2.975**	-14.301	-2.978**	-5.699	-2.972**
Cst & TT								
PP	-6.001	-3.560	-3.913	-4.288	-6.795	-3.564**	-1.971	-3.556
PP & FD	-9.527	-3.564**	-8.589	-3.564**	-14.195	-3.563**	-5.708	-3.560**

Source: Author's calculations

Notes: See Table A5.1.

Table A6. 6 Unit root tests for Cape Verde

	Revenue		Expenditure		Deficits		Debt	
	TS	CV	TS	CV	TS	CV	TS	CV
Cst								
ADF	-3.086	-3.689	-2.933	-2.980	-3.453	-2.978**	-0.506	-2.975
ADF & FD	-3.131	-2.980**	-3.503	-2.980**	-5.741	-2.980**	-3.199	-2.978**
Cst & TT								
ADF	-2.615	-3.564	-3.343	-3.572	-3.372	-3.221***	-1.739	-3.564
ADF & FD	-5.251	-3.568**	-3.391	-3.223**	-5.579	-3.572**	-3.367	-3.221***
Cst								
PP	-3.076	-3.689	-3.091	-3.689	-3.453	-2.975**	-0.591	-2.972
PP & FD	-4.911	-2.978**	-5.800	-2.978**	-7.025	-2.978**	-4.639	-2.975**
Cst & TT								
PP	-2.629	-3.564	-2.937	-3.564	-3.436	-3.564**	-1.512	-3.560
PP & FD	-5.260	-3.568**	-5.982	-3.568**	-6.933	-3.568**	-4.697	-3.564**

Source: Author's calculations

Notes: See Table A6.1.

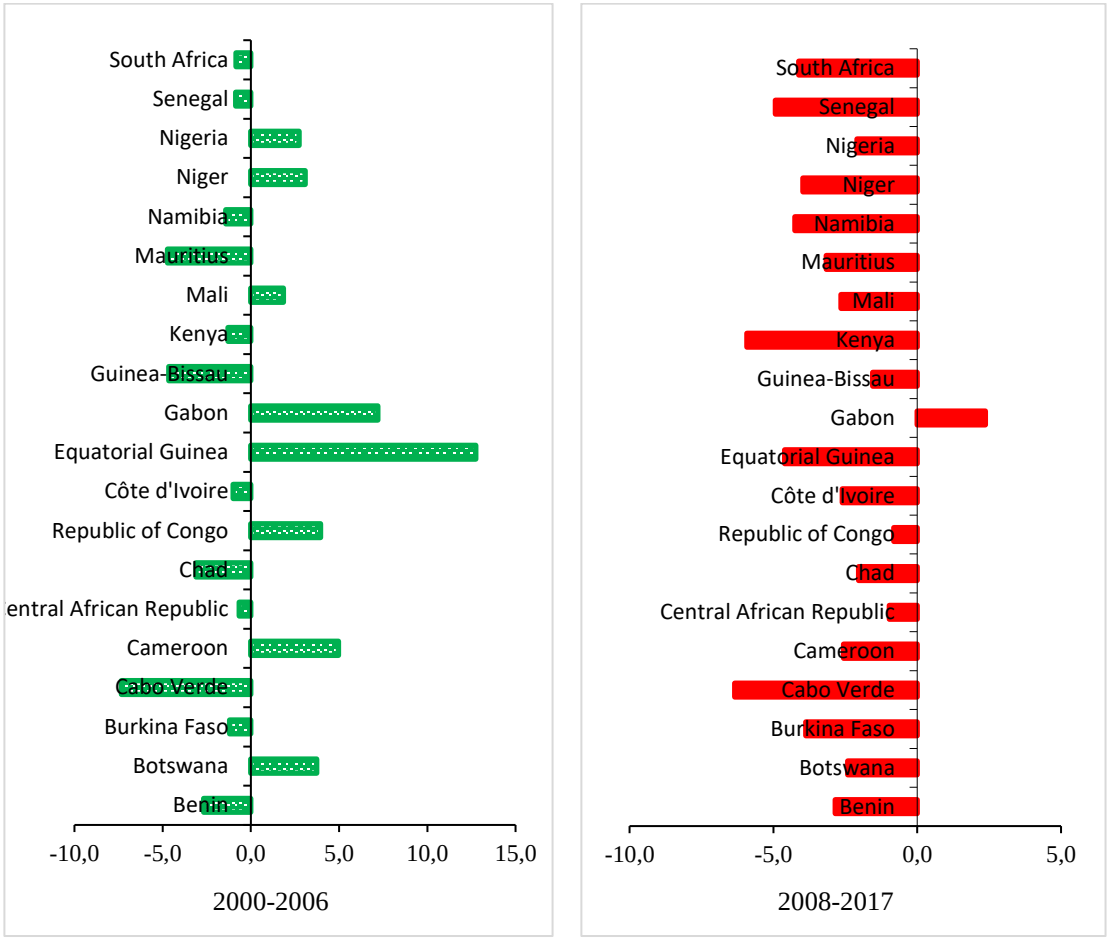


Figure A6. 1: Selected SSA countries fiscal deficits before and after the financial crisis

Appendix B6.1: Robustness checks

Table B6. 1: Cointegration test results for Botswana

Hypothesis (Min & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	23.4074	15.41	20.04	18.9593	14.07	18.63
$r \leq 1$	$r = 2$	5.3777	3.76	6.65	4.4481	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Min – Mineral rents, Exp – Government expenditure; *r* denotes the number of co-integrating vectors, 1980-2016 data sample was used.

