



Essays on Current Account Dynamics and Fiscal Rules in sub-Saharan Africa

by

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Declaration

I hereby declare that this thesis is my original work and where other people's work has been used, an acknowledgement has been made accordingly. I further declare that neither the whole work nor any part of it has been previously submitted for the award of a degree in this or any other university.

Signed by candidate

Kenrick Otieno Ayot.

Dedication

In loving memory of my mum, Mrs. Millicent Ayot and dad, Mr. John Ayot as well as my granny, Mrs. Meresiah Odilla for their tender loving care

To my dear wife, Purity and our lovely children

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List of Acronyms

ADF	Augmented Dickey-Fuller test
AERC	African Economic Research Consortium
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
AREF	African Review of Economics and Finance
ASEAN	Association of Southeast Asian Nations
CEMAC	Central African Economic and Monetary Community
CIPS	Cross-sectionally augmented Im-Pesaran-Shin
DFE	Dynamic Fixed Effects
DiD	Difference in Differences Estimator
DOLS	Dynamic Ordinary Least Squares
EAMU	East African Monetary Union
ECT	Error Correction Term
FE	Fixed Effects
FRL	Fiscal Responsibility Laws
G7	Group of Seven Countries
GDP	Gross Domestic Product
GMM	General Methods of Moment
HIPC	Highly Indebted Poor Countries
HP	Hodrick-Prescott
IBC	Intertemporal Budget Constraint
ICA	Intertemporal Approach to Current Account
IMF	International Monetary fund
IPS	Im-Pesaran-Shin
IV	Instrumental Variable
LM	Lagrange Multiplier
MG	Mean Group
NFA	Net foreign Assets
OECD	Organisation for Economic Cooperation and Development
PCA	Principal Component Analysis
PDOLS	Panel Dynamic Ordinary Least Squares
PMG	Pooled Mean Group
POSET	Partially Ordered Set
SSA	sub-Saharan Africa
SURADF	Seemingly Unrelated Augmented Dickey-Fuller test
UCT	University of Cape Town
UK	United Kingdom
UNCTAD	United Nations Conference for Trade and development
US	United States
VAR	Vector Autoregressive
WAEMU	West African Economic and Monetary Union
WDI	World Development Indicators
WEO	World Economic Outlook
WGI	Worldwide Governance Indicators

Abstract

Large and persistent current account and fiscal deficits coexisting alongside high public debt levels pose significant risks to macroeconomic stability and limit policymaking options. This thesis focuses on the current account dynamics and fiscal policy in the sub-Saharan Africa region. Over the past two decades, countries in this region have experienced large and persistent current account and fiscal deficits as well as a recent upsurge in public debt. In response to this situation, these countries are beginning to adopt fiscal rules whose primary objective is to rein in discretionary fiscal policy. This thesis examines the attendant issues within a broad context of three interrelated empirical studies, presented in separate chapters.

The first study (chapter two) examines the overall sustainability of current account balances in sub-Saharan Africa and evaluates the pattern of current account adjustment in the region. The common approach for testing current account sustainability involves testing the violation of the intertemporal budget constraint. This was implemented by testing for a cointegrating relationship between exports and imports plus net interest payments on external debt using a panel error correction model. Based on a sample of 35 sub-Saharan Africa countries from 1980-2017, the study found evidence that current account balances are weakly sustainable in the region. In addition, countries in the region face a gradual current account adjustment pattern. On average, it takes six years for the current account to return to its long-run equilibrium after a disturbance, exposing these countries to prolonged spells of current account deficits and rising debt levels when corrective measures are not put in place.

The second study (chapter three) examines the twin deficit hypothesis, or the effect of fiscal deficit on the current account deficit, and how the level of public debt impacts this relationship. Empirical studies that test this hypothesis often arrive at mixed results, possibly due to the omission of debt threshold effects on the current account. Thus, debt thresholds were included in the model used in this chapter. Using 2000-2016 data from 33 sub-Saharan Africa countries, a linear dynamic panel data model was estimated to address the twin deficit question. Next, a dynamic panel data threshold model was estimated to investigate how different debt regimes affect the twin deficit relationship. The empirical results for the linear model show that the fiscal deficit worsens the current account—thus the twin deficit hypothesis holds. However, introducing a debt threshold into this model resulted in different outcome. Based on an endogenously determined threshold level of debt,

which splits the sample into low and high debt regimes, the results reveal that the fiscal deficit continues to worsen the current account in the lower debt regime, whereas in the higher debt regime the pattern changes and the fiscal deficit loses its effect on the current account. These findings point to the uncertain effects of fiscal policy on the external imbalance when public debt reaches high levels.

The third study (chapter four) examines the overall impact of fiscal rules on fiscal performance in the sub-Saharan Africa region. In addition, it evaluates whether there are any differences in fiscal performance between countries with and without the fiscal rules. The study used the fiscal balance as a measure of fiscal performance, while a time varying composite fiscal rule index was used to capture the effects of fiscal rules. The fiscal rule index was based on the updated IMF's fiscal rules dataset. Baseline regression examined the effect of fiscal rules on fiscal performance and a fiscal policy reaction function was estimated on 1997-2015 data from 24 sub-Saharan Africa countries that implemented these rules. The regression results suggest that fiscal rules improve fiscal performance. In particular, the fiscal rules for the budget balance, debt and revenue, are found to have positive and significant effects on fiscal performance. The same regression was repeated based on supranational rules. The results reveal that supranational rules are more effective compared to national rules. The second part of the empirical analysis compared the fiscal performance between these 24 countries that have fiscal rules and 16 countries that do not implement the rules. The time period was also expanded to include 1980-1996, prior to adoption of fiscal rules. A difference in differences model was then estimated using the treatment effect method. The results reveal that there is a significant improvement in fiscal performance for countries which have fiscal rules compared to those without fiscal rules. The main conclusion from this exercise is that fiscal rules have been effective in instilling fiscal discipline in the region; therefore, there is significant benefit for countries to adopt fiscal rules.

This research supports the view that there is a causal relation between the fiscal deficit and the current account balance in most sub-Saharan Africa countries. The nature of this dynamic relationship appears to depend largely on the level of public debt. Thus, fiscal rules present an effective instrument to influence the fiscal deficit and therefore the current account balance.

Chapter 1

Introduction

1.1 Background and Motivation

The debate on whether the current account is relevant to a country's overall economy has featured prominently in both academic and public policy discourse (Corden, 1994; Edwards, 2004). The past two decades have witnessed an increase in current account imbalances across the world. While most countries located in the oil exporting region and emerging economies in Asia have recorded surpluses in the current account, a significant majority in developing countries face large and persistent current account deficits. Most of developing countries are vulnerable to macroeconomic shocks due to limited buffer against such shocks hence running current account deficit is seen as a strategy to smooth consumption. This argument is supported by Friedman (1953), Ando & Modigliani (1963) and Hall (1978), who view the current account as a buffer or shock absorber for smoothing consumption in the wake of transitory shocks to changes in output, investment and government expenditure.

Although there is validity in consumption smoothing argument for current account deficit, the economic tumult experienced in Mexico due to the peso crisis in 1994 coupled with the 2007/8 global financial crisis and the Eurozone crisis, especially in the peripheral European countries, has prompted a rethink. It is a commonly held view that current account is an important indicator of economic performance. Hence, a large and persistent current account deficit is a sign of trouble ahead (Donoso & Martin, 2014). A deficit level exceeding 5 percent should flash a warning light especially if it is financed through short-term debt or foreign exchange reserves (Milesi-Ferretti & Razin, 1996; Summers, 1996). In advanced economies, a level ranging between 4 and 5 percent is enough to trigger economic forces which could change the trajectory of current account, raising cause for concern (Mann, 2002). At the same time, persistent deficit may be viewed as a reflection of underlying distortions in the economy (Camarero et al., 2013).

The level of deficit gives an indication of the ability of a country to borrow and the willingness of lenders to advance credit. A country that runs persistent current account deficits accumulates

foreign liabilities. This may not be bad provided that resources are directed toward investment rather than consumption spending as this creates future growth opportunities that allow the debt to be serviced. However, when resources are not put to proper use and the deficit grows quickly, a country may fail to meet its debt obligations that can pose significant challenges to its macroeconomic stability. When the current account deficit becomes persistent, the exchange rate depreciates, puts pressure on debt service, and poses significant threat to intergenerational equity (Sahoo et al., 2016).

Most countries in sub-Saharan Africa (SSA) have experienced large and persistent current account deficits over the past three decades. It is also worth noting that these countries have had large and persistent fiscal deficits. More than half of the countries in the region have a level of fiscal deficit exceeding 4 percent of GDP. The few exceptions were the oil exporting countries of Nigeria and Angola, but even these have lately come under increasing pressure due to frequent fluctuation in commodity export. This emerging trend of large and persistent current account and fiscal deficits existing side by side rekindles memories of the twin deficit debate prevalent in the United States in the 1980s during the Reagan administration¹. At the heart of the twin deficit argument is the hypothesis that current account deterioration is largely attributed to the fiscal deficit. Due to the dominant role of the public sector in sub-Saharan Africa, fiscal deficit could be a major driver of current accounts fluctuations.

In a bid to deliver on their mandates, many governments in sub-Saharan Africa face growing spending pressures that are not adequately financed by the limited revenue options. The growth of total revenue has not matched the growth of overall government spending in the region. The slow growth in revenue can be attributed to commodity related revenues shortfalls from key exports that form a significant share of the budgetary revenue for many countries in sub-Saharan Africa. The most affected countries are oil exporters such as Nigeria and Angola. The boom in global commodity prices that began in the early 2000s dissipated after prices began to fall in 2011 due to weak global demand. In addition, the revenue streams to fragile states² also face an uncertain

¹ During the tenure of President Ronald Reagan (1981-1989), the United States experienced simultaneous increase in current account deficit and fiscal deficit.

² These are states faced with political uncertainty or instability due to civil conflicts and weak institutions. Among the fragile SSA states are Burundi, South Sudan, Democratic Republic of Congo, Chad, Central African Republic and Zimbabwe.

future due to reductions in aid flows. The sub-Saharan Africa region further faces challenges in containing the rising expenditure pressures driven mainly by a push to implement major infrastructure projects, the rising costs of servicing public debt coupled with the need to extend social safety nets and pro poor programs aimed at addressing rising poverty levels (Berg et al., 2009). Furthermore, similar to most developing countries, fiscal policy has largely been procyclical in this region with the trend being more pronounced in resource rich countries (Konuki & Villafuerte, 2016). Procyclicality arises when fiscal policy tends to be expansionary in good times and contractionary in bad times. This is possibly driven by political economy pressure to increase spending in good times. Procyclicality is undesirable as it amplifies the business cycles, making the booms larger and recessions deeper.

Debt financing is the dominant mode for financing current account and fiscal deficits in the sub-Saharan Africa region. The capital markets with the potential to act as alternative avenues for mobilizing private sector resources are narrow and underdeveloped. The region heavily relies on both domestic and foreign public borrowings hence raising the levels of public debt. The only countries whose debt levels have not risen significantly are the oil exporters and Highly Indebted Poor Countries (HIPC)³ relief recipient countries. Debt accumulation in less developed countries may be driven by lack of political consensus, which requires more spending to satisfy all stakeholders. It is understandable for countries to accumulate debt as a mode of bridging financing shortfalls, but the levels become of concern when they exceed some thresholds. The IMF in 2005 introduced the debt sustainability framework as a tool for assessing sustainable debt thresholds for developing countries. According to this framework, countries are classified based on policies, quality of institutions and macroeconomic prospects such that a threshold of 35 and 55 percent of GDP is set for a country with weak and medium quality institutions respectively. For countries with strong institutions, the threshold is set at a much higher level of 70 percent. Most countries in sub-Saharan Africa region fall in the category of weak institutions with only a few with medium quality institutions. Thus, the HIPC initiative offered much needed relief for most countries already burdened by public debt in the region. As a result, the aggregate level of public debt in the region substantially declined to 24 percent of GDP in 2008 down from 67 percent of GDP in 2000.

³ The Highly Indebted Poor Countries initiative is a joint IMF and World Bank program that writes off or forgives debt owed by poor countries after meeting certain set conditions.

However less than a decade later, this trend has reversed substantially. Based on a 2018 report of the Regional Economic Outlook for sub-Saharan Africa by the IMF, the median level of public debt was above 50 percent of GDP by the end of 2017.

The coexistence of high public debt with large and persistent current account and fiscal deficits, poses significant risks to macroeconomic stability. It also restricts the policy choices available to policymakers. For instance, a persistent current account deficit not only exerts negative multiplier effects on growth but also increases exposure to currency crisis due to falling foreign exchange reserves. This is particularly problematic for small developing economies that usually struggle to attract more inflows. The current account deficit can also contribute to the depreciation of the exchange rate which impacts the cost of living and triggers an inflationary spiral. Similarly, a persistent fiscal deficit is problematic if it raises interest rates, that could crowd out private investment and reduce consumption. These effects are a major drag on GDP growth, and the risks are further elevated in a high debt environment where conducting fiscal policy becomes uncertain. With rising debt, investors increasingly become wary as the risk of default grows. At the same time, the risk premia increase makes it even more difficult for government to service existing debt. Consequently, few options remain available for fiscal stabilization (Combes, Minea, & Sow, 2017).

As the economic theory postulates, the fiscal deficit drives the current account deficit; therefore, the fiscal policy becomes a major tool for controlling external imbalances. In other words, resolving the current account deficit, simply requires a reduction in the level of fiscal deficit in the economy. Some of the foremost fiscal reform packages proposed to address growing fiscal deficits are fiscal rules. The essence for adoption of fiscal rules is to reign in discretionary fiscal policy which is likely to breed government failures and incentive structures promoting deficit bias. In this regard, as a tool of fiscal governance, properly designed and implemented fiscal rules can help reduce fiscal deficit bias and the time inconsistency problem in fiscal policy, as well as strengthen the commitment of the authorities to fiscal adjustment (Ter-Minassian, 2010). In addition, rules can correct perverse incentives in policymaking, such as the common pool problem and government shortsightedness. In other words, well designed fiscal rules can result in improved fiscal outcomes through disciplinary effects which can in turn impact the current account balance.

The link between fiscal rules and current account balance can be both direct and indirect. For the direct channel, fiscal rules affect the current account balance through interest rates. A strong fiscal institutional framework can lower interest rates on bonds issued by the government which can lead to a further fall in the general interest rates in the economy (Hallerberg & Wolff, 2008; Iara et al., 2011; Johnson & Kriz, 2005). While this reduces capital inflows, it enhances consumption and investment that contributes to the depreciation of exchange rate, which could further impact the current account (Abbas et al., 2011; Baxter, 1995). Such a conclusion points to a direct association between fiscal rules and the current account balance. For the indirect channel, a country with strong fiscal institutions in terms of budget-making processes and executions as well as an adherence to the set fiscal or debt limits is likely to experience improvement in the fiscal balance (Debrun et al., 2008; Nerlich & Reuter, 2013). This relationship can create spillover effects on current account balance considering the close linkage between the current account and fiscal balances.

Until the last two decades, fiscal rules were prevalent in advanced and emerging economies but few countries in the sub-Saharan Africa region had fiscal rules. However, this trend is changing as adoption of fiscal rules in this region is steadily picking up. The last two decades have seen a significant increase in countries with fiscal rules in this region, with more than double the number in the past two decades. Most of these rules are supranational in nature as compared to national rules. Despite this leap, the level of fiscal deficit remains high in the region and it is not clear whether the rules have had any significant impact on fiscal performance.

The issues highlighted above about current account, fiscal deficit and the fiscal rules form the basis of the three distinct yet interrelated empirical studies in this thesis. The first examines whether the current account balances are sustainable in the sub-Saharan Africa region. In addition, it evaluates the pattern of current account adjustment in the region. The second probes the effect of fiscal deficits on current accounts and considers whether this relationship is in direct relation to the level of indebtedness in the economy. The third investigates the effect of fiscal rules on fiscal performance and analyses differences in fiscal performance between countries with and without the fiscal rules.

1.2 Overview of Empirical Chapters

The first study examines whether the levels of current account balances experienced in sub-Saharan Africa are sustainable. The chapter goes beyond the question of sustainability to also assess the pattern of current account adjustment in the region, that is, how long it takes for countries to return back to a sustainable path in the event of disequilibrium. Current account sustainability is closely linked to solvency. The economy is solvent if it can service its net foreign liabilities without defaulting on them (Milesi-Ferretti & Razin, 1996). Solvency is theoretically defined in relation to the intertemporal budget constraint (IBC). In this sense, an economy is solvent if the current level of external debt is equal to the present value of the future trade surpluses. Therefore, a formal way of determining the solvency of economy is to test for violation of the IBC. Intuitively, a sustainable current account is understood to be one that does not violate the IBC. According to the literature, the common approach to test this hypothesis is to check whether past current account series follow a stationary process or if there is cointegration between the components of current account (Taylor, 2002; Trehan & Walsh, 1991). Such evidence in the data forms the basis for concluding that the current account balance is consistent with solvency and hence sustainable. This thesis adopts the latter approach that is based on the cointegration of current account components namely exports and imports including interest payments on external debt. This method is preferred as it enables the study of both the dynamics of current account adjustment as well as the strength of sustainability.

Existing studies on current account sustainability yield mixed results, showing that the conclusion on current account sustainability depends on the approach and estimation techniques used. Most studies in the SSA region are based on stationarity tests (Chu et al., 2007; Hashiguchi & Hamori, 2012; Holmes, 2003). Such an approach is limited when investigating the strength of sustainability and the adjustment path back to equilibrium when the current account deviates from its equilibrium path. This thesis extends the literature and differs from existing studies on the region in several respects. Firstly, in addition to investigating whether the current account is sustainable or not, this study evaluates the strength of sustainability. Secondly, this study uses an error correction framework that allows for analysis of how the adjustment process of current account imbalances differ across countries in the region. This technique allows for comparison of the speed of adjustment back to equilibrium across the countries when the current account balance is off the

equilibrium path. Using a panel error correction model on data from a sample of 35 of the SSA countries for 1980-2017, the evidence suggests that largely current account balances are weakly sustainable in the region with 16 out of 35 countries showing evidence of unsustainable balances. In addition, these countries face gradual current account adjustment patterns as it takes an average of six years for the current account to return to its long-run equilibrium after disturbance.