Table B6. 2: Cointegration test results for Nigeria

Hypothesis (Oil & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	19.4404	15.41	20.04	12.5852	14.07	18.63
$r \leq 1$	$r = 2$	6.8551	3.76	6.65	6.8551	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Oil – Oil rents, Exp – Government expenditure; *r* denotes the number of co-integrating vectors, 1980-2016 data sample was used.

Table B6. 3: Cointegration test results for Equatorial Guinea

Hypothesis (Oil & Exp)		Trace statistics	Critical values		Max-Eigen statistics	Critical values	
Null	Alternative		5%	1%		5%	1%
$r = 0$	$r \geq 1$	17.9681	15.41	20.04	12.4711	14.07	18.63
$r \leq 1$	$r = 2$	5.4971	3.76	6.65	5.4971	3.76	6.65

Source: Author's estimates

Notes: Abbreviations: Oil – Oil rents, Exp – Government expenditure; *r* denotes the number of co-integrating vectors, 1980-2016 data sample was used.

Table B6.4: Model Based sustainability tests for selected SSA commodity producing countries

	Botswana			Equatorial Guinea			Nigeria		
VARIABLES	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic	Linear	Quadratic	Cubic
Lagged debt	0.691**	0.909**	1.007	1.341***	1.222**	-0.985	0.026	0.003	0.091
	(0.259)	(0.331)	(0.638)	(0.472)	(0.487)	(0.934)	(0.045)	(0.046)	(0.082)
Quadratic lagged debt		-0.053	-0.045		-0.008	0.053**		-0.001	-0.002**
		(0.043)	(0.064)		(0.010)	(0.019)		(0.001)	(0.001)
Cubic lagged debt			-0.002			0.001***			-0.000
			(0.010)			(0.000)			(0.000)
Output gap	0.394	0.500*	0.501	-0.693	-0.756	-0.717	0.139	0.105	-0.010
	(0.283)	(0.288)	(0.293)	(0.546)	(0.548)	(0.677)	(0.318)	(0.307)	(0.307)
Expenditure gap	-0.406	-0.294	-0.295	-1.532***	-1.578***	-0.879***	-0.431	-0.526*	-0.524*
	(0.313)	(0.330)	(0.337)	(0.155)	(0.159)	(0.174)	(0.274)	(0.269)	(0.263)
Real interest rates	-0.247	-0.304	-0.298	0.073	0.459	-0.410	-0.060	-0.123	-0.128
	(0.179)	(0.188)	(0.195)	(0.837)	(0.945)	(0.990)	(0.121)	(0.123)	(0.121)
Fiscal rules	6.608*	6.360*	6.342	-36.769	-39.781	22.904	-5.909	-5.138	-5.744
	(3.535)	(3.650)	(3.735)	(78.585)	(81.104)	(56.693)	(4.359)	(4.192)	(4.116)
Mineral price	-0.108	-0.112	-0.111						
	(0.067)	(0.069)	(0.071)						
Oil price				0.030	-0.031	0.348	0.073	0.049	0.055
				(1.160)	(1.179)	(0.868)	(0.062)	(0.061)	(0.060)
Constant	3.611	5.015	4.943	29.993	32.874	-47.904	-0.666	1.133	1.347
	(2.810)	(3.092)	(3.198)	(67.362)	(73.767)	(37.509)	(1.841)	(2.027)	(1.984)
Observations	34	34	34	34	34	34	34	34	34
R-squared	0.425	0.444	0.444	0.794	0.807	0.638	0.189	0.267	0.320
DW Statistics	2.08	2.05	2.05	1.85	1.84	2.09	2.08	2.13	2.11

Note: Standard errors are reported in parentheses *** denotes significance at 1 percent ** denotes significance at 5 percent and * denotes significance at 10 percent. All models control for serially correlated residuals using a Cochrane-Orcutt procedure.

Table B6. 5: Markov-switching sustainability tests for selected SSA commodity countries