The second study investigates the effect of the fiscal deficit on the current account deficit and further assesses whether this relationship depends on the level of public debt. This study is motivated by the fact that studies testing the twin deficit relationship often arrive at mixed results. Whereas some studies show evidence of the twin deficit holding true, in the sense that the fiscal deficit contributes to the deterioration of the current account, others find that fiscal deficit improves the current account. The latter group of studies conform to the twin divergence hypothesis after Kim & Roubini (2008). Moreover, other studies find no significant relationship between fiscal and current account deficits in line with the Ricardian equivalence hypothesis. A possible explanation for mixed findings in testing this hypothesis is that the models used do not account for threshold effects in current account dynamics. Empirical studies have clearly demonstrated that current account dynamics are characterized by threshold effects with debt level being a potential candidate (Nickel & Tudyka, 2014; Nickel & Vansteenkiste, 2008). In summary, the current account responds differently to fiscal deficit depending on the level of public debt. This hypothesis is tested within the broad context of sub-Saharan Africa and is the first study of this region that explores the link between current account and fiscal deficit on the one hand and public debt on the other. This study provides an interesting insight given that this region is beset with persistent current account and fiscal deficit coexisting side by side with rising public debt. Another notable contribution of this study is that most studies testing the twin deficit hypothesis are concentrated in developed countries with only a few considering sub-Saharan Africa. Yet, there is substantial heterogeneity in the factors driving the current account in advanced and low income countries (Chinn & Prasad, 2003). The forces driving current account dynamics in advanced economies should not be generalized and applied to low income settings like sub-Saharan Africa. As such, a specific study on the region would better explain the current account dynamics. To fulfil the objective of this chapter, a dynamic panel data model with threshold effects is estimated on a sample of 33 countries in sub-Saharan Africa for the period 2000-2016. Based on an endogenously

determined threshold level of debt at 54 percent, the results suggest that twin deficit exists at levels below this threshold but cease to hold at higher levels.

The third chapter investigates the effect of fiscal rules on fiscal performance. In addition, it compares fiscal performance between countries with and without the fiscal rules. Fiscal performance is measured using the fiscal balance. Existing empirical studies in this area are mainly concentrated in advanced countries. In comparison, the sub-Saharan Africa region has not received similar attention. This study fills a critical gap in the literature by conducting a study with a specific focus on sub-Saharan Africa using the updated IMF Fiscal Rule dataset (Lledo et al., 2017). The dataset is comprehensive and enables the assessment of various aspects of fiscal rules, both at national and supranational level. This study also contributes to the literature by assessing fiscal performance differences between countries with fiscal rules (treated) and those without fiscal rules (control) in the region using a treatment effect method. This assessment is yet to be performed previously for countries in this region. To implement this study, a strength index of fiscal rules is constructed based on the updated fiscal rules dataset. This index is used to capture the effect of fiscal rules. A fiscal policy reaction function within a dynamic panel data model framework that controls for economic, political and institutional variables is estimated. The results suggest that fiscal rules have a positive and significant effect on fiscal performance. This finding is further confirmed in the difference in differences treatment effect model which compares the fiscal performance in countries with fiscal rules to those without. The results show that there is a significant improvement in fiscal performance over time for countries with fiscal rules as compared to those without the rules.

1.3 Organisation of the Thesis

The rest of this thesis is organized as follows. Chapter two examines current account sustainability in the sub-Saharan Africa region. Chapter three examines the effect of fiscal deficit on current account and assesses whether this relationship depends on the level of indebtedness in the economy. Chapter four investigates the effect of fiscal rules on fiscal performance. Chapter five concludes with a summary of the thesis findings, draws policy implications, and recommends areas for further research.

Chapter 2

Current Account Sustainability in sub-Saharan Africa

2.1 Introduction

Most countries have opted to fund their widening current account deficits by escalating borrowings. This response contributes to a build-up of the country's external debt burden and hence raises concerns on the sustainability of these deficits. A sustainability assessment is therefore necessary to ascertain whether the level of deficits observed in the region is consistent with solvency conditions. An economy is deemed solvent if it can repay its debt without defaulting. Stationarity or mean reverting property of current account is indicative of a country's ability not to default on its debt.

Existing studies on this subject have taken place within the context of individual and groups of countries. Most attention has focused in the US and OECD countries (Camarero et al., 2013; Chen, 2011; Hamori, 2009; Holmes, 2006b; Husted, 1992; Raybaudi, Sola, & Spagnolo, 2004; Wu, 2000; Wu, Chen, & Lee, 2001), with a few other studies in Asia (Baharumshah, Lau, & Fountas, 2003, 2005; Lau & Baharumshah, 2003; Sahoo et al., 2016; Singh, 2015), Latin American region (Chortareas, Kapetanios, & Uctum, 2003; Donoso & Martin, 2014; Holmes, 2006a; Kalyoncu & Ozturk, 2006). A few more have also been on sub-Saharan Africa (Chu et al., 2007; Gnimassoun & Coulibaly, 2014; Hashiguchi & Hamori, 2012; Holmes, 2003; Shuaibu & Oyinlola, 2017).

The empirical studies on sub-Saharan Africa shows mixed results, a clear indication that the conclusion on current account sustainability depends on the approach and estimation techniques used. Furthermore, most studies in this region focus on stationarity of current account (Chu et al., 2007; Hashiguchi & Hamori, 2012; Holmes, 2003), but this technique has limited use when investigating the dynamics of current account sustainability such as the strength of sustainability and the adjustment mechanism back to equilibrium when current account is off the equilibrium path. The framework in Gnimassoun & Coulibaly (2014) captures these aspects and therefore provides a useful case study for this chapter.

This work extends the literature and differs from existing studies in the region in the following respects. Firstly, this study not only investigates whether the current account is sustainable or not but also assesses the strength of sustainability. This relates to determining whether the level of sustainability is weak or strong. Secondly, this study uses an error correction framework which allows for an analysis of how the adjustment process of current account imbalances differs across countries in the region. This technique enables us to compare the speed of adjustment back to equilibrium across the countries whenever current account balance is off the equilibrium path. The following three key research questions emerge and are addressed in this study; First, are current account balances sustainable in sub-Saharan Africa region? Second, what is the strength of sustainability? and finally, what is the pattern of the current account adjustment across countries in the region?

The rest of this chapter is organized as follows. Section two provides a conceptual definition of current account sustainability. Section three discusses the current account trends in sub-Saharan Africa. Section four reviews the relevant literature. Section five presents the methodology followed by empirical results in section six. Section seven concludes the chapter.

2.2 Current Account Sustainability: Definition of the Main Concepts

The current account is a component of the balance of payment that captures international flows of goods and services, primary income (also known as net factor income) and secondary income (also known as unilateral current transfers) between residents and nonresidents of a country (IMF, 2009). The balance on this account is known as the current account balance and shows the difference between the sum of exports and income receivable and the sum of imports and income payable. According to this definition, exports and imports refer to both goods and services, while income refers to both primary and secondary income (IMF, 2009).

Another definition considers the current account as changes in net foreign asset accumulation. Particularly, it captures the difference in private saving and private investment plus the difference in tax revenue and government expenditure. Hence when the current account is in deficit, either the value of private savings is insufficient to finance gross investment (gross fixed capital formation) and/or tax revenue is less than government spending on goods and services. In both contexts, it means that the private and/or public sector must borrow from external markets to finance this gap. This in turn reflects a negative change in net foreign asset accumulation which means that the country is accumulating foreign liabilities, and thereby reducing its claim against the rest of the world. As such, persistent current account deficit implies accumulation of foreign liabilities which raises concerns over sustainability of these deficits.

In common parlance, a situation is sustainable if it can be maintained or kept at a certain level for a prolonged period. Accordingly, Mann (2002) views current account deficit as sustainable if it does not generate economic forces which change the trajectory of other macroeconomic variables. That is, it does not generate effects on domestic variables such as savings and investment or does not lead to significant international portfolio adjustments that cause changes in the trajectory of the interest rate. Conversely, an unsustainable current account generates economic forces that induce changes in macroeconomic variables that in turn change the path of current account. For instance, when a country runs persistent current account deficit, the stock of debt expands quickly to an extent that foreign investors lose confidence in the economy's ability to service its debt. This could trigger knock-on effects that may continue in the economy, for instance a rise in interest rate

or currency depreciation. Thus, in this regard, current account deficit is viewed as unsustainable if it triggers massive systemic changes.

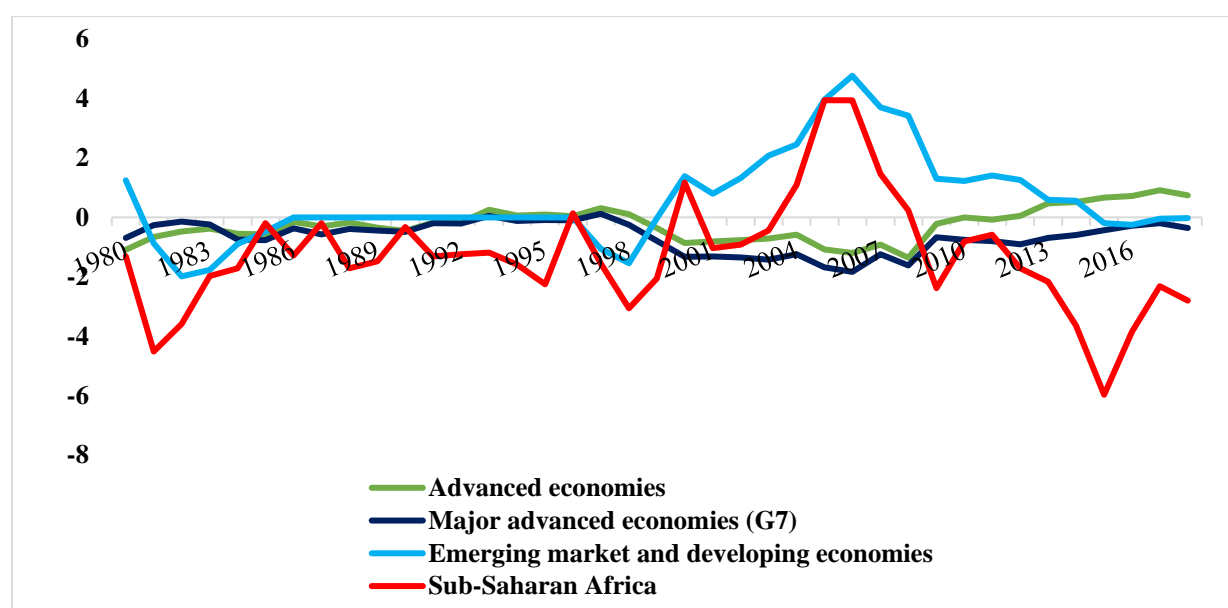
In addition, current account sustainability can be viewed within the context of solvency. There is a close link between the sustainability of the current account balance and the solvency of the economy. The economy is viewed as solvent if it can service its net foreign liabilities without defaulting on them (Milesi-Ferretti & Razin, 1996). Solvency is theoretically defined in relation to the IBC. In this sense, an economy is solvent if the current level of external debt is equal to the present value of the future trade surpluses. To determine the solvency of an economy, it is imperative to test for violation of the IBC. It follows that a sustainable current account is one that does not violate the IBC.

Practically, it is difficult to test for solvency due to the forward-looking nature of the IBC which requires equating the current level of external indebtedness to present discounted values of future trade surpluses. There is considerable uncertainty involved in determining the level of future trade surpluses. Therefore, a commonly used approach is to check whether the past realizations of current account series follows a stationary process or if the current account components are cointegrated (Taylor, 2002; Trehan & Walsh, 1991). Such evidence in the data forms a basis for the conclusion that the current account balance is consistent with solvency and hence sustainable.

2.3 Current Account Trends in sub-Saharan Africa

The current account deficit has been a persistent feature in sub-Saharan Africa over the past three decades. Compared to other group of economies, the region has borne the brunt of prolonged deficits. Figure 2.1 shows a historical trend of current account deficits for selected economic groups namely, advanced economies, major advanced economies (G7), emerging markets and the sub-Saharan Africa.

Figure 2.1: Trends in current account balance (% of GDP) for selected group of economies, 1980-2018

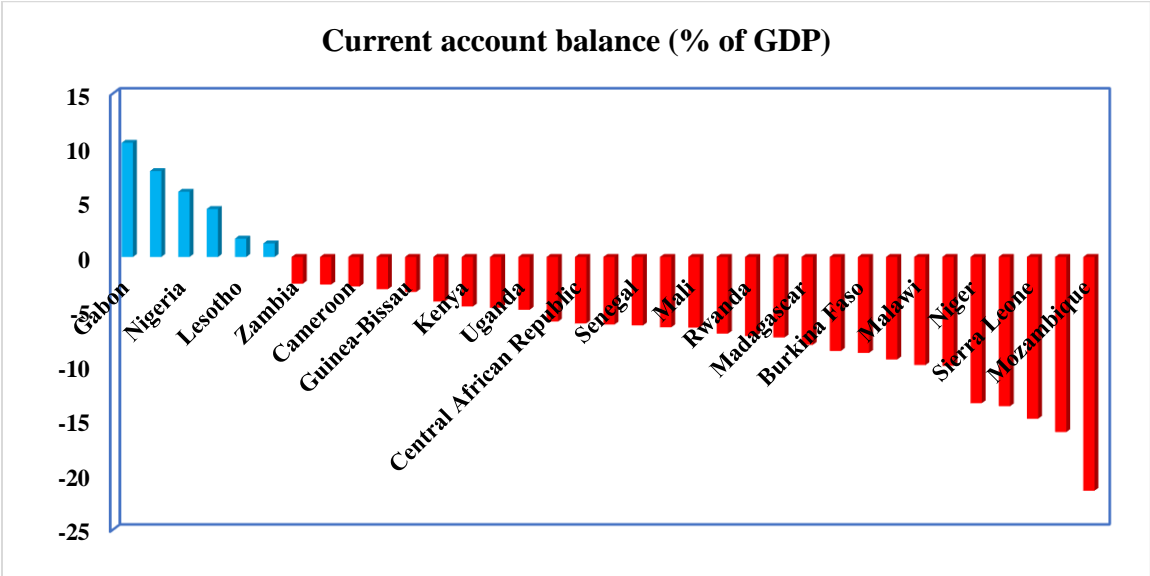


Source: World Economic Outlook, 2018

The figure shows that the deficit in SSA has not only been persistent but also large in magnitude compared to other group of economies. While the deficit averaged below 0.5 percent in other economic groups, it maintained a higher average of 1.5 percent in SSA, even rising to 4.5 and 3 percent in 1981 and 1998 respectively. The only period the region experienced a surplus was between 2000 and 2007. The high deficits experienced in SSA in the early 1980s and early 1990s were due to commodity price shocks and the global recessions in 1981-82 and 1991-93. In addition, protectionist policies in the developed world increased around early 1990s. These events largely affected developing countries, many sub-Saharan Africa countries included due to their heavy reliance on commodity exports (Holmes, 2003). However, from 2000 onwards up to 2007, the SSA region and emerging markets experienced a substantial improvement in their external

position. This upward momentum begun to reverse following the onset of the 2007/8 global recession, reaching a deficit of 6 percent in 2015 before edging up again. A closer examination of country specific circumstances shows cross-country variations with majority of countries in the region experiencing large deficits. This analysis is shown in Figure 2.2

Figure 2.2: Current account balance in selected sub-Saharan African countries (Annual average for the period 2000-2017)



Source: World Economic Outlook, 2018

The summary statistics in Appendix A2.5 show that the average annual current account balance for the period 1980-2017 ranged between a deficit of 17.8 percent in Mozambique to a surplus of 7.2 percent in Gabon. It further reveals that, overall, 22 out of 35 countries in the sample exhibit deficits exceeding 5 percent, breaching the threshold considered acceptable by international standards (Mann, 2002; Milesi-Ferretti & Razin, 1996; Summers, 1996). Only few countries experienced current account surplus over the same period. These are Eswatini (formerly Swaziland), Gabon, Lesotho, Nigeria and Botswana, two of which are oil producers.

2.4 Review of Literature

2.4.1 Theoretical literature

There are three main approaches that explain external sustainability. These include the intertemporal approach to current account, the portfolio or stock equilibrium approach and the intertemporal solvency approach. The first two approaches are based on the optimal decisions of economic agents while the later uses arithmetic methods.

The intertemporal approach to the current account developed by Sachs (1981) and later extended by Obstfeld & Rogoff (1995) is premised on the permanent income hypothesis of Friedman (1957) and expectation theory of Hall (1978). This approach argues that the current account balance results from intertemporal optimization by forward-looking rational agents. Current account imbalances are therefore viewed as necessary to serve as a buffer for smoothing consumption against transitory shocks. Accordingly, when the output falls below its permanent level, agents borrow to smooth consumption therefore running current account deficits and vice versa. The intertemporal approach provides an equilibrium benchmark model (since it arises out of an agent's optimal decision) which can be used to compare actual and optimal levels of current account. For instance, if the actual deficit is significantly higher than the level considered optimal, then current account is seen as unsustainable (Milesi-Ferretti & Razin, 1996). This is because the optimal level of current account provides an indication of an ideal state and therefore an opportunity for corrective action whenever there is a divergence.

The intertemporal solvency approach advanced by Husted (1992), much like the intertemporal approach to current account, builds on the notion of the IBC. This approach links current account sustainability to the solvency of the economy, which is seen as solvent when the IBC is not violated i.e. when the net foreign debt is equal to the present value of future trade surpluses. In this model, current account is considered sustainable if agents satisfy the long-run IBC, which is obtained by forward iteration of the single-period budget constraint and imposition of no-Ponzi game restriction.

This approach makes use of several techniques to test whether the IBC is met. The commonly used techniques are stationarity tests of the current account and tests examining the cointegration of the

components of current account. As far as stationarity of the current account is concerned, some tests assume that current account follows a stationary process while others presuppose that it follows a nonstationary path. The first category considers the current account as following a stationary process exhibiting zero mean and constant variance. This means that the current account series is mean reverting hence shocks have no permanent effects and it is not possible to have current account deficits or surpluses that grows indefinitely (Herzberg, 2015). This sustainability criterion is regarded to be in a strong sense since a current account fluctuating around its mean can be maintained indefinitely.

The second category asserts that current account follows a nonstationary path in which it becomes stationary after first difference (i.e. integrated of order one). This implies that shocks do not decay and therefore have a permanent effect. As such, current account does not return quickly to its equilibrium value after deviation hence the economy is likely to experience persistently growing deficits or surpluses. Again, a stationary current account after first difference is equivalent to a stationary net foreign asset (NFA) position after second difference⁴. This form of sustainability is in a weak sense because an economy in this situation is likely to experience a prolonged spell of current account deficits and even a rise in the levels of net foreign debt. Such a situation can easily degenerate into macroeconomic instability, liquidity or debt crisis.