		Botswana		Equatorial Guinea		Nigeria	
VARIABLES		Sustainable	Unsustainable	Sustainable	Sustainable	Unsustainable	Sustainable
Lagged debt		0.664***	0.319	0.628**	***1.232	-0.055	0.116***
		(0.221)	(0.279)	(0.318)	(0.327)	(0.036)	(0.033)
Real interest		-0.613***	-0.104	-0.266	0.863***	-0.294***	-0.173
		(0.187)	(0.175)	(0.343)	(0.158)	(0.082)	(0.107)
Output gap		0.284	0.623***	0.043**	0.131***	0.341	0.208
		(0.243)	(0.217)	(0.020)	(0.030)	(0.221)	(0.249)
Expenditure gap		-1.481***	-1.072***	0.010***	-0.039***	-0.616***	0.084
		(0.460)	(0.321)	(0.003)	(0.009)	(0.168)	(0.258)
Fiscal rules		0.921	4.957*	6.894***	-1.685	-21.549***	-1.759
		(1.924)	(2.866)	(1.511)	(1.266)	(5.655)	(2.251)
Mineral rents		2.037***	-2.506***				
		(0.599)	(0.454)				
Oil price				-0.028	-0.021	0.385***	-0.057*
				(0.022)	(0.019)	(0.084)	(0.031)
Constant		-4.345***	5.530***	-4.276***	2.756***	-9.413***	7.251***
		(1.233)	(1.147)	(0.755)	(0.722)	(1.819)	(1.210)
Regime invariant							
AR (1)		-0.191		-0.606***		-0.266***	
		(0.181)		(0.160)		(0.055)	
Log (Sigma)		1.032**		3.097**		2.174**	
		(0.000)		(0.000)		(0.000)	
Regime properties							
Transition	p_{11}	0.71		0.14		0.60	
	p_{22}	0.72		0.35		0.70	
Duration	d_1	3.4		1.1		2.5	
	d_2	3.7		1.5		3.4	
Ergodic Prob.	π_1	0.61		0.57		0.57	
	π_2	0.39		0.43		0.43	
Observations		34	34	34	34	34	34

Note: Standard errors, significance levels and other details as reported in Table B6.4.

Appendix C6.1: Debt sustainability framework

The concept of debt sustainability starts with the government financing constrain. The following dynamic equation helps to relate debt in period t to last period's debt plus debt service and primary balance.

$$B_t = (1+r)B_{t-1} - S_t \qquad B6.1$$

Where B_t is debt in period t, r is the interest on government debt and S_t is the primary balance. The above equation tracks the time path of public debt. We can also infer from the above equation that: if the government runs a primary balance equal to zero then the growth of public debt will depend on the interest rate. Iterating the Equation B6.1 forward n periods and summing up we get the following:

$$B_{t-1} = \sum_{j=0}^{n} \frac{R_{t+j}}{(1+r)^{J+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}} \qquad B6.2$$

Where G is government expenditures excluding interest payments and R denotes tax revenues. From B6.2 above, when the last term approaches zero the quantity of periods expands and the NPG will hold, that is

$$\lim_{n \to \infty} \frac{B_{n+1}}{(1+r)^{n+1}} = 0 \qquad B6.3$$

Equation B6.3 of the NPG states that the present value of public debt for the indefinite future converges to zero. Therefore, in order for the condition to be met, debt (B) must grow at a slower rate relative to interest rate (r). Furthermore, government shall not continuously meet interest payments obligations through issuance of new debt. If this condition is met, then Eq. B6.2 reduces to:

$$B_{t-1} = \sum_{j=0}^{n} \frac{R_{t+j}}{(1+r)^{J+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}} \qquad B6.4$$

Assuming that growth of debt over time is at a constant rate y then we can have

$$B_{t+j} = (1+\delta)B_{t+j-1}, \text{ for all } j,$$

it follows that Eq. B6.3 is equal to:

$$\lim_{n \to \infty} \left(\frac{1+y}{1+r}\right) B_0 \ = \ 0 \qquad B6.5$$

For Eq. B6.5 to converge to zero at which public debt grows must e less than the rate of interest rates in the economy or $y < r$.

Furthermore, the literature helps to relate the PVC to the accounting approach by assessing fiscal sustainability with a focus on public debt. Given that the current GDP (Y_t) is equal to the previous GDP (Y_{t-1}) the growth rate (g):

$$Y_t = (1+g)Y_{t-1} \qquad B6.6$$

We can transform Eq. B6.1 into ratios of GDP to get the following:

$$b_t = \left(\frac{1+r}{1+g}\right) b_{t-1} \ - \ s_t \qquad B6.7$$

Where the small letters refer to the ratio of GDP.

Rearranging Eq. B6.7 and solving for s we get:

$$s_t = \left(\frac{1+r}{1+g}\right) b_{t-1} \ - \ b_t \qquad B6.8$$

And when there is stability in public debt it will not grow overtime, or

$$b_{t-1} = b_t \qquad B6.9$$

In this case B6.8 and becomes:

$$s_t = \left(\frac{r \ - \ g}{1+g}\right) b_{t-1} \qquad B6.10$$

We can therefore deduce that debt depends on the differential of interest rates and GDP growth ($r - g$). If $g > r$, then public debt tends to stabilize even with a modest budget deficit. If $g = r$, public debt depends entirely on the primary balance. And if $r > g$, debt tends to keep on growing over time and requires a high primary balance to stabilize it.