Another method for examining the validity of the IBC is by testing the cointegration of the components of the current account which include; exports and imports inclusive of interest payments on external debt as well as savings and investment⁵. The existence of a cointegration relationship implies that there is a long-run relationship between the components of current account and any deviation from the equilibrium is only temporary. Thus, current account is seen as sustainable in this case. Furthermore, cointegration of exports and imports implies that the two variables share a common stochastic trend, implying a long-run relationship and that any deviation

⁴ Note that, ignoring capital account, current account can also be defined a change in the NFA. This can be expressed as; $CA_t = D_t - D_{t-1} = \Delta NFA$, where CA_t and D_t are the current account and net foreign assets at period t respectively.

⁵ When unilateral current transfer is excluded, current account can be defined as the difference between exports and imports plus net factor income. Similarly, current account can be expressed as the gap between gross domestic savings and gross domestic investment plus the gap between tax revenue and government spending.

is only temporary. This testing procedure was advanced by Husted (1992) and most empirical studies are based on this approach due to its simplicity and apt theoretical foundation.

Another approach for examining external sustainability is the portfolio or stock equilibrium approach to the current account advanced by Kraay & Ventura (2000) and extended by Calderón et al.(2000). This approach views current account sustainability from the perspective of NFA position based on the outcome of portfolio decisions by rational investors across countries. The current account sustainability results from long-run portfolio equilibrium conditions as well as short-run dynamics that drive asset reallocation. Equilibrium in the long-run can be attained when domestic and foreign investors achieve the desired portfolio across countries. When viewed from this perspective, the current account is therefore simply a means through which an investor can achieve a desired asset position. Hence, short run equilibrium adjustments driven by current account deficits are necessary since the investors face imperfections in the financial and factor market that may hinder them from achieving their desired optimal portfolio.

2.4.2 Empirical literature

This study examines the empirical literature on current account sustainability in several broad themes. The first group of studies focuses on stationarity of current account balance and the NFA. The second group delves into the cointegration of components of current account balance while the final group focuses on the negative feedback effects between trade balance and the NFA. The next sub-section reviews empirical studies along these themes.

2.4.2.1 Stationarity of current account and the NFA

The rationale behind the studies under this category is that the stationarity of current account in levels or stationarity of NFA in first difference is enough to satisfy the IBC. Several empirical studies have tested this hypothesis. For instance, Wu (2000) used a panel unit root test of Im-Pesaran-Shin to examine the stationarity of current account balances in 10 OECD countries for period 1977-1997. The findings suggest that current account is stationary in the sampled countries confirming that the IBC is not violated in those countries. A similar conclusion was arrived at by Taylor (2002) who repeated the same analysis but at individual country level for the same sample.

Holmes (2003) investigated the same question but using a different technique for a group of 21 African countries for the period 1960-2000. The study adopted a seemingly unrelated ADF (SURADF) panel unit root test method over standard unit root test methods due to the former's ability to account for cross-section dependence and to also distinguish results for each country. Holmes study found that 5 out of 21 countries had unsustainable current account balances, namely Burkina Faso, Ghana, Lesotho, Mauritania and Senegal. A follow-up study by Chu et al., (2007) employed the same method but on a larger sample of 48 countries for the period 1980-2004. The evidence suggests that the current account for 11 countries contained unit root and was therefore unsustainable. Similarly, Hashiguchi & Hamori (2012) applied panel unit root tests that control for cross-section dependence on an unbalanced panel of 37 sub-Saharan Africa countries for the period 1980-2006. The findings indicate that current account balance is not sustainable in the region.

Studies have also employed nonlinear unit root methods to test for current account sustainability. For instance, Raybaudi, Sola, & Spagnolo (2004) used a nonlinear Markov switching ADF model to identify periods when current account balances evolve in a non-stationary manner. The study used a sample of five countries, namely Argentina, Brazil, Japan, the UK and the US. The evidence suggests that three out of the five countries considered, namely Brazil, Japan and the UK had sustainable balances. Chen (2011) investigated whether current account deficits for eight OECD countries are characterized by unit root process with regime switches. This technique sought to find out whether current account was sustainable in some periods compared to others. The study used an unbalanced panel covering 1970-2009. The evidence from the Markov switching unit root regression suggests that IBC does not hold in Australia, Czech Republic, Finland, Hungary, New Zealand, Portugal and Spain.

Only a few studies investigate the stationary properties of the NFA. For instance, Chortareas et al. (2003) used non-linear unit root methods to tests for sustainability based on the debt-to-GDP ratio for a group of Latin American countries. The result suggests evidence of strong sustainability in all countries except Chile. These findings overturn previous results obtained using the traditional unit-root test. Sawada (1994) applied the same method to investigate whether heavily indebted

countries (HICs) were solvent. Using a sample period of 1955-1990, the evidence suggests that HICs were facing a debt overhang problem.

2.4.2.2 Cointegration between the components of current account

Empirical studies in this category investigate the presence of a cointegrating relationship between various components of current account including; exports and imports with net interest payments on external debt, and savings and investment. However, much of the focus is on the cointegration relationship between exports and imports inclusive of net interest payments. Few studies are based on cointegration between savings and investment.

The seminal study using this approach was by Husted (1992) who investigated current account sustainability in the US for the period 1967-1989. The study found that until the end of 1983, the US current account was sustainable, i.e. the IBC was not violated. But thereafter, from 1983 onwards, the current account became unsustainable due to a structural shift in the economy. In another study by Wu, Chen, & Lee (2001) for a group of G7 countries, using quarterly data for period 1973Q2-1998Q4 found evidence for strong current account sustainability. However, their finding was later overturned by Hamori (2009) based on annual data between 1960 and 2005. Arize (2002) found evidence of strong current account sustainability in New Zealand, Mexico and Tunisia but weak current account sustainability in Canada, Chile, Egypt and Indonesia. Baharumshah et al. (2003) focused on ASEAN-4 countries namely, Indonesia, Malaysia, Philippines and Thailand for the period 1961-1999. The study finds evidence of strong sustainability in Malaysia only while in the remaining three countries, the evidence of weak sustainability is found. Narayan & Narayan, (2005) examines a group of 22 least developed countries for evidence of cointegration using a bounds testing approach. The results indicate that current account is only sustainable in six out of the sampled 22 countries. Holmes (2006b) examines the long-run sustainability in the OECD countries. The results suggest that six out of 11 countries investigated had sustainable current account. Gnimassoun & Coulibaly (2014) investigates whether current account sustainability depends on the exchange rate regime in sub-Saharan Africa. Based on a sample of 44 countries covering 1980-2011, the evidence suggests that current account is sustainable in the region. However, sustainability is dependent on the exchange

rate regime. There was stronger sustainability in flexible exchange regime countries compared to those with fixed regime.

Baharumshah, Lau, & Fountas (2005) examines current account sustainability in eight East Asian countries in the period before and after the Asian crisis. The eight countries are Singapore, Taiwan, South Korea, Malaysia, Thailand, Indonesia, Philippines and Japan. Using a dynamic OLS (DOLS) model, the study finds that current account was not sustainable in the pre-crisis period (1970-1997), while it was sustainable in the post crisis era (1970-2000). The return to sustainable path was attributed to large currency depreciations and economic recovery. Shuaibu & Oyinlola (2017) applies both unit root and cointegration tests robust to structural changes to examine whether the current account balance in Nigeria is sustainable for the period 1981-2013. The results obtained suggest that the current account in Nigeria is sustainable and that there were no structural changes during the period under consideration.

Few studies focus on the cointegrating relationship between savings and investment. Based on this criteria, Dash (2017) investigates the sustainability of current account for a group of countries in three regions, namely Europe and Central Asia, Latin America and Caribbean, and sub-Saharan Africa for the period 1981-2014. Using Pooled Mean Group estimator in an error correction framework, the result suggest that current account is weakly sustainable in Latin America and Caribbean and sub-Saharan Africa while strongly sustainable in Europe and Central Asia. Applying the same criteria, Matsubayashi (2005) investigates whether the current account is sustainable in the US for the period 1975Q1 to 1998Q2 using time series estimation techniques. The findings suggest that current account was sustainable.

2.4.2.3 Responsiveness of the trade balance to the NFA

These studies test the negative response of trade balance to the NFA. In this case, current account is regarded as sustainable if it responds to rising net foreign debts (assets) by increasing (decreasing) the trade balance. Based on this approach, Camarero et al., (2013) investigates external solvency for a group of 23 OECD countries for the period 1970-2012. The study adopts a multicointegration approach which combines both flow and stock analysis. The findings indicate that there is weak sustainability for all countries in the flow analysis and strong sustainability for

six countries in the stock analysis. These countries are Austria, the Netherlands, Portugal, Spain, Japan and New Zealand. Similarly, Durdu et al. (2013) adapts Bohn (2007) error-correction reaction function approach to test the negative feedback effect between net export (NX) and NFA. Using a panel of 21 industrial countries and 29 emerging markets over the period 1970-2006, the evidence shows that there was a negative response of NX on NFA. Hence the observed imbalances were not inconsistent with external solvency. This analysis further suggests that a stronger response was necessary for countries with weaker fundamentals compared to those with stronger ones.

2.4.3 Overview of the literature

The portfolio equilibrium model provides a better analytical framework for assessing external imbalances from a stock perspective. However, this approach has limited application in sub-Saharan Africa countries that are small and poorly integrated to the international financial markets. Due to underdeveloped capital markets, portfolio inflows in terms of equity and bonds remain insignificant (Osakwe & Verick, 2007). Therefore, trade flows in the form of exports and imports remain the dominant factor driving current account imbalances in that region (Gnimassoun & Coulibaly, 2014). Hence, IBC criterion based on trade flows is more relevant for sub-Saharan African countries. This approach becomes the focus of the analysis in this study.

Turning to empirical literature, the geographical focus for most studies is in the US and OECD countries (Camarero et al., 2013; Chen, 2011; Hamori, 2009; Holmes, 2006b; Husted, 1992; Raybaudi et al., 2004; Wu, 2000; Wu et al., 2001), with a few other studies in the Asian region (Baharumshah et al., 2003, 2005; Lau & Baharumshah, 2003; Sahoo et al., 2016; Singh, 2015), Latin American region (Chortareas et al., 2003; Donoso & Martin, 2014; Holmes, 2006a; Kalyoncu & Ozturk, 2006) and sub-Saharan African region (Chu et al., 2007; Gnimassoun & Coulibaly, 2014; Hashiguchi & Hamori, 2012; Holmes, 2003; Shuaibu & Oyinlola, 2017). With the focus largely on the US and OECD countries, other regions have been neglected, particularly sub-Saharan Africa.

Furthermore, analysis of empirical findings in the sub-Saharan Africa region shows mixed results, which is a clear indication that current account sustainability depends on the approach and

estimation techniques used. Most studies in this region focus on stationarity of current account (Chu et al., 2007; Hashiguchi & Hamori, 2012; Holmes, 2003). Such an approach has limited use when investigating the dynamics of current account sustainability including the strength of sustainability and adjustment mechanism back to equilibrium when current account is off the equilibrium path. The framework in Gnimassoun & Coulibaly (2014), however, provides a useful case study as it focuses on these dynamics.

2.5 Methodology

2.5.1 Theoretical framework

The theoretical framework on the intertemporal solvency approach developed by Husted (1992) and extended by Kónya (2009) is adopted in the assessment of current account sustainability in sub-Saharan Africa. This framework considers a representative agent of a small open economy that produces and exports a single composite good and has no government. The agent can borrow and lend in the international market using one-period financial instruments at the prevailing world interest rate and aims at maximizing lifetime utility subject to budget constraints. The agent faces the following budget constraint;

$$C_t = Y_t + B_t - I_t - (1 + r_t)B_{t-1} \quad (2.1)$$

where C_t denotes consumption, Y_t is aggregate output, I_t is investment, B_t is net stock of debt, r_t is the one-period world interest rate, and $(1 + r_t)B_{t-1}$ is the net debt from the previous period. Equation (2.1) can be expressed in terms of B_t as follows:

$$-B_t = Y_t - C_t - I_t - (1 + r_t)B_{t-1} \quad (2.2)$$

Defining the trade balance as $TB_t = Y_t - C_t - I_t$ and substituting in equation (2.1) result in the following single period budget constraint:

$$B_t = -TB_t + (1 + r_t)B_{t-1} \quad (2.3)$$

Through forward iteration and recursive substitution of equation (2.3), (see Appendix A2.1 for derivation), the following intertemporal budget constraint is derived:

$$B_t = \sum_{i=1}^{\infty} \lambda_i TB_{t+i} + \lim_{n \rightarrow \infty} \lambda_n B_{t+n}, \quad \lambda_i = \prod_{j=1}^i \frac{1}{1 + r_{t+j}}. \quad (2.4)$$

Equation (2.4) is the economywide IBC. It implies that the present value of outstanding foreign debt at the end of period t should be equal to the sum of the discounted values of all future trade

surpluses. This holds so long as the second term on the right-hand side is zero (i.e. $\lim_{n \rightarrow \infty} \lambda_n B_{t+n} = 0$). This terminal restriction is known as the transversality condition which must be satisfied for a country to remain solvent. In other words, when a country is solvent, the future external debts (in the limit) tends to zero in the long run. This assumption in the literature is referred to as the ‘no Ponzi-game’ condition. It limits the ability of the government to roll-over its debt indefinitely and happens when the net foreign debt grows at slower pace than the interest rate (Herzberg, 2015). From equation (2.4), either of two scenarios can imply violation of the IBC. The first scenario occurs if the current level of outstanding debt (B_t) exceeds the present discounted value of future trade surpluses, and the country is over borrowing to refinance maturing external debt by new loans which is not optimal. The second scenario takes effect if the current level of outstanding debt (B_t), is less than the present discounted value of future trade surpluses. This is also not optimal as the welfare can be improved through more borrowings.

2.5.2 Empirical implications of the intertemporal budget constraint

To test the validity of the IBC empirically, this study follows the approach of Hakkio & Rush (1991) on fiscal sustainability. In this context, this would imply testing for a cointegrating relationship between exports and imports inclusive of interest payments. This is a sufficient condition for current account sustainability. Before proceeding, the following assumptions are made; the world interest rate is stationary with unconditional mean r , so that $r_t = r + \mu_t$ and $E(r_t) = E(r) + E(\mu_t) = r$. Further, the trade balance is noted as the difference between exports X and imports M . These assumptions are applied to equation (2.3) to obtain:

$$X_t - M_t = -B_t + (1 + r_t)B_{t-1} \quad (2.5)$$

Adding $-rB_{t-1}$ on both sides of equation (2.5) and introducing an auxiliary variable $Z_t = M_t + (r_t - r)B_{t-1}$ to capture deviation of interest rate from conditional mean. Further rearranging the equation for B_t to obtain:

$$B_t = Z_t - X_t + (1 + r)B_{t-1} \quad (2.6)$$

Solving equation (2.6) by forward iteration (see Appendix A2.2 for derivation) method yields:

$$Z_t + rB_{t-1} = X_t + \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \quad (2.7)$$

Assuming that X_t and Z_t follow a random walk with drift so that the data generating process is given by AR (1). The following representation is obtained:

$$X_t = \alpha_1 + X_{t-1} + \varepsilon_{1,t}; \quad \Rightarrow \quad \Delta X_t = \alpha_1 + \varepsilon_{1,t} \quad \Rightarrow \quad \Delta X_{t+j} = \alpha_1 + \varepsilon_{1,t+j} \quad (2.8a)$$

Similarly:

$$Z_t = \alpha_2 + Z_{t-1} + \varepsilon_{2,t}; \quad \Rightarrow \quad \Delta Z_t = \alpha_2 + \varepsilon_{2,t} \quad \Rightarrow \quad \Delta Z_{t+j} = \alpha_2 + \varepsilon_{2,t+j} \quad (2.8b)$$

Where α_1 and α_2 are drift parameters, $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ follow a white noise process⁶ and further noting that $0 < \lambda < 1$.

Substituting equation (2.8a) and (2.8b) into equation (2.7), to obtain:

$$Z_t + rB_{t-1} = X_t + \sum_{j=1}^{\infty} \lambda^j [\alpha_1 - \alpha_2 + \varepsilon_{1,t+j} - \varepsilon_{2,t+j}] + r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \quad (2.9)$$

Since $\sum_{j=1}^{\infty} \lambda^j = \sum_{j=1}^{\infty} \left(\frac{1}{1+r}\right)^j = \frac{1}{r}$, equation (2.9) becomes:

$$Z_t + rB_{t-1} = X_t + \frac{\alpha_1 - \alpha_2}{r} + \sum_{j=1}^{\infty} \lambda^j (\varepsilon_{1,t+j} - \varepsilon_{2,t+j}) + r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \quad (2.10)$$

Imposing transversality condition on the last term of equation (2.10), i.e. $r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} = 0$ and

using the fact that by definition $Z_t = M_t + (r_t - r)B_{t-1} \Rightarrow Z_t + rB_{t-1} = M_t + r_t B_{t-1}$, and

further introducing the following notations:

$$\alpha = \frac{\alpha_1 - \alpha_2}{r}, \quad \varepsilon_t = \sum_{j=1}^{\infty} \lambda^j (\varepsilon_{1,t+j} - \varepsilon_{2,t+j}), \quad MM_t = M_t + r_t B_{t-1}$$

Making these substitutions into equation (2.10) yields the following simple linear relationship between exports (X_t) and the sum of imports and interest payment on net debts:

⁶ A sequence $\{\varepsilon_t\}$ is a white noise process if each value in the sequence has a mean zero, has a constant variance and is uncorrelated with all other realizations (Enders, 2010).

$$\begin{aligned}
Z_t + rB_{t-1} &= X_t + \alpha + \varepsilon_t & \Rightarrow & \quad MM_t = X_t + \alpha + \varepsilon_t \\
X_t &= \alpha + \beta MM_t + \varepsilon_t & & \quad (2.11)
\end{aligned}$$

Equation (2.11) forms the basis for testing current account sustainability. It shows that provided ε_t is stationary i.e. $\varepsilon_t \sim I(0)$, then the sufficient condition for the IBC to be satisfied is that the trade flows X_t and MM_t are each $I(1)$ and cointegrated of order $[1,1]$ with cointegrating vector $[1, -1]$ (Husted, 1992). In addition, the coefficient term $\beta = 1$. If these conditions are met, then current account is sustainable in a strong sense.

However, strictly speaking, the condition that $\beta = 1$ is not necessary for the IBC to hold (Hakkio & Rush, 1991). If $0 < \beta < 1$ ⁷ and X_t and MM_t are cointegrated then current account would still be sustainable but in a weak sense. Otherwise, if X_t and MM_t are cointegrated with the $\beta = 1$, then current account is sustainable in a strong sense. On the other hand, if $\beta = 0$, then there is no cointegration, hence current account is unsustainable (Coakley, Kulasi, & Smith, 1996; Jansen, 1996; Quintos, 1995).