Appendix D6.1: Stationarity and cointegration framework

Using the ADF and PP conditions, we estimate the following regressions:

$$\Delta X_t = \beta_1 + \beta_2 X_{t-1} + \sum_{i=1}^{k} \delta_i \Delta X_{t-i} + \varepsilon_t \qquad C6.1$$

Where Δ denotes the first difference operator, (X_t) denotes government revenue, expenditure, public debt and deficit respectively. δ_i, β_i are constant parameters and ε_t is the stationary stochastic process. The optimal lags are based on various specifications for both the ADF and PP. To establish the order of integration, C6.1 is adjusted by adding the second differences on lagged first and *k* lags of second difference given as:

$$\Delta^2 X_t = \lambda_1 \Delta X_{t-1} + \sum_{i=1}^{k} \mu_i \Delta^2 X_{t-i} + \varepsilon_{1t} \qquad C6.2$$

Where $\Delta^2 X_t = \Delta X_t - \Delta X_{t-1}$, λ and μ are constant parameters while ε_{1t} is a stationary stochastic process.

Appendix D6.2: Johansen Cointegration tests

The Johansen tests begins with a Vector autoregressive (VAR) of order *p* given as:

$$x_t = \mu + A_1 x_{t-1} + \ldots\ldots\ldots + A_p x_{t-p} + \varepsilon_t \qquad C6.3$$

Where x_t represents a $(n \times 1)$ integrated variable vector generally represented as *I(1)* while ε_t represents an $(n \times 1)$ innovation vector. There are two likelihood tests and they include the trace statistics and maximum eigen value statistics given as follows:

$$J_{trace} = -S \sum_{t-r+1}^{n} ln(1 - \hat{\beta}) \qquad C6.4$$

$$J_{max} = -Sln(1 - \beta_{r+1}) \qquad C6.5$$

S is used to determine the sample size, shows the biggest correlation. The Johansen model is advantageous as it can be used in estimation of several cointegrating relationships.

Appendix 6.1D: Description and Measurement of Variables

Table D6. 1 Description and Measurement of variables

Variable	Description	Source
Public debt	The ratio of total debt which includes domestic and foreign debt as a ratio of GDP. Debt levels put a constraint on the countries development as they endeavour to meet their debt obligations. Further, we expect a priori increase in lagged debt to respond positively with primary balance.	IMF/WEO & WDI
Primary balance	Is the governments net borrowing excluding interest payments and is calculated as $s_t = Revenue_t - Spending_t\ (less\ r_t)$.	IMF/WEO
Output gap	Is calculated as $\frac{(GDP_{actual} - GDP_{potential})}{GDP_{potential}}$. We use a standard HP filtered output gap measure taking the cyclical component of log of real GDP over the entire sample.	IMF & Authors calculations.
Expenditure gap	Is the cyclical component of public spending and we use the HP filter and choose our smoothing parameter $\lambda = 100$. It is calculated as $\frac{(Exp_{actual} - Exp_{potential})}{Exp_{potential}}$	IMF and Authors calculations
Real interest rates	Is the government borrowing rate adjusted for inflation as measured by the GDP deflator. It is taken as a proxy for the real interest rate on public debt.	WB & WDI
Fiscal rules	Is a dummy variable, with 1 when a fiscal rule in place and 0.	IMF database
Fiscal Rules Index (FRI)[1]	Index between 0 and 1 of the fiscal rule characteristics. We construct the FRI's using the characteristics as outlined in the FR's database.	IMF & authors construction

Note: IMF – International Monetary Fund, WB – World Bank, WEO – World Economic Outlook, WDI - World Development Indicators. [1]We follow Foremny 2014 to construct our FRI.

Table D6. 2 Summary of Empirical studies on fiscal and debt sustainability

Author(s), Year	Case study	Study period	Model(s) or Estimation strategy	Variables included	Key findings
Aldama et al. (2018)	USA	1940-2016	Bohn's tests & Markov switching	**Dependent:** Primary balance to GDP ratio **Independent:** Public debt, output gap, expenditure gap	Bohn's tests: No positive feedback of public debt on primary balance. Markov-switching: positive feedback of public debt on primary balance in sustainable regime.
Irungu et al. (2019)	Kenya	1963-2014	Markov-switching	**Dependent:** fiscal balance to GDP ratio **Independent:** public debt, output gap, expenditure gap & real interest rates	Positive feedback of public debt on primary balance in sustainable regime.
Baharumshah (2017)[1]	Malaysia	1980-2014	Markov-switching intercept autoregressive heteroskedasticity error correction model (MSIAH-ECM)	Dependent: Primary balance to GDP ratio Independent: public debt (total debt, domestic debt & external debt), government revenue and expenditure	The fiscal deficits path is sustainable except for Asian financial crisis and global financial crisis periods.
Ko et al. (2015)	Japan	1970-2011	Markov-switching VAR (MSVAR)	**Dependent:** primary balance to GDP ratio, discount factor & public debt.	Regime switch occurred in 1990s, Ricardian was adopted in first regime and no feedback effect of debt on primary balance in second regime. Domar growth strategy is adopted and reduces debt.
Doi et al. (2011)	Japan	1980-2010	Markov-switching	**Dependent:** primary balance to GDP ratio/tax revenue/average overnight call rate **Independent**: public debt, output gap, expenditure gap, deviation of real effective exchange rate & inflation rate	Primary balance does not positively respond to rising debt, thus, debt is explosive. They find active fiscal policy (tax revenue does not rise with increase in debt), monetary policy is passive (interest rates do not respond to a rise in inflation), therefore, debt is not sustainable.