2.5.3 Model specification and empirical strategy.

The empirical strategy for this study follows two steps. First, a cointegration test between exports and imports is carried out. Second, a long-run estimation of the relationship between exports and imports in an error correction framework is done.

2.5.3.1 Panel cointegration test

The series are said to be cointegrated when they are nonstationary individually but their linear combination is stationary (Engle & Granger, 1987). The cointegration between exports and imports gives evidence for existence of long-run relationship between them such that even though the two variables may wander arbitrarily in the short run, they move together in the long-run.

The cointegration tests are also grouped into first- and second-generation, where the former assumes cross-section independence while the latter relaxes this assumption. The residual based

⁷ A scenario where $\beta > 1$ would imply a surplus since export growth exceeds imports.

tests by Kao (1999) and Pedroni (1999) are examples of first generation cointegration tests. The Kao test assumes that there is a uniform cointegrating vector (homogeneous cointegration) while the Pedroni test assumes that there is panel specific cointegrating vector (Pedroni cointegration test results with panel-specific AR parameter). Most residual based cointegration tests require the long-run cointegrating vector for variables in levels to be equal to short-run parameters in their first difference. This strict requirement referred to as common-factor restriction has been blamed for the low power of residual based tests (Kremers et al., 1992).

The second-generation tests, on the other hand do not impose any restriction on common factors. Furthermore, they allow for heterogeneous cointegration as well as cross-section dependence. A notable example is by Westerlund (2007), who developed four panel cointegration test statistics based on structural rather than residual dynamics. Each test can include individual-specific short-run dynamics, including serially correlated error terms, non-strictly exogenous regressors, individual specific intercepts and trend terms, and individual-specific slope parameters. The set-up for this model is presented below following Persyn & Westerlund (2008):

$$\Delta X_{i,t} = \delta_i' d_t + \alpha_i (X_{i,t-1} - \beta_i MM_{i,t-1}) + \sum_{j=1}^{p_i} \alpha_{ij} \Delta X_{i,t-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta MM_{i,t-j} + \mu_i + \epsilon_{i,t} \quad (2.14)$$

where $t = 1, 2, \dots, T$ and $i = 1, 2, \dots, N$ denotes the time-series and cross-sectional units, respectively, $X_{i,t}$ and $MM_{i,t}$ represent exports to GDP ratio and imports including interest on external debt to GDP ratio in country i at time t , respectively. While d_t contains the deterministic components, for which there are three cases. In the first case, $d_t = 0$ such that equation (2.14) has no deterministic terms; in the second case, $d_t = 1$ such that equation (2.14) is generated with a constant; and in the third case $d_t = (1, t)'$ so that equation (2.14) is generated with both a constant and a trend. $\epsilon_{i,t}$ is the error term which is assumed to be independent across both i and t . The presence of cross-sectional dependence can be handled by bootstrap methods.

Equation (2.14) can further be reparametrized and expressed as follows:

$$\Delta X_{i,t} = \delta'_i d_t + \alpha_i X_{i,t-1} + \lambda_i MM_{i,t-1} + \sum_{j=1}^{p_i} \alpha_{ij} \Delta X_{i,t-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta MM_{i,t-j} + \mu_i + \epsilon_{i,t} \quad (2.15)$$

where $\lambda_i = -\alpha_i \beta_i$. The parameters α_i is the speed of adjustment that determines the speed at which the system corrects back to equilibrium relationship after a sudden shock. If $\alpha_i < 0$, then there is error correction, which implies that $X_{i,t}$ and $MM_{i,t}$ are cointegrated; if $\alpha_i = 0$, then there is no error correction and, thus no cointegration. Hence, the null hypothesis of no cointegration can be formulated as $H_0: \alpha_i = 0$. The alternative hypothesis formulation depends on assumption about the homogeneity of α_i . Two of the tests, called group-mean tests (G_t and G_a), assume that α_i is not equal across i , implying that H_0 is tested against alternative, $H_1^g: \alpha_i < 0$ for at least one i . The second pair of tests, known as panel tests (p_t and p_a), assume that α_i is equal for all i and are designed to test H_0 versus $H_1^p: \alpha_i = \alpha < 0$ for all i . This study relies on both residual based and non-residual based tests by Pedroni (1999) and Westerlund (2007), respectively to test for cointegration.

2.5.3.2 Error correction model specification

For every cointegrating relationship, there exists an error correction representation (Engle & Granger, 1987). As such, the long run relationship between exports and imports is estimated within an error correction framework after establishing that both variables are cointegrated. The autoregressive distributed lag (ARDL) model is used to estimate the long run relationship between exports and imports with the advantage that it can accommodate a mix of both $I(1)$ and $I(0)$. This model can be specified as follows:

$$X_{i,t} = \sum_{j=1}^p \lambda_{ij} X_{i,t-j} + \sum_{j=0}^q \delta_{ij} MM_{i,t-j} + \mu_i + \epsilon_{i,t} \quad (2.16)$$

where the number of countries is $i = 1, 2, \dots, N$ and the number of years is $t = 1, 2, \dots, T$. In this case, T is large enough for the model to fit for each country separately. $X_{i,t}$ and $MM_{i,t}$ represent exports to GDP ratio and imports including interest on external debt-to-GDP ratio in country i at time t , respectively; μ_i represents country specific fixed effects and $\epsilon_{i,t}$ is a set of normally distributed error terms with country specific variances, $\text{Var}(\epsilon_{i,t}) = \sigma_i^2$. The optimal lag length order p and q , is determined using Akaike information criteria (AIC).

If $X_{i,t}$ and $MM_{i,t}$ are $I(1)$ and cointegrated, then the error term is an $I(0)$ process. Thus equation (2.16) can then be expressed in the following manner as an error correction representation:

$$\Delta X_{i,t} = \phi_i(X_{i,t-1} - \beta_i MM_{i,t}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta X_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}^* \Delta MM_{i,t-j} + \mu_i + \epsilon_{i,t} \quad (2.17)$$

where $\phi_i = -(1 - \sum_{j=1}^p \lambda_{ij})$, $\beta_i = \sum_{j=0}^q \delta_{ij} / (1 - \sum_k \lambda_{ik})$, $\lambda_{ij}^* = -\sum_{m=j+1}^p \lambda_{im}$ $j = 1, 2, \dots, p-1$, and $\delta_{ij}^* = -\sum_{m=j+1}^q \delta_{im}$ $j = 1, 2, \dots, q-1$.

The parameter ϕ_i is the error-correction speed of adjustment term. It represents the speed at which $X_{i,t}$ adjusts back to long-run equilibrium following a change in $MM_{i,t}$. If $\phi_i = 0$, then there would be no evidence for a long-run relationship between $X_{i,t}$ and $MM_{i,t}$ and by extension no cointegration. This parameter is expected to be significantly negative under the assumption that the variables return to long-run equilibrium. The parameter β_i represents the coefficient of long-run relationship between $X_{i,t}$ and $MM_{i,t}$.

A major finding of the large N and large T dynamic panel literature is that it is inappropriate to use fixed or random effects estimators or even instrumental variable estimators, such as the Arellano & Bond (1991) generalized method of moments (GMM) to estimate equation (2.17). This is because they assume that the slope coefficient is homogeneous and the series is stationary (Im et al., 2003a; Pesaran et al., 1999; Pesaran & Smith, 1995). Using these methods when slope coefficients are heterogeneous across groups could result in inconsistent and misleading estimates.

The literature therefore suggests two techniques for the estimation of dynamic panels with heterogeneous parameters across groups. These are the mean-group (MG) and pooled mean-group (PMG) estimators. Firstly, the MG estimator proposed by Pesaran & Smith (1995) allows both the intercepts, slope coefficients, and error variances to differ across the panels. Essentially, it fits the error correction model separately for each group and then calculates a simple arithmetic average for the coefficients. This yields consistent estimates if country-specific coefficients are

independently distributed and regressors are exogeneous. However, if some coefficients are similar for some groups, then MG estimates are inefficient.

Thus, the second approach by Pesaran et al. (1999) known as the PMG estimator is recommended. This PMG estimation technique involves both pooling and averaging as the name suggests. Moreover, it also allows the intercept, short-run coefficients and error variances to differ across the groups. The only difference with MG estimator is that it constrains the long-run coefficient to be identical (homogeneous) across the groups. This restriction is relevant for this study as it imposes solvency constraints on all countries under consideration in a uniform manner. Similar justification cannot, however, be made for short-run dynamics and error variances given that it is reasonable to assume that short-run adjustments vary across countries due to country heterogeneities. To choose between MG and PMG estimators, Pesaran et al., (1999) suggests a Hausman test on homogeneity restriction of the long-run coefficient. Since equation (2.17) is nonlinear in parameters, Pesaran et al. (1999) proposes a maximum likelihood method to estimate the parameters. Equation (2.17) therefore forms the main estimation equation in this study.

2.5.4 Data

The data used in this study is annual secondary data for the period 1980-2017 covering 35 sub-Saharan African countries. The selected sample is based on availability of data and the list of countries can be found in Appendix A2.4. The data is sourced from the World Development Indicators (WDI) and comprise exports, imports and net interest payments on external debt. The series on exports (X) comprise exports of goods and services while imports (MM) comprise imports of goods and services plus net interest payment on external debt. MM series is constructed from the imports and net import payment on external debt. The series are then scaled by the GDP. The variable description and descriptive statistics are provided in Appendix A2.3 and A2.5, respectively.

2.6 Empirical Results

This section reports and discusses empirical results based on the cointegration tests and the error correction model.

2.6.1 Cointegration test results

The second step in our empirical strategy is to test for cointegration between exports and imports inclusive of interest payments. The error correction procedure of Westerlund (2007) is applied and also perform a confirmatory test based on the Pedroni (1999) testing procedure. Table 2.2 reports the results based on the two sets of tests. According to the Westerlund (2007) test, all the four test statistics reject the null of no cointegration in favour of the hypothesis that exports and imports inclusive of interest payments are cointegrated in some panel units. The finding generally shows that exports and imports have a long-run relationship. These results continue to hold even when the alternative residual based testing procedure of Pedroni (1999) is done as shown in the right panel of Table 2.2.

Table 2.1: Panel cointegration test

Westerlund (2007) cointegration test ⁸				Pedroni cointegration test		
Test statistic	Value	Z-value	p-value	Test statistic	Result	p-value
G_t	-2.613	-5.460	0.0000	Modified Phillips-Perron	-2.1195	0.0170
G_a	-10.813	-3.943	0.0000	Phillips-Perron	-3.0896	0.0010
P_t	-12.400	-3.629	0.0000	Augmented Dickey-Fuller	-3.2262	0.0006
P_a	-7.692	-4.301	0.0000			

Notes: Both Westerlund (2007) and Pedroni (1999) cointegration test have the null hypothesis of no cointegration against the alternative that some panels are cointegrated. G_t and G_a denote group mean tests. P_t and P_a denote panel test.

Despite the above evidence rejecting the null hypothesis of no cointegration, the way the alternative hypothesis is formulated signals the possibility that cointegration may not hold for some countries. Therefore, there is a need to devise a test that goes beyond the general group to specific countries. In addition, given that the dual purpose of this study is to establish whether current account is sustainable or not, and to determine the degree and pattern of current account adjustment. Such analysis is performed using the error correction model which is estimated next.

⁸ We thank Persyn & Westerlund (2008) for providing a user written program for carrying out this test.

2.6.2 Error correction model estimation results

The dynamic heterogeneous panel data model specified in equation (2.17) is estimated using the PMG estimator. The results are reported in Table 2.3, which also details the MG and dynamic fixed effects (DFE) estimators for comparison purposes. This analysis focuses on PMG estimator because it gives consistent and efficient estimates as shown by the Hausman test statistics. The test statistic is 1.28 distributed as a $\chi^2(1)$ with a *p-value* of 0.257, indicating that the null hypothesis restriction of homogeneous long-run coefficient cannot be rejected.

Table 2.2: Error correction model estimation results⁹

Variable	PMG		MG		DFE	
	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E
<i>Long-run Coefficient</i>						
<i>MM</i>	0.3463855***	0.04307	1.204685*	0.72593	0.1949519**	0.08925
$H_0: \beta = 1?$	230.29***		0.08		81.37***	
<i>Short-run coefficient</i>						
Error-correction term	-0.1979339***	0.02322	-0.2454635***	0.02866	-0.1108987***	0.01337
ΔMM	0.1615204***	0.03666	0.1545707***	0.03329	0.0756973***	0.01609
Constant	0.0325289***	0.00571	0.0389409***	0.01064	0.0228049***	0.00514
Hausman test	1.28					
<i>p-value</i>	0.2572					
No of Countries	35		35		35	

Notes: * ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively. PMG refers to panel mean group estimator; MG is mean group estimator and DFE is difference fixed effects estimator. The Hausman test is a test statistic on the long-run homogeneity restriction between PMG and MG. The null hypothesis is that PMG estimator is more efficient than MG. *MM* is a ratio of imports inclusive of net interest payment on external debt.

The long-run coefficient (β) is positive and highly significant with a coefficient value of 0.35, the DFE estimator is within the same range at 0.19 while the MG estimator is much larger at 1.2. These findings indicate that on average, exports and imports inclusive of interest payments have a long-run relationship in most countries. Hence, the IBC seems to hold. The magnitude of this coefficient is however significantly less than unity according to the PMG estimator. This is confirmed by the Wald test which rejects the hypothesis that $\beta = 1$ at all conventional levels of significance. The MG estimator is unable to reject this hypothesis. However, this study adopts the more robust interpretation given by PMG estimator. This result implies that current account is weakly

⁹ We thank Blackburne & Frank (2007) for providing a user written program for carrying out this test.

sustainable in the region, confirming similar results by Dash (2017) and Gnimassoun & Coulibaly (2014).

The error correction term that measures the speed of adjustment to the long-run equilibrium is negative and statistically significant with an estimate of -0.198. Similar results are observed across the other two estimators indicating generally that there is convergence towards a long-run equilibrium relationship. This is in turn a confirmation of a cointegrating relationship between exports and imports inclusive of interest. The absolute value for the error correction term for the PMG estimator (0.198) is lower than the MG estimator (0.245), suggesting a slower rate of adjustment. Particularly, this translates to a half-life¹⁰ of three years; meaning on average it takes approximately six years for complete adjustment to long-run equilibrium in case of a short-term disturbance. A situation which may be contributing to weak current account sustainability in the sub-Saharan Africa region. The slow adjustment appears to be driven mainly by persistent current account deficits in the region over the past two decades. The short-run coefficient on imports and interest payments on external debt is positive and significant, implying that in the short run, exports and imports move in the same direction.

2.6.3 Current account sustainability- country level analysis

The advantage of PMG estimation is that it allows for short run dynamics (coefficients) to differ across the panel units, thus enabling short run analysis across countries. The sign and magnitude of coefficient of the error correction term gives an indication of the speed of adjustment back to long-run equilibrium in case of exogenous shock between exports and imports inclusive of interest payments. A negative and significant coefficient term indicates convergence.

Furthermore, this analysis enables for identification of countries that do not adjust back to long-run equilibrium. Recall that the null of no error-correction relation is equivalent to evidence of no long-run relationship between exports and imports which signifies that current account is not sustainable. Similarly, an insignificant error correction coefficient is indicative of non-

¹⁰ The half-life is calculated as $\log(0.5)/\log(1 - |ECT|)$, where ECT is the error correction term for speed of adjustment. The higher the $|ECT|$, the lower the half-life and the faster is the adjustment.

convergence between exports and imports and by extension is evidence that current account is unsustainable. This background enables us to analyze the pattern of current account adjustment of individual countries in the sub-Saharan Africa region.

Table 2.4 reports the error correction estimates by country and half-life estimates for sub-Saharan African countries. The table only reports the results for countries with significant error correction terms (For the list of countries with non-significant error correction term, see Appendix A2.6.).

Table 2.3: Error correction term (ECT) and half-life estimates

Country	ECT	Std. Err.	Half-life
Malawi	-0.5102018***	0.1516	0.971
Cameroon	-0.4458864***	0.1253	1.174
Sierra Leone	-0.4214473***	0.1211	1.267
Nigeria	-0.4098699***	0.1346	1.314
South Africa	-0.3617356***	0.1151	1.544
Gabon	-0.3311755**	0.1423	1.723
Niger	-0.3273892***	0.1156	1.748
Swaziland	-0.3141645***	0.1180	1.838
Burundi	-0.3036833***	0.1158	1.915
Botswana	-0.3013474***	0.1081	1.933
Uganda	-0.2917297**	0.1146	2.010
Togo	-0.2630096***	0.1004	2.271
Ethiopia	-0.2424201*	0.1327	2.497
Zambia	-0.2218922**	0.1045	2.763
Côte d'Ivoire	-0.2107433**	0.0996	2.929
Chad	-0.1957978***	0.0722	3.181
Benin	-0.1642348*	0.9181	3.864
Rwanda	-0.1397844*	0.0841	4.603
Ghana	-0.137521*	0.0727	4.685

Notes: * ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively. ECT is the error correction term for speed of adjustment. Only countries with significant ECT estimates are reported. The half-life is calculated as $\log(0.5)/\log(1 - |ECT|)$, where the higher the $|ECT|$, the lower the half-life and the faster is the adjustment.

The results indicate negative and significant adjustment coefficient for 19 out of the 35 sampled countries. This means that 19 meet the criteria for convergence and sustainability; the remaining 16 countries (see Appendix A2.6) have unsustainable current account balances, which is a violation of their respective IBCs.

The magnitude of the speed of adjustment term varies across the sampled countries. Malawi has the fastest adjustment followed by Cameroon, Sierra Leone, Nigeria and South Africa in that order. Malawi has a half-life of about a year, implying that it takes only two years for a complete adjustment whenever there is disequilibrium in the current account. On the other hand, Ghana shows the slowest adjustment followed by Rwanda, Benin and Chad in that order. Rwanda has a half-life of about 5 years, implying that it takes roughly 10 years for complete adjustment to take place whenever the current account is in disequilibrium.

2.6.4 Robustness tests

The purpose of this exercise is to assess the implications of splitting the sample into different income groups on the results. After estimating the model in full sample, a re-estimation is done based on country characteristics and income groups, such as those that have benefitted from debt relief under the HIPC initiatives¹¹; the fragile countries; the oil exporters; the middle income countries; and the lower income countries (see Appendix A2.4 for a breakdown of countries). The estimation results based on the PMG estimator are reported in Table 2.5.

Table 2.4: Current account sustainability by income group

Variable	Full sample	HIPC countries	Fragile states	Oil exporters	Middle income countries	Lower income countries
<i>Long-run Coefficient</i>						
<i>MM</i>	0.346*** (0.043)	0.338*** (0.048)	0.664*** (0.094)	0.633*** (0.158)	0.382*** (0.082)	0.330*** (0.049)
$H_0: \beta = 1?$	230.29***	187.42***	12.88***	5.36**	58.17***	184.03***
<i>Short-run coefficient</i>						
Error-correction term	-0.198*** (0.023)	-0.196 *** (0.027)	-0.202 *** (0.041)	-0.294*** (0.081)	-0.203*** (0.036)	-0.194*** (0.032)
ΔMM	0.162*** (0.037)	0.165 *** (0.042)	0.053 *** (0.041)	0.003 (0.152)	0.209 *** (0.068)	0.119 *** (0.035)
Constant	0.033*** (0.006)	0.024*** (0.004)	0.006* (0.003)	0.036*** (0.009)	0.048*** (0.009)	0.018*** (0.004)
Half-life	3.14	3.18	3.08	1.99	3.05	3.22

¹¹ HIPC debt relief initiative reduced the level of external debt for recipient countries in this region. A fact which is expected to have strong effects on sustainability of current account balances for these countries.

Variable	Full sample	HIPC countries	Fragile states	Oil exporters	Middle income countries	Lower income countries
No of Countries	35	25	13	5	16	17

Notes: * ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors in parenthesis. The half-life is calculated as $\log(0.5)/\log(1 - |ECT|)$, where the higher the $|ECT|$, the lower the half-life and the faster is the adjustment. ECT is the error correction term for speed of adjustment. *MM* is a ratio of imports inclusive of net interest payment on external debt.

Again, the results indicate that the long-run coefficient is positive and significant across the five income groups. The magnitude of long-run coefficient is almost similar across all income groups except for fragile and oil exporting countries. Nevertheless, the Wald test still rejects the null hypothesis that the long-run coefficient is equal to unity even though this hypothesis is rejected at a higher level for oil exporters compared to the remaining categories (5 percent compared to 1 percent for other income groups). This suggests that even though current account is weakly sustainable in all the cases, it is less weak, or relatively strong for oil exporting countries. Generally, these findings confirm our earlier results that current account balance is weakly sustainable in the sub-Saharan Africa region even after controlling for different income groups.

The speed of adjustment coefficient is again negative and significant across all five income categories with similar half-life except for oil exporters. The oil exporters have a half-life of two years compared to three years for the other income groups, with the low-income category recording the highest half-life of 3.22 years. These results suggest that it takes approximately four years to reduce the current account imbalances in oil exporting countries compared to six years in other income groups. As such, current account balance in oil exporting countries adjusts back to equilibrium at the fastest rate whenever there is a shock in the external accounts while the slowest adjustment is experienced in the low-income countries. A finding which points to the fact that non-oil exporting countries have limited buffer to withstand negative external shocks on their current account. In summary these results further confirm that our earlier findings are robust to different income groupings in the region.

The overall finding is that current account is weakly sustainable in sub-Saharan Africa, with a significant number of countries having unsustainable balances. In general, this implies that these countries are likely to experience prolonged spells of current account deficit. The slow pattern of adjustment back to equilibrium provides further evidence to this finding. For a vast majority of

countries in the region, it takes an average of about six years for a complete adjustment to long-run equilibrium in response to a short-run disturbance. Under these conditions, a build-up in levels of external debt is likely to occur, since the current account deficits are not cleared quickly enough. Such a situation could prove problematic for these countries in the long term for several reasons. Firstly, it can lead to a rise in net interest payment for servicing debt, which could crowd out private investment and hence reduce GDP growth. Secondly, net interest payment could outstrip GDP growth, which in turn could impair the ability of these economies to service their debt. Finally, rising levels of foreign debt in these countries could increase their vulnerability to adverse exogenous shocks.

2.7 Conclusion

This chapter sought to examine the sustainability of current account balances in the sub-Saharan Africa region. In addition, it attempted to assess the strength of sustainability of these balances and their pattern of adjustment in the region. A test for cointegrating relationship between exports and imports was done within the error correction framework, testing whether there was a long-run relationship between these two variables. The model estimates the long-run coefficient as well as the speed of adjustment across the countries in sub-Saharan Africa and results confirm existence of a long-run relationship for most countries but with weakly sustainable current account balances. Furthermore, the evidence reveals that a significant number of countries (16 out of 35) in this region face unsustainable balances. This situation is likely to result in prolonged spells of current account deficits, which is also evidenced by the slow pattern of adjustment back to equilibrium. On average, it takes about six years for a complete adjustment to long-run equilibrium in case of a short-run disturbance. The resulting build-up of external debt, since the current account deficits are not cleared quick enough, could crowd out private investment if not addressed, and hence reduce GDP growth. It could also impair the ability of these countries to service their debt. Further, the rise in the levels of foreign debt raises the vulnerability of these countries to exogenous shocks. In view of these findings, the next chapter explores whether the public sector, which is dominant in sub-Saharan Africa, could be contributing to this current account situation given that, during the period of this analysis, the region was also encountering large and persistent fiscal deficits.

Appendix A

Appendix A2.1: Intertemporal Budget Constraint

The single period budget constraint in section 5.1 is expressed as:

$$B_t = -TB_t + (1 + r_t)B_{t-1} \quad (2.18)$$

Forward iteration and recursive substitution of (18) yield:

$$\begin{aligned} B_{t+1} &= -TB_{t+1} + (1 + r_{t+1})B_t \\ B_{t+2} &= -TB_{t+2} + (1 + r_{t+2})B_{t+1} \\ &= -TB_{t+2} - (1 + r_{t+2})TB_{t+1} + (1 + r_{t+2})(1 + r_{t+1})B_t \\ &\vdots \\ B_{t+n} &= -TB_{t+n} - (1 + r_{t+n})TB_{t+n-1} - \dots \\ &\quad - (1 + r_{t+n})(1 + r_{t+n-1}) \dots (1 + r_{t+2})TB_{t+1} \\ &\quad + (1 + r_{t+n})(1 + r_{t+n-1}) \dots (1 + r_{t+1})B_t \end{aligned}$$

Rearranging the last equation for B_t , we obtain the following expression:

$$B_t = \frac{TB_{t+n}}{(1 + r_{t+n})(1 + r_{t+n-1}) \dots (1 + r_{t+1})} + \frac{TB_{t+n-1}}{(1 + r_{t+n-1}) \dots (1 + r_{t+1})} + \dots + \frac{TB_{t+1}}{(1 + r_{t+1})} + \frac{B_{t+n}}{(1 + r_{t+n})(1 + r_{t+n-1}) \dots (1 + r_{t+1})}$$

Alternatively, by letting n approach infinity, we obtain the following expression:

$$B_t = \sum_{i=1}^{\infty} \lambda_i TB_{t+i} + \lim_{n \rightarrow \infty} \lambda_n B_{t+n}, \quad \lambda_i = \prod_{j=1}^i \frac{1}{1 + r_{t+j}}. \quad (2.19)$$

Appendix A2.2: Intertemporal Budget Constraint

The single period budget constraint in section 5.1 is expressed as:

$$B_t = Z_t - X_t + (1 + r)B_{t-1} \quad (2.20)$$

Forward iteration and recursive substitution of equation (xx) n times gives:

$$\begin{aligned} B_{t+1} &= Z_{t+1} - X_{t+1} + (1 + r)B_t \\ &= Z_{t+1} - X_{t+1} + (1 + r)\{Z_t - X_t + (1 + r)B_{t-1}\} \\ &= Z_{t+1} - X_{t+1} + (1 + r)(Z_t - X_t) + (1 + r)^2 B_{t-1} \\ &\vdots \\ B_{t+n} &= \sum_{j=0}^n (1 + r)^{n-j} (Z_{t+j} - X_{t+j}) + (1 + r)^{n+1} B_{t-1} \end{aligned} \quad (2.21)$$

Making B_{t-1} the subject of the formula we obtain:

$$\begin{aligned} B_{t-1} &= \sum_{j=0}^n (1 + r)^{-j-1} (Z_{t+j} - X_{t+j}) + (1 + r)^{-n-1} B_{t+n} \\ &= \sum_{j=0}^n \lambda^{j+1} (Z_{t+j} - X_{t+j}) + \lambda^{n+1} B_{t+n}, \quad \lambda = \frac{1}{1 + r} \end{aligned}$$

Letting n approach infinity, we get:

$$B_{t-1} = \sum_{j=0}^{\infty} \lambda^{j+1} (Z_{t+j} - X_{t+j}) + \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \quad (2.22)$$

With further manipulation of equation (22), we get:

$$\begin{aligned} B_{t-1} &= \sum_{j=0}^{\infty} \lambda^{j+1} (Z_{t+j} - X_{t+j}) + \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \\ &= \lambda(X_t - Z_t) + \lambda^2(X_t - Z_t) + \lambda^3(X_t - Z_t) + \dots + \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \\ &= \lambda(X_t - Z_t) + \lambda^2(X_t - Z_t) - \lambda^2(X_t - Z_t) + \lambda^2(X_t - Z_t) + \lambda^3(X_t - Z_t) \\ &\quad - \lambda^3(X_t - Z_t) + \lambda^3(X_t - Z_t) + \dots + \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \end{aligned}$$

$$\begin{aligned}
&= \lambda(X_t - Z_t) + \lambda \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + \lambda \sum_{j=0}^{\infty} \lambda^{j+1} (X_{t+j} - Z_{t+j}) \\
&+ \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n}
\end{aligned}$$

Making use of the fact that $B_{t-1} - \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} = \lambda \sum_{j=0}^{\infty} \lambda^{j+1} (X_{t+j} - Z_{t+j})$, we obtain:

$$= \lambda(X_t - Z_t) + \lambda \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + \lambda B_{t-1} + (1 - \lambda) \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n}$$

$$B_{t-1} - \lambda B_{t-1} = \lambda(X_t - Z_t) + \lambda \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + (1 - \lambda) \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n}$$

$$\frac{1 - \lambda}{\lambda} B_{t-1} = X_t - Z_t + \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + \frac{1 - \lambda}{\lambda} \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n}$$

$\because \lambda = \frac{1}{1+r} \Rightarrow r = \frac{1-\lambda}{\lambda}$, we then obtain:

$$r B_{t-1} = X_t - Z_t + \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n}$$

$$Z_t + r B_{t-1} = X_t + \sum_{j=1}^{\infty} \lambda^j (\Delta X_{t+j} - \Delta Z_{t+j}) + r \lim_{n \rightarrow \infty} \lambda^{n+1} B_{t+n} \quad (2.23)$$

Appendix A2.3: Description of variables

Variable Name	Description	Units	Source
Exports of goods and services	Exports of goods and services comprise all transactions between residents of a country and the rest of the world involving a change of ownership from residents to nonresidents of general merchandise, net exports of goods under merchanting, nonmonetary gold, and services.	current US\$	WDI
Imports of goods and services	Imports of goods and services comprise all transactions between residents of a country and the rest of the world involving a change of ownership from nonresidents to residents of general merchandise, nonmonetary gold, and services.	current US\$	WDI
Interest payments on external debt	Interest payments on external debt which comprise of long-term debt, IMF charges, and interest paid on short-term debt. Long-term external debt is defined as debt that has an original or extended maturity of more than one year and that is owed to nonresidents by residents of an economy and repayable in currency, goods, or services. Short-term external debt is defined as debt that has an original maturity of one year or less.	current US\$	WDI
Imports plus interest payment on external debt	The series constructed by adding the value for imports of goods and services on interest payments on external debt and scaling by GDP	% of GDP	WDI
GDP	Gross Domestic Product	current US\$	WDI
Current account balance	Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income. Data are in current U.S. dollars.	% of GDP	WDI

Notes: WDI is the World Bank's World Development Indicators

Appendix A2.4: List of selected countries

#	Full sample	HIPC countries	Fragile states	Oil exporters	Middle -income countries	Low-income countries
1	Benin	Benin	Benin	Cameroon	Botswana	Benin
2	Botswana	Burkina Faso	Central African Republic	Chad	Cabo Verde	Burkina Faso
3	Burkina Faso	Burundi	Chad	Gabon	Cameroon	Burundi
4	Burundi	Cameroon	Comoros	Nigeria	Cote d'Ivoire	Central African Republic
5	Cabo Verde	Central African Republic	Cote d'Ivoire	Republic of Congo	Gabon	Chad
6	Cameroon	Chad	Gambia		Ghana	Comoros
7	Central African Republic	Comoros	Guinea-Bissau		Kenya	Ethiopia
8	Chad	Côte d'Ivoire	Madagascar		Lesotho	Gambia
9	Comoros	Ethiopia	Malawi		Mauritius	Guinea-Bissau
10	Côte d'Ivoire	Gambia	Mali		Nigeria	Madagascar
11	Ethiopia	Ghana	Republic of Congo		Republic of Congo	Malawi
12	Gabon	Guinea-Bissau	Sierra Leone		Senegal	Mali
13	Gambia	Madagascar	Togo		Seychelles	Mozambique
14	Ghana	Malawi			South Africa	Niger
15	Guinea-Bissau	Mali			Swaziland	Rwanda
16	Kenya	Mozambique			Zambia	Sierra Leone
17	Lesotho	Niger				Tanzania
18	Madagascar	Republic of Congo				Togo
19	Malawi	Rwanda				Uganda
20	Mali	Senegal				
21	Mauritius	Sierra Leone				
22	Mozambique	Tanzania				
23	Niger	Togo				
24	Nigeria	Uganda				
25	Republic of Congo	Zambia				
26	Rwanda					
27	Senegal					
28	Seychelles					
29	Sierra Leone					
30	South Africa					
31	Swaziland					
32	Tanzania					
33	Togo					
34	Uganda					
35	Zambia					

Appendix A2.5: Descriptive statistics for selected sub-Saharan African countries, 1980-2017

Country	CAB-to-GDP			Exports-to-GDP			Imports-to-GDP		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Benin	-7.42	-28.53	-1.64	21.52	13.50	31.30	35.07	24.01	53.07
Botswana	5.53	-29.27	26.45	53.66	34.80	75.10	50.77	33.34	84.43
Burkina Faso	-6.41	-13.16	0.52	13.11	7.90	26.00	28.22	20.34	39.98
Burundi	-7.50	-21.46	1.72	8.60	4.70	12.90	26.81	14.37	39.79
Cabo Verde	-8.92	-45.33	5.32	27.80	13.30	47.40	62.72	37.41	85.77
Cameroon	-3.07	-5.97	1.45	23.63	13.90	33.50	24.87	12.48	36.88
Central African Republic	-5.13	-14.82	-0.49	17.62	10.70	26.90	27.86	18.06	41.49
Chad	-8.48	-84.40	8.15	24.04	6.60	51.00	36.58	7.75	114.24
Comoros	-5.88	-27.75	3.44	9.04	8.20	11.60	26.39	16.35	39.04
Côte d'Ivoire	-3.27	-18.19	10.37	40.74	29.40	53.80	37.96	1.07	52.11
Ethiopia	-3.60	-12.64	1.54	10.02	3.24	16.70	22.34	5.95	39.87
Gabon	7.21	-19.39	27.33	54.54	35.20	69.00	38.36	25.15	59.62
Gambia	-4.07	-18.60	1.57	31.95	12.40	59.90	43.53	25.79	79.03
Ghana	-5.07	-11.93	0.12	25.83	3.30	48.80	39.40	17.17	70.37
Guinea-Bissau	-11.37	-35.71	2.93	15.61	4.90	27.50	36.50	18.64	62.90
Kenya	-2.67	-10.37	11.42	24.11	13.20	38.90	38.92	23.54	90.52
Lesotho	3.66	-31.41	47.25	29.79	11.04	56.42	146.12	82.43	250.19
Madagascar	-7.62	-21.10	0.57	22.35	10.60	35.40	31.65	17.18	50.71
Malawi	-7.36	-17.42	-0.14	24.45	15.90	35.70	37.30	23.25	55.64
Mali	-6.09	-14.70	1.26	20.56	13.30	28.40	33.81	27.84	44.20
Mauritius	-3.53	-13.50	6.29	55.96	42.30	68.50	62.37	50.62	74.00
Mozambique	-17.77	-44.74	-5.70	18.70	2.50	40.70	44.57	12.16	85.56
Niger	-10.30	-25.08	0.08	18.60	14.10	24.60	32.85	24.12	49.26
Nigeria	3.10	-5.10	21.53	19.61	5.20	36.00	17.45	8.00	37.11
Republic of Congo	-10.07	-73.65	19.67	66.88	39.80	94.00	62.25	38.27	111.54
Rwanda	-5.05	-15.76	8.29	10.10	5.20	18.20	26.45	14.54	65.16
Senegal	-6.45	-11.23	-3.50	25.34	19.20	35.20	32.35	23.78	41.71
Seychelles	-12.68	-27.51	6.45	48.93	8.90	108.00	87.61	55.14	133.47
Sierra Leone	-9.12	-65.03	10.71	20.02	7.80	34.70	33.80	15.07	84.63
South Africa	-1.18	-6.02	5.76	27.40	20.70	35.60	25.26	15.91	38.58
Swaziland	0.45	-17.19	26.08	61.86	44.90	84.40	74.57	40.45	115.91
Tanzania	-8.15	-26.23	-1.13	14.77	4.04	24.10	26.45	9.00	49.98
Togo	-6.80	-13.15	2.89	37.62	24.40	51.20	53.80	40.18	70.82
Uganda	-3.77	-9.89	1.82	13.40	7.10	24.30	25.41	11.58	37.38
Zambia	-5.13	-19.81	7.53	33.75	23.90	44.50	38.48	25.14	60.07

Notes: CAB is current account balance

Appendix A2.6: Error correction term (ECT) for countries with unsustainable current account balances

Country	ECT	Std. Err.
Madagascar	-0.2000061	0.123893
Central African Republic	-0.1475387	0.090738
Guinea-Bissau	-0.1412041	0.093994
Mauritius	-0.1306584	0.092519
Mali	-0.1289271	0.079629
Tanzania	-0.1199654	0.076653
Senegal	-0.112219	0.082456
Republic of Congo	-0.0992996	0.074605
Kenya	-0.0760946	0.086122
Gambia	-0.0751383	0.089895
Seychelles	-0.0571772	0.050853
Comoros	0.00041690	0.050903
Cabo Verde	-0.0337308	0.062626
Burkina Faso	-0.0108231	0.080691
Lesotho	-0.0098026	0.026536
Mozambique	0.0085156	0.045502

Notes: * ** and *** denote statistical significance at the 10%, 5% and 1% levels respectively. ECT is the error correction term for speed of adjustment.