Kia (2007)	Iran & Turkey	1970-2003 1967-2001	Cointegration tests Bohn's tests	**Dependent**: primary balance to GDP ratio **Independent**: public debt, output gap, expenditure gap, energy revenue to GDP ratio.	Fiscal budgets in both Iran & Turkey is not sustainable.
Neaime (2015)	Euro area	1977-2013	Unit root tests & Cointegration tests	Variables: Output, revenue, expenditure, debt, deficit, primary balance.	Under cointegration tests: sustainable fiscal policy in Germany & France, while in Ireland, Spain, Italy & Portugal they were sustainable in 1970s and 80s. Greece has unsustainable fiscal policy. Unit root tests: France, Italy, Greece, Ireland, Portugal & Spain unsustainable while Germany is sustainable fiscal policy.
Neaime (2010)	MENA	1960-2009	Unit root tests & Cointegration tests	**Variables:** budget deficit, government revenue, expenditure, public debt.	Strong sustainability of fiscal policies in Tunisia & weak sustainability in Egypt. Jordan & Turkey have unsustainable fiscal & debt while Morocco the results are mixed.
De Mello (2011)[1]	Brazil	1995-2004	Bohn's tests & Cointegration tests	**Dependent:** Primary balance to GDP ratio **Independent:** public debt, output gap, government revenue, expenditure & inflation.	Debt is found to be sustainable as primary balance positively responds to increase in public debt.
Bohn (1998)	US	1916-1995	Bohn's tests	**Dependent:** Primary balance to GDP ratio **Independent**: public debt, output gap & expenditure gap.	Debt is sustainable as primary balance is found to be an increasing function of public debt.
Elton Beqiraj (2018)	OECD	1991-2015	ECM Panel Cointegration	**Dependent:** cyclically adjusted primary balance to GDP ratio	There is a long-run relationship between public debt and structural primary balance

				Independent: public debt, debt to potential GDP, output gap & expenditure gap	which is negative, and the governments are not supporting actions to counteract public debt
Bravo Santos et al. (2001)	Euro area	1960-2000	Cointegration tests	**Variables:** Government revenue & expenditure	Fiscal sustainability in Austria, France, Germany, Netherlands and the UK. Belgium, Denmark, Ireland, Portugal, Italy & Finland have unsustainable debt.
Brady et al. (2017)	Italy	1862-2013	Unit root tests, Cointegration tests & Markov switching	**Variables:** Public debt and deficits.	Moderate debt & deficit in regime 1 and high public debt & deficit in regime 2. The results are persistent and that the sustainable state will persist for 30 years while unsustainable lasts 66 years.
Burger et al. (2012)	South Africa	1974-2008	Bohn's tests, TAR, State space & VECM	**Dependent:** primary balance **Independent**: public debt, output gap & expenditure gap	Fiscal policy has been sustainable during the sample period by primary balance reacting positively to increase in public debt.
Gabriel et al. (2010)[1]	Selected countries[2]	1975-2004	Markov-switching Cointegration model	**Variables:** Government revenue and expenditure	Fiscal policy has been sustainable during stable regimes as primary balance responds positively.

Source: Author's compilation

Notes: Abbreviations: MENA – Middle East & North Africa, OECD – Organisation for Economic Co-operation and Development, ECM – Error Correction Model, VAR – Vector Auto Regressive, VECM – Vector Error Correction Model and TAR – Threshold Auto Regressive Model. [1]Use quarterly dataset. [2]Selected countries include: South Africa, Bahamas, Finland, France, Thailand & US.

Chapter Seven

Contributions and Policy Implications of the thesis

7.0 Summary

In the previous chapters of this thesis, we have explored the relationship of Fiscal Rules, Fiscal Space and Debt Sustainability. Prior studies, such as Heller (2006), Aizenman and Jinjarak (2010) and Romer and Romer (2019) on measurement of fiscal space, Reuter (2018) on compliance of fiscal rules, Nerlich and Reuter (2016) on the efficacy of fiscal rules on fiscal space, and Aldama and Creel (2018) and Everaert and Jansen (2018) on fiscal sustainability, provide the key background on the relationships examined in these thesis chapters.

We began by examining the concept of fiscal space in Chapter three, as this is commonly cited as a constraint (and goal) of fiscal policy. We extended the work of Aizenman and Jinjarak (2010) and developed our own definition of *hybrid fiscal space* as the difference of the country's *debt/GDP* ratio relative to the group mean ratio. Our data is based on a sample of 57 fiscal rules in 20 Sub-Sahara Africa countries provide an explicit overview of fiscal rules in SSA and the determinants for individual fiscal rules compliance among specific characteristics and other fiscal frameworks.

We investigated the compliance to fiscal rules using logit and IV Probit models. The findings in the chapter suggest that the overall compliance rate is high at 54% but with significant heterogeneity. Further, the numerous econometric analyses undertaken reveal that, overall, monitoring and adoption of rules by central governments turn out to be significantly associated with higher probability of compliance. In addition, institutional factors like corruption and government effectiveness seem to affect compliance. The findings show that corruption is associated with lower probability of compliance, while regulatory quality is associated with higher probability of compliance. Similarly, the quality of regulations seems crucial in the compliance agenda, as it increases the compliance rate when the quality is high.