Chapter 3

Effect of Fiscal Deficit on the Current Account in sub-Saharan Africa: Does the level of Public Debt matter?

3.1 Introduction

Given the conclusion of chapter two that current account is weakly sustainable in the sub-Saharan Africa region, this chapter continues with this discussion to find out if the public sector drives the behaviour of current account in the region. The sub-Saharan Africa has maintained large and persistent levels of both current account deficit and fiscal deficit over the past two decades. This rekindles the twin deficit debate that was prevalent in the US in the 1980s during the Reagan administration¹². The only exceptions are oil exporters, although lately they have also come under increasing pressure due to frequent fluctuations in commodity exports, all against the backdrop of a recent upsurge in public debt in the region. It is notable that the HIPC¹³ debt relief program initially contributed to substantial decline in the average level of debt in the region. The level of debt-to-GDP ratio declined sharply from a high of 67 percent in 2000 to 24 percent in 2008. However, since 2008, less than a decade later, there appears to be a reversal as the debt ratio is again rising steadily. The median level of public debt stood at 50 percent of GDP as at the end of 2017, according to the IMF's Regional Economic Outlook report for sub-Saharan Africa.

The debate whether the fiscal deficit drives the current account deficit has featured prominently in the literature. There are three possible causal relationships between current account and fiscal deficit. The twin deficit hypothesis argues that an increase in the fiscal deficit increases the current account deficit. The alternative view is that fiscal deficit does not affect current account deficit in line with the Ricardian equivalence hypothesis. Further, a more extreme view is that fiscal deficit improves the current account deficit in line with the twin divergence hypothesis.

Empirical tests on this question often yield mixed results; the debate on this subject is therefore still wide open. Some studies have provided evidence for the twin deficit hypothesis (Abbas et al., 2011; Chinn & Prasad, 2003; Egwaikhide, 1997; Forte & Magazzino, 2015; Kalou & Paleologou,

¹² During the tenure of President Ronald Reagan (1981-1989), the United States experienced simultaneous increase in current account deficit and fiscal deficit.

¹³ The Heavily Indebted Poor Countries (HIPC) initiative launched in 1996 by the IMF and World Bank with an aim of debt reduction or forgiveness to poor countries facing debt burden.

2012; Monacelli & Perotti, 2007; Rafiq, 2010; Salvatore, 2006). Others have confirmed the twin divergence view (Kim & Roubini, 2008; Sakyi & Opoku, 2016). Moreover, others have found no significant relationship at all (Aristovnik & Djuric, 2010; Burcu, 2011; Bussière, Fratzscher, & Müller, 2010; Corsetti & Müller, 2006; Kaufmann, Scharler, & Winckler, 2002). One possible explanation for mixed findings is that the models addressing this problem do not account for threshold effects in the current account dynamics.

The existence of threshold effects in current account dynamics has been confirmed by a number of studies (Aizenman & Sun, 2010; Clarida et al., 2005; Duncan, 2014; Freund, 2005; Holmes, 2011; Nickel & Vansteenkiste, 2008). In particular, one of the threshold variable that could be driving the relationship between current account and fiscal deficit is the level of public debt (Nickel & Tudyka, 2014; Nickel & Vansteenkiste, 2008). It follows that current account would respond differently to fiscal deficit depending on the level of public debt. We seek to test this hypothesis within the context of sub-Saharan Africa in this chapter.

This study follows closely the literature in Nickel & Vansteenkiste (2008) and uses the estimation technique proposed by Caner & Hansen (2004), which assumes that the threshold variable is exogenous. However, debt ratio in a current account model can be endogenous because of possible correlation with other factors affecting current account but omitted from the model. Similarly, countries with high current account deficit are more likely to accumulate more debt than those with lower deficits. This work therefore extends the literature by allowing the public debt as a threshold variable to be endogenous. It then employs an estimation technique of Seo & Shin (2016) for dynamic panel threshold model which allows for endogenous threshold.

So far, there is no study in sub-Saharan Africa that has explored the linkage between public debt on the one hand, and current account and fiscal deficit on the other. This is an interesting dimension in the context of the region which is beset with persistent current account and fiscal deficit coexisting side by side with rising public debt. Another notable contribution of this study is that most studies testing the twin deficit hypothesis are concentrated in developed countries with only a few focused on sub-Saharan Africa (Ahmad, Aworinde, & Martin, 2015; Egwaikhide, 1997; Sakyi & Opoku, 2016). Even for these few, majority of studies are country specific; those that cover the entire region are quite scarce.

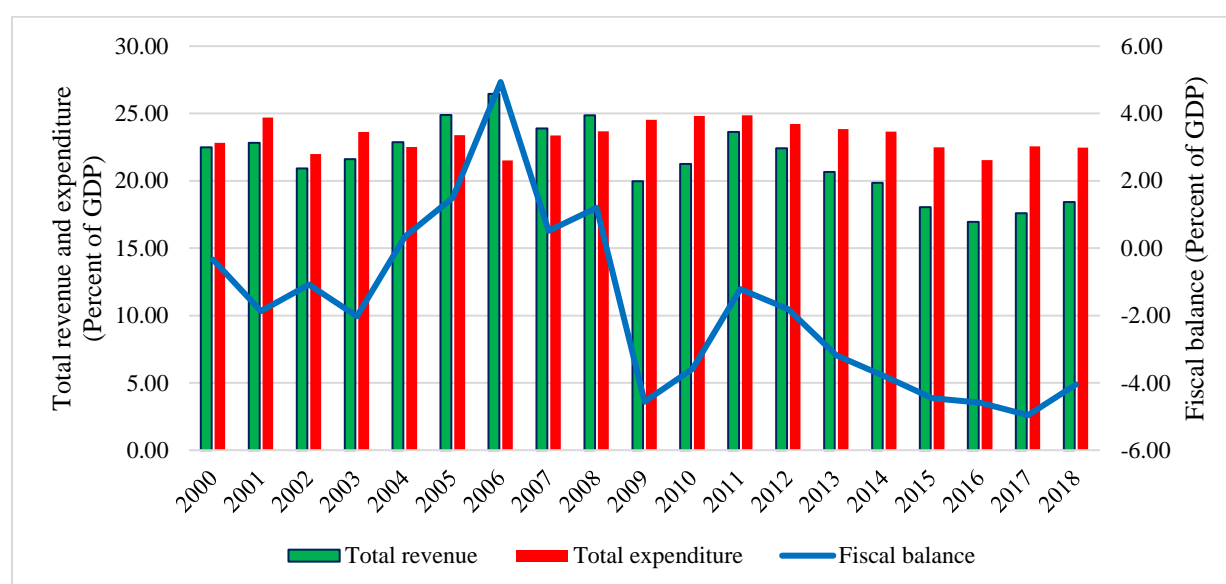
In view of the foregoing, this chapter examines the effect of fiscal deficit on current account and assesses whether this relationship depends on the level of indebtedness in the economy. The following two research questions are addressed. Firstly, does fiscal deficit lead to current account deficit. Secondly, does the relationship between fiscal deficit and current account deficit depend on debt level.

The rest of this chapter is organized as follows. Section two reviews recent fiscal and current account developments in the sub-Saharan Africa region. Section three reviews the relevant theoretical and empirical literature. Section four presents the methodology while section five reports and discusses the empirical results. Section six concludes the chapter.

3.2 Review of Recent Fiscal and Current Account Developments in sub-Saharan Africa

This section examines the recent fiscal, current account and public debt developments in the sub-Saharan Africa region over the past two decades. Figure 3.1 presents the trends in total revenue and total expenditure in the sub-Saharan Africa. The left axis plots the ratios of total revenue and expenditure while the right axis plots the ratio of fiscal balance which in this case defines the gap between total revenue and total expenditure. The total revenue comprises of the tax and nontax revenue while total expenditure comprises of expenditures on goods and services, compensation of employees including wages and salaries, subsidies and other transfers.

Figure 3.1: Trends in total revenue and total expenditure in sub-Saharan Africa



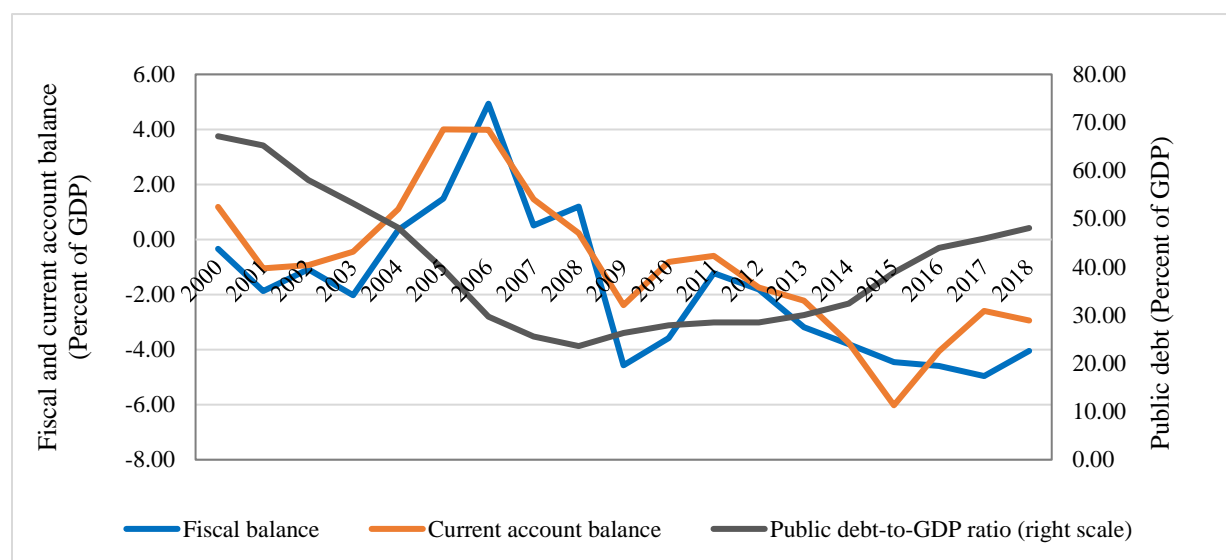
Source: WEO, 2019

Several stylized facts emerge from the analysis of Figure 3.1. The region shows a general trend of higher levels of expenditure compared to revenue receipts throughout the period under review (2000-2018) except for a period between 2004 and 2008. The main drivers of higher expenditure in the region during the review period were compensation to employees as well as expenditures on goods and services (World, Bank 2018).

Figure 3.2 shows the trends in fiscal balance and the current account balance (left axis) as well as public debt (right axis) between period 2000 and 2018. The current account and fiscal balance

appear to move in the same direction for quite a while throughout the period. Whenever the current account balance improves, the fiscal balance also improves and vice versa. This shows a strong evidence of co-movement between them.

Figure 3.2: Trends in current account balance, fiscal balance and public debt in sub-Saharan Africa



Source: WEO, 2019

Figure 3.2 shows the current account and fiscal balance in deficit between 2000 and 2004 before briefly moving to surplus and reaching a peak in 2006. The region experienced improved balances in the period leading to the great recession of 2007/8 between 2003 and 2006. The fiscal balance increased from a deficit of 2 percent in 2003 to a surplus of 5 percent in 2006. At the same time, the current account balance also improved from a deficit of 0.5 percent to a surplus of 4 percent.

However, the events of the 2007/8 global financial crisis, which weighed down heavily on developed countries, appear to have also spilled over to sub-Saharan Africa. Hence, just like in advanced economies, the region embarked on fiscal stimulus program to boost aggregate demand. The program involved huge public spending which largely affected the fiscal balance more than the current account balance. This is evident from considerable deterioration in fiscal balance from a surplus of 0.5 percent in 2007 to a deficit of 4.5 percent in 2009, compared to a current account balance that declined marginally from 1.5 percent in 2007 to 2.3 percent in 2009. This represented a 4-percentage-point drop for fiscal balance compared to a percentage point drop of 0.8 for current

account balance. After the end of recession in 2009, there was significant improvement in both balances, with fiscal deficit improving to 1.2 percent and current account deficit climbing to 0.6 percent in 2011. This improvement was however short-lived as the two balances began deteriorating again thereafter.

The opposite trend is apparent with the public debt in the region (right axis of Figure 3.2). For the period of improvement in current account and fiscal balance, public debt was falling and vice versa. However, the question as to whether there was any causal relationship between these variables is an empirical one and can only be determined empirically. Between 2000 and 2008, the public debt fell steadily from a high of 67 percent in 2000 to 24 percent in 2008 as shown in Figure 3.2. This decline coincided with improved fiscal performance during the period and debt forgiveness extended to selected countries in the region under the HIPC program. Majority of countries in sub-Saharan Africa benefited from this program with 30 out of a total of 36 eligible countries coming from this region. However, from 2008 onwards, public debt began to rise again. The debt rose steadily, reaching 48 percent of GDP in 2018. Accordingly, more countries are entering into debt distress, with more than 40 percent of countries in this situation coming from sub-Saharan Africa (World Bank, 2018). The implication of growing debt is that greater share of revenue is allocated towards debt service at the expense of other pressing developmental needs.

3.3 Review of Literature

3.3.1 Theoretical literature

Viewed through the lens of the national accounting framework, the relationship underpinning current account and fiscal balance can be derived from the national income identity of an open economy as shown below:

$$Y = C + I + G + X - M \quad (3.1)$$

Where Y represents the gross domestic product, C is consumption, I is gross investment, G is government expenditure, X is exports and M is imports. Adding the net factor receipts from abroad, (R) to (3.1) we obtain:

$$\begin{aligned} GNI &= Y + R \\ &= C + I + G + X - M + R \end{aligned} \quad (3.2)$$

Where GNI is the gross national income. Further, using the fact that $CA = X - M + R$, and re-arranging (3.2), we obtain:

$$CA = GNI - (C + I + G) \quad (3.3)$$

Adding and subtracting taxes (T) on both sides of (3.3) and further re-arranging, to obtain:

$$CA = (GNI - C - T) - I + (T - G)$$

Where $(GNI - C - T) = S$ is gross domestic savings and $(T - G)$ is the public sector balance. Thus, the current account can be expressed as follows:

$$CA = (S - I) + (T - G) \quad (3.4)$$

Where, $(S - I)$ is the net saving of the private sector and $(T - G)$ is the net saving from government (fiscal balance). Thus, current account can be viewed as a savings investment gap in the public and private sector. This relationship can also be expressed as:

$$CA = (S - I)_p + (S - I)_g \quad (3.5)$$

Where subscript p and g in equation (3.5) denote private and government sectors respectively. Equation (3.5) is an important identity which shows that current account deficit arises due to saving gaps in either the government or private sector. In low-income countries, the deficit is mostly

driven by the saving gap in the government sector which is not fully offset by the net saving in the private sector. Therefore, this identity demonstrates that fiscal balance is an important driver of the current account balance, assuming equality of the private savings and investment. Hence, persistent current account deficit may reflect persistent government spending in excess of receipts. This co-movement of the current account and fiscal balance in the same direction as ‘twins’ is the core idea behind the twin deficit hypothesis. However, if private savings fully offset the changes in fiscal deficit, then there will be no deficit in the current account, which is consistent with the Ricardian equivalence hypothesis. These two competing views are discussed further in the next paragraphs.

The framework described in equation (3.5) above broadly explains the possible channels of transmission from fiscal balance to current account balance. The Mundell-Fleming framework predicts that in an economy operating under a flexible exchange rate, a fiscal expansion arising from the increase in government expenditure or tax cuts worsens the current account. This occurs through a rise in domestic interest rates, which attracts capital inflows leading to the appreciation of the exchange rate, which in turn results in a fall in net exports assuming the Marshall-Lerner conditions¹⁴ hold. Ultimately, this worsens the current account balance. However, it is important to note that the chain of events leading to deterioration in the current account balance are not instantaneous but happens after some time lapse; current account responds sluggishly to changes in exchange rate. In fact, it is possible for current account to improve initially to an appreciation of the exchange rate before eventually worsening. This phenomenon could be described as inverse J-curve effect.

Another channel of transmission is the Keynesian framework which argues that fiscal expansion due to tax cut, for instance, has a wealth effect on household income by raising the disposable income. This in turn increases private consumption, leading to a reduction in private savings and hence causing current account deficit to widen. However, Sutherland (1997) posits that the impact of fiscal expansion on private consumption depends on debt levels. At moderate levels, fiscal policy has Keynesian effects because the current generation of consumers discount future taxes knowing that they may not be alive when taxes are raised at that time; or assuming there will be a

¹⁴ According to this condition, exchange rate depreciation leads to the balance of payment improvement only if the sum of export and imports demand elasticities is greater than unity.

larger population available to pay the taxes by then. However, when debt rises to extreme levels, the current generation of consumers perceive that there is a high probability that they will be alive to pay the extra taxes. Because of that, the households are likely to save more to offset future tax increase. The rise in private savings reduces consumption, leading to improvements in the current account. Hence, in this case, fiscal deficit could be contractionary. Perotti (1999) expresses a similar view, predicting that fiscal policy shocks have asymmetric effects depending on debt ratios. At lower debt ratios, expenditure shocks have Keynesian effects, and non-Keynesian effects are felt at higher debt ratios. The level of debt, therefore, acts as an important determinant of the expectations of the private agents.

The Keynesian framework working through government spending can also directly impact the current account. According to this concept, a fiscal expansion through an increase in government expenditure impacts the current account through a direct effect on absorption. The argument here is that when the economy is at full employment, a fiscal expansion worsens the current account balance by raising aggregate demand beyond the productive capacity of the economy. In other words, current account deficit arises when the absorptions¹⁵ exceed the national income.

An alternative view to the standard Keynesian theory is provided by the Ricardian equivalence hypothesis, which argues that there is no relationship between fiscal deficit and current account deficit because the intertemporal shifts between taxes and government expenditures do not affect interest rates, investment and, by extension the current account balance (Barro, 1989). Central to this argument is that consumers being rational agents with perfect foresight can perceive that fiscal deficit arising from tax cuts or bond issuance does not alter the present value of household wealth, given that both represent tax liabilities to be repaid in future. Therefore, fiscal expansion is offset by a proportionate rise in private savings which supports the notion that the current account is not affected by fiscal policy actions.