Chapter five evaluates the effect of fiscal rules on fiscal space in presence of institutions. The two Stage Least Squares (2SLS) and fixed effect models are employed. The findings in this chapter suggest that fiscal rules enhance fiscal space. The overall findings show that the use of fiscal rules enhanced fiscal space and institutional design plays a significant role on the effectiveness of fiscal rules. The revenue and balanced budget rules seem to dominate in enhancing fiscal space. Thus, policy transparency and commitment to effective governance can help scale up fiscal space in SSA. In addition, the findings in the chapter indicate that the effect of the combination of rules varies across different rules. The findings show that a combination of the debt and revenue rules or balanced budget and revenue rules yields higher fiscal space.

Chapter five examines the effectiveness of fiscal rules on fiscal space while Chapter six assesses the sustainability of debt in SSA. The findings of the two chapters are greatly related as underscored by the thematic area of this thesis.

Chapter six investigates the conduct of debt sustainability in SSA with the objective of highlighting public debt sustainability and macroeconomic implications of fiscal solvency thereof. Firstly, we conduct unit root tests for fiscal data in SSA which revealed, except for Kenya and Equatorial Guinea, that budget deficits are sustainable for all SSA countries. Secondly, we conduct cointegration tests for government revenue and expenditure. The empirical test results, reveal the presence of cointegration between revenue and government expenditure and thus, indicating fiscal sustainability in SSA. Thirdly, we estimate different specifications of Bohn's sustainability tests. The estimates reveal fiscal sustainability in Botswana, Burkina Faso, Equatorial Guinea and Cape Verde. For Kenya and Nigeria, the results do not allow for rejection of fiscal unsustainability: the feedback coefficient on public debt is not significant. Further, for Nigeria and Burkina Faso, the results provide evidence of fiscal fatigue. Fourthly, we estimate a Markov-switching regime changes with fiscal rules and without. The Markov-switching allows us to identify the sustainable and unsustainable regimes for fiscal policy prescriptions.

The Markov-switching results without fiscal rules reveal that on average, about 3-year period of fiscal policy postponement does not preclude future sustainability in Kenya as long as fiscal consolidation lasts for 3 years. For Botswana, on average a 6-year period of fiscal policy

consolidation postponement does not preclude future sustainability, it provides fiscal policy consolidation that lasts for 1 year on average. For Burkina Faso, a 1-year fiscal policy consolidation delay does not affect future sustainability as long as fiscal consolidation takes 1 year. For Equatorial Guinea, on average 29-year period of fiscal policy delay does not preclude future sustainability as long as fiscal policy consolidation takes about 4 years. In Nigeria, a 2-year period of fiscal policy postponement does not preclude future sustainability as long as fiscal consolidation takes on average 4 years. For Cape Verde, on average a 4-year period of fiscal policy consolidation delays cannot preclude future fiscal policy consolidation, provided fiscal policy last for 3 years. We find that with the introduction of fiscal rules in our Markov-switching specification improves our results significantly. As such, some countries have both regimes to be sustainable. In the case of unsustainable or a weakly sustainable regime, fiscal policy rules play a significant role to enhance primary balance response to increase in public debt.

Additionally, our results in Chapter five reveal that a combination of the debt rule and either the revenue rule or balanced budget rule results in higher fiscal space and hence fiscal sustainability. This result corroborates the findings in Chapter six that the debt rule is important for fiscal sustainability. Indeed, as noted in Chapter six the introduction of the debt rule results in both regimes one and two in Botswana and Cape Verde to be sustainable. These findings show that the choice and combination of fiscal rules plays an important role in enhancement for fiscal space and improvement of fiscal sustainability.

7.1 Contributions

This Ph.D. thesis adds to the body of knowledge on fiscal rules, fiscal space and debt sustainability, and each of the main chapters tries to make a significant contribution. The thesis is perhaps notable for the broad range of analytic techniques employed to assess underlying relationships.

The literature is rapidly increasing on fiscal rules and their implications for fiscal sustainability and fiscal space among different countries and there has been an increase in the adoption of fiscal rules across countries. We interpret this trend as a desire by the public for increased rules and hence predictability in fiscal policy, as opposed to a purely discretionary agenda. The use of fiscal rules may be following in the popularity of inflation targeting for monetary policy, which similarly provides a more rules-based approach. This desire for a rules-based approach and more

predictability is becoming more popular in developing countries and Africa in particular. It may also reflect a distrust of the policy makers or at least the traditional deficit bias of fiscal policy makers.

Moreover, the implementation of fiscal rules is geared towards fiscal sustainability thus, it is important to examine the efficacy of rules on fiscal sustainability especially in developing countries like SSA. Most importantly, the extent to which SSA's have adopted fiscal rules as part of their legal systems to enhance fiscal prudence deserves some special analysis to deepen the understanding of rules in the region.

The present study makes several contributions to the existing empirical literature. First, the concept of fiscal space is complex and rather loosely used in policy circles. Here, we have reviewed the empirical literature and added some additional nuance to the measure of fiscal space by taking the difference of group mean of public debt to tax revenue ratio and the actual public debt to tax revenue ratio. We test the efficacy of our measure of fiscal space to detect fiscal distress and find it effective.