Besides the Ricardian equivalence hypothesis, another view that counters the Keynesian understanding of the twin deficit is the twin divergence hypothesis. Kim & Roubini (2008) is the proponent of this school of thought, arguing against the co-movement between current account and fiscal balance. Instead, these two variables follow divergent paths in that fiscal deficit

¹⁵ These are domestic expenditure on total consumption, government expenditure and investment

improves the current account deficit, possibly due to the countervailing impact of output fluctuations on budget and current account deficit. For instance, a positive productivity shock promotes economic boom which induces an increase in private investment relative to private savings. This is because investment expenditure reacts more strongly to the business cycle than private savings; current account deteriorates as a result. At the same time, a boom in the economy improves the fiscal balance due to effect of automatic stabilizers on taxes and spending (output expansion generates tax increment and decline in government expenditure due to cuts in unemployment benefits, for instance). The full chain of events results in a situation where the current account worsens (improves) as the fiscal balance improves (worsens).

3.3.2 Empirical literature

The empirical studies on the effect of fiscal balance on current account balance are premised on three broad categories. The first category reviews studies that support the twin deficit hypothesis while the second one looks at realms of studies supporting the alternative view of either the Ricardian equivalence or twin divergence hypothesis. The final category reviews studies that examines whether twin deficit hypothesis holds in the presence of threshold effects.

The studies on twin deficit hypothesis draws largely from experiences in the US in the 1980s and 1990s (Abell, 1990; Darrat, 1988). Studies supporting the concept argue that an increase in fiscal deficit leads to the deterioration of the current account. Notably, Salvatore (2006) tests this hypothesis in G-7 countries for the period 1973-2005. The empirical result provides strong support for the twin deficit in this group of economies. Monacelli & Perotti (2007) also arrives at the same conclusion after investigating the effect of government spending shocks on real exchange rate, the trade balance, output and private consumption on a set of OECD countries. Using structural VAR on a quarterly series for period 1975Q1-2006Q2, the study finds support for the twin deficit hypothesis, except for the US, where the effect of spending shock seems negligible. Kalou & Paleologou (2012) also tests for the twin deficit hypothesis in Greece for the period 1960-2007. Using a vector error correction model allowing for structural break, the study finds support for the twin deficit hypothesis. Rafiq (2010) also investigates for evidence of twin deficit hypothesis in the UK and the US using a time varying vector autoregressive model. Based on data for the period 1973Q1-2008Q4 and 1973Q1-2009Q1 for the UK and the US respectively, the study finds evidence for twin deficit hypothesis in both countries, however with a reduced impact in the last

20 years of the sample period.

Egwaikhide (1997) investigates the effect of budget deficit on the current account balance in Nigeria for the period 1973-1993. The study develops a structural model that captures the interrelationships between budget deficit, domestic credit, aggregate demand, price level and the balance of payment. After solving the model, a counterfactual simulation exercise is done and reveals that raising the budget deficit contributes to deterioration of the current account balance.

Chinn & Prasad (2003) conducts the same test but using panel estimation techniques on a group of industrial and developing countries. Controlling for a broad set of macroeconomic variables and using annual data for the period 1971-1995, the study finds a positive correlation between current account and government budget balance. Abbas et al (2011) also performs this test for a large group of economies in advanced, emerging and low-income countries using a variety of statistical methods including panel data methods. Their findings indicate that, on average an increase in fiscal balance by 1 percentage points of GDP is associated with a current account improvement of 0.3-0.4 percentage points of GDP. This relationship is especially pronounced in emerging and low-income economies when the exchange rate is flexible, the economies are more open; output is above potential; and the initial debt is above 90 percent of GDP.

Magazzino (2012) examines the relationship between fiscal deficit, trade deficit and private consumption in European countries for the period 1970-2010. Using different panel model specifications, the study arrives at mixed findings. For the static panel data model, the results support the twin deficit hypothesis, with a 1 percent increase in fiscal deficit contributing to a 0.21 percent increase in current account deficit. Conversely, for dynamic panel specification, the findings vary according to the estimator used. When difference GMM is used, the findings support twin deficit hypothesis, while when the system GMM is used, the results lose significance, hence lending support to the Ricardian equivalence hypothesis. Later on Forte & Magazzino (2015) repeats the same study with the sample split into two set of periods 1970-1991 and 1992-2010. The common correlated effect mean group estimator is then used on the sample. The results show evidence of twin deficit in the second sub-period, while the former shows evidence of Ricardian view.

The second category of empirical studies argue that fiscal deficit does not cause current account

deficit to deteriorate; instead, there is either no relationship at all (Ricardian equivalence view) or fiscal deficit improves the current account balance (twin divergence view). This category of studies therefore negates the twin deficit hypothesis. For instance, Kim & Roubini (2008) examines the effects of government deficit shocks on the current account and real exchange rate in the US. Based on a VAR model, the empirical results provide evidence of improvements in the current account due to government deficit shocks. This finding supports the twin divergence hypothesis. Similar evidence is found in Sakyi & Opoku (2016), which tests for empirical evidence of twin deficit hypothesis in Ghana. The study employs a cointegration technique allowing for structural break on annual time series data for the period 1960-2012. The results suggest improvement of current account as a result of fiscal deficit in accord with Kim & Roubini (2008).

Corsetti & Müller (2006) also performs a twin deficit test on Australia, Canada, the UK and the US using VAR. Their model predicts that the effect of fiscal shock on external balance depends on the degree of openness and shock persistence. Their empirical findings suggest that fiscal policy shock worsens the trade account in economies with persistent fiscal expansion and less open. Noting that the US and Australia are less open compared to Canada and the UK, the effect of fiscal policy shock on current account is limited in these countries. These findings support the conclusion that fiscal expansion has negligible effect on trade balance in less open economies.

Burcu (2011) investigates for evidence of twin deficit hypothesis in Turkey using annual data for the period 1975-2009. Based on a fractional cointegration approach, the study finds little evidence for a relationship between trade deficit and budget deficit, and by extension, the twin deficit hypothesis in Turkey. Similarly, Aristovnik & Djuric (2010) conducts the same investigation for the EU region. Based on annual data for the period 1995-2008, the study finds no evidence of twin deficit hypothesis. Bussière et al. (2010) also investigates the role of government budget balance and productivity shock on current account balance in 21 OECD countries. To assess this relationship, the paper extends the standard intertemporal model of current account to include non-Ricardian household behaviour. Based on annual data for the period 1960-2003, the study finds evidence of Ricardian behaviour in the data. Kaufmann et al. (2002) tests for twin deficit hypothesis in Austria using quarterly data covering the period 1976Q1-1998Q4. Based on vector error correction model, the study arrives at same conclusion of no evidence of the twin deficit hypothesis in the data.

The final category of studies examines the threshold effects in the relationship between fiscal deficit and current account balance. There are few studies in this category. For instance, Nickel & Vansteenkiste (2008) investigates how the debt to GDP ratio affects the relationship between fiscal policy and current account balance. The paper estimates a sample of 22 industrialised countries using a dynamic panel threshold model for the period 1985-2005. It finds three debt thresholds that have significant effect on the relationship between fiscal policy and current account. At low and medium level (up to 44 percent), the relationship is positive in that, an increase in fiscal deficit increases current account deficit, and at medium and high level (between 44 and 90 percent), the relationship is still positive but with reduced effect. However, at a very high debt level (above 90 percent), the relationship turns negative and insignificant, suggesting that rising fiscal deficit has no effect on the current account deficit.

Nickel & Tudyka (2014) also explores the effect of fiscal stimulus at varying degrees of public indebtedness on real GDP, private investment and trade balance. The study adopts Bayesian techniques in the estimation of panel VAR on a sample of 17 European countries for the period 1970-2010. The results suggest that trade balance reacts negatively to fiscal stimulus shock when the level of indebtedness is low, and switches signs when the level rises. These findings provide evidence of twin deficit hypothesis at low debt levels and twin divergence at high debt level.

However, Ahmad, Aworinde, & Martin (2015) investigates the same question but uses the level of fiscal deficit as the threshold variable. Applying the same approach on a sample of nine African countries using threshold cointegration approach, the study argues that the twin deficit relationship is nonlinear due to the size of fiscal deficit. This implies that the effect of fiscal expansion on current account deficit differ depending on the size of the fiscal deficit. For instance, the impact could be more pronounced if the deficit exceeds a critical threshold level. Testing these conjectures on quarterly data covering the period 1980Q1-2009Q4, the study arrives at mixed findings. A positive cointegrating relationship supporting twin deficit hypothesis is found in six countries namely, Botswana, Cameroon, Egypt, Morocco, Nigeria and Tanzania. A negative cointegrating relationship is found in the remaining three countries, namely, Ethiopia, Kenya and Uganda, hence lending support for twin divergence hypothesis.

3.3.3 Overview of empirical literature

Empirical tests on effect of the fiscal balance on the current account balance yields mixed results. Some studies have confirmed existence of the twin deficit hypothesis (Abbas et al., 2011; Chinn & Prasad, 2003; Egwaikhide, 1997; Forte & Magazzino, 2015; Kalou & Paleologou, 2012; Monacelli & Perotti, 2007; Rafiq, 2010; Salvatore, 2006). Others have confirmed the twin divergence view (Kim & Roubini, 2008; Sakyi & Opoku, 2016). Moreover, others have found no significant relationship at all, an outcome that mirrors the Ricardian equivalence hypothesis (Aristovnik & Djuric, 2010; Burcu, 2011; Bussière et al., 2010; Corsetti & Müller, 2006; Kaufmann et al., 2002).

Another conclusion coming out of empirical review is that most studies are concentrated in developed countries with only a few focused on sub-Saharan Africa (Ahmad et al., 2015; Egwaikhide, 1997; Sakyi & Opoku, 2016). Even for these few, majority are country specific. Studies focussing on the whole region are quite scarce. Also, emerging from empirical literature is the observation that very few studies have explored the link between public debt and the twin deficit hypothesis (Nickel & Tudyka, 2014; Nickel & Vansteenkiste, 2008). Moreover, these studies mainly focus on industrialised countries. These are some of the gaps which this chapter seeks to address, particularly in the context of the sub-Saharan Africa region which is beset with persistent current account and fiscal deficit coexisting with rising public debt.

3.4 Methodology

3.4.1 Theoretical framework

The theoretical framework underpinning the relationship between current account and fiscal balance is based on the intertemporal approach to current account (ICA) as proposed by Obstfeld & Rogoff (1995) and extended by Bussière et al.(2004), which includes liquidity constraints and habit formation. The derivation of the model proceeds in two steps. First, the aggregate consumption is derived followed by the dynamic model of current account.

3.4.1.1 Aggregate consumption function

This framework is based on a small open economy that takes world interest rates as given and trades with the rest of the world. The following variables are exogenous; output, government expenditure, taxes and investment. In addition, taxes are lump sum. The economy is assumed to be populated by a continuum of heterogeneous population normalized to one. Only two groups exist in this population. The first group is liquidity constrained and spends their disposable income in each period while the second one is not liquidity constrained and therefore optimizes their consumption behaviour over time. To distinguish the two categories, the first group is referred to as Non-Ricardian¹⁶ consumers while the latter are Ricardian consumers since their behaviour mirrors Ricardian equivalence proposition and the ICA model.

The non-Ricardian consumers make up a fraction of the population represented by $\lambda \in [0,1]$ unit interval. Therefore, the aggregate consumption \bar{C}_t can be expressed as a weighted average of non-Ricardian consumers C_t^{NR} and Ricardian consumers C_t^R with λ and $1 - \lambda$ as respective weights. This can be expressed as follows:

$$\bar{C}_t = \lambda C_t^{NR} + (1 - \lambda) C_t^R \quad (3.6)$$

Further, it is assumed that the consumption function of the non-Ricardian agent is only based on disposable income which is defined as income less investment and taxes. This can be expressed

¹⁶ This distinction is important insofar as determining which households face liquidity constraints and therefore have limited ability to smooth consumption over time. Non-Ricardian consumers are assumed to have no access to financial markets and therefore rely only on wage income to smooth consumption. These households are liquidity constrained and the converse is true for Ricardian households.

as:

$$C_t^{NR} = Y_t - I_t - T_t \quad (3.7)$$

On the other hand, the Ricardian consumer is assumed to optimize their consumption behaviour in accordance with the standard ICA model which is further extended by Bussière et al.(2004) to include habit formation. The introduction of habit formation captures the influence of past and present consumption behaviour on the intra period utility of the consumer. As such, the Ricardian consumer faces the following intertemporal maximization problem:

$$Max E_t \left[\sum_{s=t}^{\infty} \beta^{s-t} u(C_s^R - \gamma \bar{C}_{s-1}) \right] \quad (3.8)$$

$$s. t. B_{s+1}^P = (1 + r)B_s^P + Y_s - T_s - I_s - C_s^R . \quad (3.9)$$

Where E_t is the expectations operator and agents are assumed to maximize the expected infinite sum of the intertemporal utility function given by the expression $u(C_s^R - \gamma \bar{C}_{s-1})$ discounted by subjective preference β . The parameter γ , captures the degree of habit persistence which lies in the interval $0 < \gamma < 1$. The budget constraint is represented by (3.9), where B_t^P is the net financial assets held by the representative agent at the end of $t - 1$.

Forward iteration of expression (3.9) and imposing a ‘no-Ponzi game’¹⁷ condition results in the following intertemporal budget constraint:

$$E_t \sum_{s=t}^{\infty} \frac{C_s^R}{(1 + r)^{s-t}} = (1 + r)B_t^P + E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1 + r)^{s-t}} \quad (3.10)$$

¹⁷ The no-Ponzi game condition places restriction on a country’s ability to roll over debt indefinitely. It implies $\lim_{s \rightarrow \infty} \beta_{t,s} A_{s+1} = 0$, where the discount factor, $\beta_{t,s}$ is defined as: $\beta_{t,s} = \frac{1}{\prod_{v=t+1}^s (1+r_v)}$ and $\beta_{t,t} = 1$

Maximizing (3.8) subject to (3.10) for every period $s \geq t$, leads to the following optimality condition shown by the Euler equation:

$$u'(C_s^R - \gamma \bar{C}_{s-1}) = (1+r)\beta E_t\{u'(C_{s+1}^R - \gamma \bar{C}_s)\}.$$

Assuming that u is quadratic in $C_s^R - \gamma \bar{C}_{s-1}$ and β is equivalent to the market discount factor $1/(1+r)$, the above Euler equation simplifies to:

$$C_s^R - \gamma \bar{C}_{s-1} = E_t\{C_{s+1}^R - \gamma \bar{C}_s\}. \quad (3.11)$$

To derive a closed-form solution for the Ricardian consumer, equation (3.11) can be substituted into the intertemporal budget constraint (3.10), and after further simplification (see Appendix A3.1), to obtain the following consumption function of a representative Ricardian agent:

$$C_t^R = \frac{\gamma}{1+r} \bar{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P + \left(1 - \frac{\gamma}{1+r}\right) \frac{r}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s + T_s + I_s}{(1+r)^{s-t}} \quad (3.12)$$

Thus, aggregate consumption for both Ricardian and non-Ricardian agents can be obtained by substituting for C_t^R and C_t^{NR} in (3.6) using (3.7) and (3.12) to obtain:

$$\begin{aligned} \bar{C}_t &= \lambda(Y_t - T_t - I_t) + (1-\lambda) \frac{\gamma}{1+r} \bar{C}_{t-1} + (1-\lambda) \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P \dots \dots \dots \\ &+ (1-\lambda) \left(1 - \frac{\gamma}{1+r}\right) \frac{r}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} \end{aligned} \quad (3.13)$$

The government, on the other hand, faces the following budget constraint:

$$B_{t+1}^G = (1+r)B_t^G + T_t - G_t \quad (3.14)$$

Where B_t^G is government net assets in period t , G_t is government spending in period t . Iterating equation (3.14) forward and imposing a ‘no-Ponzi game condition’ gives the following intertemporal budget constraint for the government:

$$E_t \sum_{s=t}^{\infty} \frac{G_s}{(1+r)^{s-t}} = (1+r)B_t^G + E_t \sum_{s=t}^{\infty} \frac{T_s}{(1+r)^{s-t}}, \quad (3.15)$$

Further note that non-Ricardian agents own no assets; as such, the stock of net foreign assets in the economy at the end of period $t - 1$ is given by the assets owned by Ricardian households and the government:

$$B_t = (1 - \lambda)B_t^P + B_t^G. \quad (3.16)$$

3.4.1.2 Current account dynamics

According to Obstfeld & Rogoff (1995), current account can be described as a change in net foreign asset position, i.e. $CA_t = B_{t+1} - B_t$. Similarly, in terms of national accounts, the current account (net savings of the open economy) is equivalent to the sum of net investment income (net foreign assets return), rB_t and net output, $NO_t = Y_t - I_t - G_t$ less aggregate consumption:

$$CA_t = rB_t + NO_t - \bar{C}_t, \quad (3.17)$$

Additionally, by substituting for aggregate consumption from (3.13) and with further simplifications (see Appendix A3.1), the dynamic model of current account determination is expressed as:

$$\begin{aligned} CA_t = & (1 - \lambda)\gamma CA_{t-1} + \lambda(T_t + rB_t^G - G_t) + \frac{\gamma(1 - \lambda)}{1 + r} \Delta NO_t \\ & + (1 - \lambda) \left(1 - \frac{\gamma}{1 + r}\right) (NO_t - E_t N\tilde{O}_t), \end{aligned} \quad (3.18)$$

Assuming no habit formation and no liquidity constraint, i.e. $\gamma = 0$ and $\lambda = 0$, then equation (3.18) reduces to a standard ICA model expressed as $CA_t = NO_t - E_t N\tilde{O}_t$. This essentially shows that current account helps to smooth consumption whenever there is deviation of net output from its permanent level. This explains the consumption smoothing hypothesis of current account.

Expression (3.18), yields important testable implications; Firstly, the term, $T_t + rB_t^G - G_t$ represents the fiscal surplus that arises from the introduction of liquidity constraint in the model.

It shows that government spending affects consumption behaviour of liquidity constrained consumers (non-Ricardian agents) and therefore the general consumption in the economy. This further affects the current account since the fiscal surplus reduces the disposable income available to non-Ricardian consumers and the aggregate consumption in general hence resulting in current account surplus. This conclusion also mirrors the twin deficit hypothesis. Secondly, inclusion of habit formation in the standard ICA model introduces dynamics into the model. This is evident from the first term in the right-hand side of (3.18), whose implication shows that current account is a persistent variable and therefore depends on its past realizations. The extent of current account persistence is relative to the proportion of Ricardian agents in the population $(1 - \lambda)$ and the value of habit persistence (γ) .

Expression (3.18) therefore provides a framework for current account determination which shows that it is not only persistent but also affected by, among other variables, the fiscal deficit. The next section presents an empirical model that tests the validity of these conclusions.