Second, although the adoption of fiscal rules has increased in recent times, empirical evidence on the compliance of fiscal rules has not been thoroughly explored, especially for developing countries like SSA[75]. The present study examines the missing link between adoption and compliance of fiscal rules through the lenses of developing countries, which hitherto has not received much attention.

Third, the thesis empirically examines the theoretical and empirical literature on the effectiveness of fiscal rules on fiscal space. By doing so, the study combines fiscal rules, government effectiveness and corruption literature to determine whether individual or a combination of fiscal rules can enhance fiscal space and whether institutional factors play a key role in advancing the efficacy of rules. In particular, the study reveals that fiscal rules are important in enhancement of fiscal space and their efficacy increases when supported by an effective governance system.

[75] Perhaps with the exception of Reuters (2018) for the Euro Area.

Moreover, the study establishes that a combination of fiscal rules may work better for enhancement of fiscal space.

Fourth, this study investigates the sustainability of public debt by trying to use a small but representative group of SSA countries as the testing ground. We provide a linkage of fiscal policy change and fiscal rules in two regimes to ascertain whether fiscal policy is sustainable or unsustainable. Moreover, we brought to bear a variety of advanced techniques, which should increase the robustness of the findings and encourage their usage by future researchers.

From a fiscal rule's compliance front, our analysis in this thesis reveals that monitoring and adoption of rules by central governments are associated with higher probability of compliance. Further, institutional factors that include corruption and regulatory quality seem to affect compliance of fiscal rules. The analysis finds that corruption is correlated with lower probability of compliance, while regulatory quality is associated with higher probability of compliance. Therefore, the efficacy of institutions is important in the realization of fiscal prudence, thus compliance of fiscal rules. The current efforts by SSA countries supported by the IMF and the World Bank to improve transparency in public institutions will help improve fiscal rules compliance. Crucially, the political economy variables via the election cycles are associated with lower probability of compliance especially on tax revenue. This finding calls for political prudence especially during election periods to ensure compliance with fiscal rules and this will help mitigate on fiscal distress and enhance accelerated economic development.

Our analysis of the effectiveness of fiscal rules on fiscal space in chapter five reveals that rules enhance fiscal space and the design of institutional plays an important role to improve the efficacy of fiscal rules. The findings in this thesis shows that the revenue and balanced budget rules dominate in enhancement of fiscal space. This finding indicates that fiscal policy transparency and commitment to effective governance can help scale up fiscal space in SSA. We also find that the effect of a combination of rules varies across different rules. Most important is that a combination of debt rule and revenue rules and balanced budget and revenue rules yields higher fiscal space.

Furthermore, the analysis of fiscal and debt sustainability in Chapter six shows that implementation of fiscal rules cushions the country against different regimes that a country undergoes. In particular, the analysis using the Markov-switching framework without fiscal rules show that the selected group of countries experience both sustainable and unsustainable fiscal policy regimes. In particular, in a sustainable regime, the primary balance responds positively to an increase in public debt while the converse applies in unsustainable policy regime. However, the introduction of fiscal rules in the Markov-switching specification improves our results significantly. The results show that some countries have both regimes as sustainable. In the case of unsustainable or a weakly sustainable regime fiscal policy rule plays a significant role to enhance the primary balance's response to increases in public debt. The findings reveal that continued effort to adopt and reform fiscal rules in SSA are in the right direction and will result to improved fiscal discipline.

In short, it is expected that this thesis will illuminate an explicit framework on ways of assessing the effectiveness of fiscal rules to enhance fiscal space and fiscal sustainability in developing countries in addition to SSA. We also hope that the findings herein will inform fiscal policy-makers with improvements in fiscal policy management and reduce the possibility of public debt crises in SSA as well as other developing countries.

7.2 Policy Implications

First, the present study has developed a simple measurement of fiscal space, by taking into account assured and long-term revenue available for ensuring fiscal sustainability. This is because there has been a myriad of measurements for fiscal space that have varied over time with no clear-cut approach. Furthermore, the study subjected the present measure of fiscal space to test its ability to assess the probability of fiscal distress. Indeed, this brings to the fore a new measure of fiscal space and its ability to detect fiscal distress in a country. Hence as a policy recommendation, it is important that countries enhance adopted measures of fiscal space that have the ability to detect fiscal distress to signal policy makers of interventions to be put in place.

Second, from the study we establish that monitoring and adoption of rules by central governments turn out to be significantly associated with higher probability of compliance. This finding

underscores the need for SSA countries to enhance their public finance management ability through capacity building in order to monitor and enforce the implementation of fiscal rules. Furthermore, it will be important for SSA countries to utilize the limited resources at the central government to enhanced fiscal policy management. Similarly, institutional factors seem to affect compliance. In particular, corruption turn out to be associated with lower probability of compliance, while regulatory quality is associated with higher probability of compliance. This therefore means that efforts within governments to mitigate on rising corruption should be stepped up and countries should endeavour to enhance regulatory quality, as this gives them room for resource mobilisation through the taxation channel. Therefore, as a policy recommendation, it is important that policy makers scale up anti-corruption efforts through increased transparency and accountability in the public sector. Furthermore, it is in the best interest of SSA countries to continue improving the regulatory quality via human capital development. Moreover, political economy variables via the election cycles are correlated with lower probability of compliance especially on tax revenue. This calls for policy makers to strengthen capacity on public financial management to mitigate on increased spending and borrowing during the election periods. Indeed, there is need to build capacity of fiscal councils to enable provision of policy advise to mitigate the deficit bias. Furthermore, to enhance anti-corruption efforts and fiscal council operations they should be capacitated and independent mandate to undertake their assignments.

The findings of this study reveal that fiscal rules enhance fiscal space and institutional design plays a significant role on the effectiveness of fiscal rules. The study uses a new instrumental variable to examine the efficacy of fiscal rules on fiscal space. This is a key contribution in empirical literature as some of the previously used instruments, for example, regulatory quality used by Debrun (2008) do not hold. Similarly, the type of fiscal rule determines the influence on fiscal space. In particular, we establish that revenue and balanced budget rules seem to dominate in enhancing fiscal space. Therefore, there is need for enhanced policy transparency and commitment for effective governance in SSA. Additionally, there is need to scale up tax revenue to enhance spending and foster economic development. Our analysis also establishes that the effect of the combination of rules varies across different rules. Therefore, a combination of debt rule and revenue rules and balanced budget and revenue rules yields higher fiscal space. Therefore, as a matter of policy recommendation a combination of two rules is optimal for prudent fiscal

management. Relatedly, policies geared towards strengthening a combination of debt and revenue rules and balanced budget and revenue rules should be scaled up. More specifically, policies to enhance tax revenue will be important to enhance resource mobilisation and mitigate a debt surge.

Additionally, the findings from this study show varied outcomes on fiscal sustainability. Importantly, using a four-pronged approach, we establish that presence of fiscal sustainability in all the selected countries. Moreover, our findings indicate correlation between government spending and revenue thus offering a cogent snapshot of the need for countries to enhance resource mobilization ability to match spending needs in SSA countries. Further, the findings in this study reveal the presence of two regimes that are sustainable or unsustainable. This calls for policy reforms geared towards increasing revenue via the tax channel. Given the volatility of oil revenue due to the changes in global oil prices, tax revenue offers a reliable and sustainable source of resource mobilization. Relatedly, our findings establish that the use of fiscal rules mitigates the effects of the unsustainable regime. This shows that fiscal rules offer a powerful tool to cushion the economy in periods of recessions. It is instructive for SSA countries to strengthen their fiscal rules via monitoring and enforcement, and other mechanisms to enhance their efficacy.

Further, there is need for immediate fiscal reforms to ensure that observed deficits do not translate into explosive public debts leading to a further call for debt reliefs. The continued fiscal reform efforts among SSA countries geared tax revenue will enhance the effectiveness of fiscal policy response to increased public debt. Similarly, spending should be undertaken in sectors that have long-term returns to guarantee future revenue in an environment of limited fiscal revenue and fiscal rules should contain clear escape clauses to accommodate public spending for development during periods of emergency or crisis. Furthermore, there is need to strengthen fiscal rules and supported by fiscal councils and research to keep up with the changing dynamics. To strengthen the application and use of fiscal rules, there is need for capacity building in public financial management to public officers tasked with responsibility of implementing fiscal policy. For commodity countries like Equatorial Guinea and Nigeria there is need to realign their fiscal rules to the changing commodity prices in order to cushion the country during periods of commodity revenue. Further, the revenue realised during oil windfalls should continue being saved in the sovereign wealth funds as well as invested in development projects to sustain the country in the long run.

In general, the application of fiscal rules for fiscal policy management has revealed from our findings the ability to enhance fiscal space improve fiscal sustainability among SSA countries. Therefore, targeted mechanisms to strengthen fiscal rules to be more responsive to country development needs will help avoid debt distress that previously engulfed the region.

7.3 Future Research

This thesis has emphasized that fiscal policy rules are useful to enhance fiscal space and debt and fiscal sustainability. We have briefly examined the issue of compliance to those fiscal policy rules and their effectiveness, but more research in these areas is warranted, particularly in regard to the relationship with different regimes. In Chapter four it would be important to examine the regime changes on the compliance rates of fiscal rules via the regime shifts logit models. This can help to track a policy regime in accordance with the tenets of the rules employed to ensure effective fiscal policy compliance.

In Chapter five, further research can examine the role of the political economy on the effectiveness of fiscal rules. There is need to look at the effect of fiscal rules on fiscal space at the individual country level to shed more light on country differences and policy interventions that are country specific. Further, the effect of fiscal rules on fiscal space can be broadened to include their welfare effects in a general equilibrium model. This may have policy implications on the welfare effects and perhaps motivate more countries to adopt fiscal rules. It will also be important in future for research to be undertaken by considering the comparison between countries using fiscal rules and those not using rules. Finally, in Chapter five, the link of fiscal sustainability to monetary policy could help shape policy on economic stabilisation.

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