3.4.2 Model specification.

3.4.2.1 The Dumitrescu-Hurlin test for Granger causality

Before estimation is performed, a pre-diagnostic test is conducted to determine if there is reverse causality between current account and fiscal balance. Economic theory alludes to such a possibility. If this is confirmed, then it creates a potential problem for endogeneity which should be taken care of in the formal model. Dumitrescu & Hurlin (2012) provides a testing framework for the Granger non-causality in heterogeneous panels. The underlying regression for this test can be specified as follows:

$$CA_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_{ik} CA_{i,t-k} + \sum_{k=1}^K \beta_{ik} FB_{i,t-k} + \varepsilon_{i,t} \quad (3.19)$$

With $i = 1, \dots, N$ and $t = 1, \dots, T$; $CA_{i,t}$ and $FB_{i,t}$ are respective current account balance and fiscal balance for country i in year t . The model also assumes that these two variables are stationary; as such, a stationarity test is performed before carrying out the Granger causality test. The coefficients can differ across the countries but are assumed to be time invariant. The lag order K is identical for all individuals and is determined based on optimal lag selection criterion.

As noted in Granger (1969), causality test in this case would entail testing whether past values of fiscal balance have significant effect on the current value of the current account balance and vice versa. The null hypothesis of the absence of causality for all individuals in the panel can be specified as:

$$H_0: \beta_{i1} = \dots = \beta_{iK} = 0 \quad \forall i = 1, \dots, N$$

Against the alternative hypothesis that there is causality for some individuals, if not all. Dumitrescu-Hurlin (DH) proposes two Wald statistics, \bar{Z} (z-bar) and \tilde{Z} (z-bar tilde), based on standard normal distribution to test this hypothesis. The \bar{Z} is ideal for large N and large T cases while \tilde{Z} is ideal for large N and small T (Lopez & Weber, 2017).

3.4.2.2 The baseline dynamic linear panel data model

A dynamic panel data model is used to estimate the effect of fiscal balance on current account balance. This model can be specified as follows:

$$CA_{i,t} = \gamma CA_{i,t-1} + \delta FB_{i,t} + B'X_{i,t} + \lambda_t + \eta_i + \varepsilon_{i,t}, \quad \varepsilon_{i,t} \sim iid(0, \sigma^2) \quad (3.20)$$

Where subscript i is an index of individual country and t is for time. CA is the current account balance as a share of GDP, FB is the fiscal balance as a share of GDP and X represents vector of controls as postulated by economic theory and empirical studies such as Lane & Milesi-Ferretti (2012), Medina et al. (2010) and Das (2012), among others. These controls include: GDP growth, real effective exchange rate, trade openness, terms of trade and investment. λ_t represent time effects, η_i is the unobserved country specific effects, and $\varepsilon_{i,t}$ is the idiosyncratic error term.

The dynamic model structure of equation (3.20), due to the presence of a lagged dependent variable, poses a potential problem of endogeneity if estimated by fixed effects. In addition, endogeneity could arise from reverse causality between current account and fiscal balance. Although, the fixed effects estimator eliminates the country specific effects through within group transformation of the original equation by time demeaning, it is not appropriate for a dynamic model. In a static model, it results in consistent estimates. However, in a dynamic case, such a transformation induces a correlation of order $1/T$ between the lagged dependent variable and the error term, a situation known as the Nickell bias after Nickell (1981). This bias is pronounced in

small T and large N case meaning few panel periods and many cross-section units respectively. Thus, given that the data structure used for empirical estimation in this study exhibits similar features (i.e. a case of 33 countries and 17 years), fixed effects needs to be applied with caution.

These potential econometric challenges can be addressed using system GMM estimators for dynamic panels developed by Arellano & Bover (1995) and Blundell & Bond (1998). The system GMM estimator produces consistent estimates in dynamic panels. Furthermore, the estimator also produces robust results in the presence of omitted variable bias and a simultaneity problem. It uses lags of the regressors as instruments. This estimator combines regression equations in a single system both in levels and first difference, with each equation having a specific set of instrumental variables. Further, it has improved properties of stronger instruments compared to Arellano & Bond (1991) since variables in levels are likely to be weakly correlated with future differences if the series are close to a unit root. In addition, system GMM is appropriate for the dataset used in this study, as it fits into small T and large N case. The system GMM is therefore adopted as one of the estimators in this study.

3.4.2.3 The dynamic panel threshold model specification

The second part of our empirical strategy involves testing whether the relationship between the current account and fiscal balance depends on the level of indebtedness in the economy. To implement this test, the baseline linear dynamic panel data model (3.20) is transformed into a dynamic panel data model with threshold effects as follows:

$$CA_{it} = (\gamma_1 CA_{i,t-1} + \delta_1 FB_{i,t} + \beta'_1 X_{i,t})\{q_{it} \leq \gamma\} + (\gamma_2 CA_{i,t-1} + \delta_2 FB_{i,t} + \beta'_2 X_{i,t})\{q_{it} > \gamma\} + \lambda_t + \eta_i + \varepsilon_{it} \quad (3.21)$$

Where the variables are as earlier defined in equation (3.20). In addition, q_{it} is the threshold variable represented by debt to GDP ratio. $I\{\cdot\}$ is the indicator function for the threshold variable q_{it} , which can either be above or below a threshold value γ . The role of the threshold parameter γ is to split the sample into two regimes, with observations either being in high or low debt regimes. Where $q_{it} \leq \gamma$, implies a low debt regime and $q_{it} > \gamma$, implies a high debt regime. The slope coefficients δ_1 and δ_2 determines the fiscal effects in low and high debt regimes respectively.

The bulk of estimation techniques for dynamic panel threshold models assumes that the threshold variable is exogenous (Caner & Hansen, 2004; Dang et al., 2012; Ramírez-Rondán, 2015). However, it is possible for the threshold variable, in this case, the debt-to-GDP ratio, to be endogenous because of reverse causality and omitted variable bias¹⁸. If not accounted for could result in unreliable estimates. Seo & Shin (2016) proposes an estimation technique which accounts for endogeneity of the threshold variable and regressors. As such, this study adopts their approach in estimation of the threshold model (3.21) which proceeds in a sequence of steps.

Firstly, the threshold level is determined by performing a series of least squares minimization procedures involving estimation of equation (3.21) based on all possible values of q_{it} . The corresponding estimates and the sum of squared residuals are stored¹⁹. Then the threshold value γ is selected as the one that minimizes the residual sum of squares. Secondly, a linearity test is conducted to determine the presence of threshold effects in the model. This involves testing for the significance of selected threshold value γ . However, this test suffers from the Davies problem²⁰ because the threshold parameter γ is not identified under the null hypothesis of no threshold effects (Davies, 1977). To remedy this situation, the critical values used for inference are based on a bootstrap procedure. Hence, this technique uses supremum statistics. Finally, if the threshold value γ is found to be significant, then the slope parameters of equation (3.21) are estimated by difference GMM on the created split sample.

3.4.3 Data type and source

A sample of 33 countries out of the 46 in the SSA region is selected based on availability of data (see Appendix A2.3 for the list of selected countries). Countries with missing data are excluded from the sample. The empirical analysis uses annual time series data for the period 2000-2016 drawn from three databases namely, the IMF's World Economic Outlook (WEO), the World

¹⁸ Since debt could be correlated with a range of other factors affecting current account but omitted from the model. Similarly, countries with high current account deficit are more likely to accumulate more debt than those with lower deficits.

¹⁹ This step is repeated for each value of threshold series, through grid search on specified subset of the series which is trimmed in order to guarantee a minimum number observations in the resulting sub-samples (Baum, Checherita-Westphal, & Rother, 2013).

²⁰ The inference problem when the nuisance parameter is not identified under the null hypothesis was first studied by Davies (Nickel & Vansteenkiste, 2008).

Bank's World Development Indicators (WDI) and the UN's United Nations Conference for Trade and Development (UNCTAD). The variables description and descriptive statistics are presented in Appendix A3.2 and A3.4, respectively.

3.4.4 Definition and priori expectation of variables

Current account balance is the dependent variable and is measured as the sum of net exports of goods, services, net income and current transfers as a share of GDP. A positive value for this variable is interpreted as a surplus while a negative value as a deficit. The current account balance is the dependent variable and is expressed as a share of GDP.

Fiscal balance is measured as the difference between general government revenue and expenditure expressed as a share of GDP. This variable is expected to have a positive relationship with the dependent variable since a fall in government spending or increase in government revenue increases fiscal balance which also increases current account balance. This is expected to be the case assuming that both Mundell-Fleming and Keynesian hypotheses hold. In an empirical context, this theoretical construct is known as the twin deficit hypothesis.

Trade openness is measured as the sum of imports and exports as a share of GDP. It is expected to have a positive relationship with current account balance in line with the view that at a given exchange rate, more open economies are attractive to international trade due to fewer trade restrictions. This prediction has empirical support from Chinn & Prasad (2003) and Das (2012).

Terms of trade is measured as the ratio of export to import unit value index. Terms of trade is expected to have a positive relationship with current account balance since an improvement in terms of trade is also associated with improvement in current account balance. This prediction is consistent with the Harberger-Laursen-Metzler effect, which conjectures that a deterioration in terms of trade lowers real income and savings, thereby worsening the current account.

Real effective exchange rate (REER) is defined as a nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) deflated by the price indices of the country and the corresponding partner countries. An increase (decrease) in the index implies a real appreciation (depreciation) of the domestic currency and therefore exports

become more (less) expensive compared to imports. Hence, an increase in REER indicates a loss of competitiveness. A priori, REER is expected to have a negative relationship with current account balance given that an appreciation contributes to loss of competitiveness of exports, thereby resulting in a decline in exports relative to imports. This is expected to have further adverse effects on the current account balance in line with the Mundell-Fleming model. Most sub-Saharan African countries are expected to be sensitive to exchange rate movements due to heavy reliance on primary exports, which are highly sensitive to commodity price fluctuations.

GDP growth is measured as the annual change in the real GDP and is expected to have a negative relationship with current account balance. In line with the ICA, the GDP growth is expected to have a negative relationship with current account balance as high income is associated with high consumption, which results in current account deficit. The variable is lagged because income has lagged impact due to accelerator effect. The relationship between GDP growth and current account balance has been tested empirically by a number of studies (Bussière et al., 2004; Chinn & Ito, 2008; Chinn & Prasad, 2003; Das, 2012; Glick & Rogoff, 1995).

Total investment is measured as the total value of the gross fixed capital formation and changes in inventories as a share of GDP. This variable is expected to have a negative effect on current account balance since high investment leads to the narrowing of the savings investment gap, which is associated with a fall in current account balance.

3.5 Empirical Results

3.5.1 The Granger causality test

Before this test is performed, a stationarity test is conducted on current account and fiscal balance. The results indicate that the two variables are largely stationary in levels (see Appendix A3.6). Next, the Granger causality test of Dumitrescu & Hurlin (2012) is performed and the results are reported in Table 3.1. The test rejects the null hypothesis of no Granger causality in both directions, meaning that fiscal balance does Granger-cause current account and vice versa. This result provides evidence of a bidirectional relationship between current account balance and fiscal balance. The implication of this dual causality is that fiscal balance is endogenous and should be treated appropriately in the formal model.

Table 3.1: Granger non-causality test results²¹

Fiscal balance Granger-cause current account balance

Optimal number of lags (AIC): 3 (lags tested: 1 to 3).

W-bar = 6.6751

Z-bar = 8.6190 (p-value = 0.0000)

Z-bar tilde = 2.5390 (p-value = 0.0111)

Notes: H0: Fiscal balance does not Granger-cause current account balance,

H1: Fiscal balance does Granger-cause current account balance for at least one country.

Current account balance Granger-cause fiscal balance

Optimal number of lags (AIC): 1 (lags tested: 1 to 3).

W-bar = 2.5220

Z-bar = 6.1823 (p-value = 0.0000)

Z-bar tilde = 3.9891 (p-value = 0.0001)

Notes: H0: Current account balance does not Granger-cause fiscal balance.

H1: Current account balance does Granger-cause fiscal balance for at least one country.

3.5.2 Dynamic linear panel data model

The estimation results for the linear dynamic panel data model without threshold effects (3.20) is presented in Table 3.2. Three estimators are reported including system GMM, difference GMM and the fixed effects estimator. Due to Nickell bias arising from a fixed effects estimator on a

²¹ Credits to Lopez and Weber (2017) for providing a user written program for this test

dynamic panel data model, the discussion of the empirical results focuses on the first two estimators. Both the system and difference GMM are estimated using the user written Stata program xtabond2 by Roodman (2009). As pointed out earlier, the lagged dependent variable and fiscal balance are endogenous. The GMM model takes this into account and uses second lags of these variables as instruments. The table displays the relevant specifications tests with corresponding p-values. The Hansen test of over-identifying restrictions confirms the validity of the instruments used in the model. The Hansen J statistic is 26.29 with a p-value of 0.61 for system GMM, hence we are unable to reject the null hypothesis that the overidentifying restrictions are valid.

Table 3.2: Regression results for linear dynamic panel data model

Current account balance	System GMM (1)	Difference GMM (2)	Fixed Effects (3)
Lagged current account balance	0.556*** (0.0949)	0.376*** (0.0835)	0.404*** (0.0862)
Fiscal balance	0.326*** (0.0920)	0.276*** (0.0793)	0.308*** (0.0638)
Trade openness	0.00711 (0.0160)	0.0163 (0.0331)	0.0221 (0.0339)
ToT index	0.000227 (0.000146)	0.000563*** (0.000199)	0.000528** (0.000196)
Real effective exchange rate (REER)	0.00291 (0.0182)	-0.0352 (0.0240)	-0.0386** (0.0184)
Lagged GDP growth	-0.165 (0.124)	-0.138 (0.131)	-0.159 (0.125)
Total investment	-0.194 (0.143)	-0.558*** (0.177)	-0.546*** (0.155)
ar1	-3.023	-2.954	
ar1p	0.00250	0.00314	
ar2	0.984	1.675	
ar2p	0.325	0.0939	
hansen	26.69	27.54	
hansenp	1.000	0.542	
Observations	528	495	528
No of Countries	33	33	33

Notes: The reported results assume that the fiscal balance and lagged cab are endogenous. Robust standard errors are in parentheses and asterisks denotes level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01. Time trends controlled for but not reported. ToT is terms of trade index.

Furthermore, the Arellano-Bond test for autocorrelation does not reject the null hypothesis of no second-order serial correlation but rejects that for first-order serial correlation. This result is

consistent with the notion that the AR (1) process in first differences usually reject the null hypothesis of no autocorrelation, while the more important AR (2) test which detects autocorrelation in levels does not reject this hypothesis. This confirms that the model does not suffer from serial correlation.

Turning to the point estimates for slope coefficients, the estimate on lagged dependent variable is positive and highly significant. This confirms the persistence of current account balance, with an estimate of 0.56. A similar result is reported for difference GMM estimator but with a lower estimate of 0.38. This finding is in line with Chinn & Prasad (2003), Calderón et al. (2001) and Das (2012). The coefficient of primary interest in this study is that of fiscal balance which is also positive and highly significant as expected across all the three reported estimators. The system GMM reports a magnitude of 0.33 while difference GMM shows a lower estimate of 0.28. This finding suggests that an increase in fiscal deficit results in an increase in current account deficit. It further suggests that the twin deficit hypothesis holds in the sub-Saharan Africa region and thereby answers one of research questions in this chapter. This result is also consistent with both theoretical (including Mundell-Fleming and Keynesian hypotheses) and several empirical studies (Abbas et al., 2011; Chinn & Prasad, 2003; Egwaikhide, 1997; Forte & Magazzino, 2015; Kalou & Paleologou, 2012; Monacelli & Perotti, 2007; Rafiq, 2010; Salvatore, 2006). Demonstrating that fiscal deficit drives the current account deficit in the region, this finding implies that fiscal policy can be used as a potent policy option for controlling current account deficit. Again, these findings support the notion that fiscal consolidation can contribute to an improvement in external accounts.

The results for the control variables are also reported. While most of them show expected signs, they lack significance as the system GMM model shows. On the other hand, the difference GMM reports a significant terms of trade index and total investment with the respective expected signs. The positive relationship between terms of trade and current account balance is consistent with our priori expectation and the theoretical argument that improvement in terms of trade has positive effects on current account balance so long as the Marshall-Lerner conditions hold. This finding also confirms the Harberger-Laursen-Metzler effect in sub-Saharan Africa.

The significance of the total investment means that an increase in investment expenditure reduces general savings in the economy which contributes to deterioration of the current account balance. This situation is driven by the fact that most countries in sub-Saharan Africa are still in the early stages of economic development, which requires importation of heavy equipment and machinery for infrastructure development and industrialization. Hence, deterioration of the current account arising from these activities sometimes turns out to be inevitable as these accrues future benefits to the economy.

3.5.3 Dynamic panel data model with threshold effects

Another research question that this study seeks to address is whether the relationship between current account balance and fiscal balance depends on the level of public debt. This question is investigated using a dynamic panel data threshold model which allows for an endogenous threshold variable and regressors following the empirical methodology of Seo & Shin (2016). The estimation and test results are reported in Table 3.3 showing the findings both in low debt and high debt regimes. In addition, the linear model results for the full sample are also reported for comparison purposes. The test for a null hypothesis of no threshold effects is performed based on supremum statistics and the results indicate a very low bootstrap p-value, close to zero. This suggests strong evidence for threshold effects in the current account model. The threshold variable in this case is debt-to-GDP ratio, which is endogenously estimated at 54 percent and does not differ much from the rule of thumb level of 55 percent set by the IMF. About 60 percent of the observations fall below the 54 percent threshold while 40 percent are above it. The observations below the 54 percent debt-to-GDP ratio threshold are regarded as being in the low debt regime while those above this level are regarded as being in the high debt regime.

The fact that majority of countries, about 60 percent, fall in the low debt regime during the sample period is largely attributed to the HIPC debt relief initiative, which substantially lowered the debt burden on most countries in sub-Saharan Africa. As shown in Appendix A3.7, the concentration of countries in the high debt regime was high in early 2000s, with over 70 percent of countries reported in this category but later continued to drop steadily reaching 12 percent in 2012. However, from 2013 onwards, the proportion of countries in the high debt regime begun to rise again.

Table 3.3: Regression results for dynamic panel data model with threshold effects

Current account balance	Low debt regime (\leq 54%)	High debt regime ($>$ 54%)	Full sample
Lagged current account balance	-0.0112 (0.1148)	0.2154 (0.1637)	0.376*** (0.0835)
Fiscal balance	0.264*** (0.0749)	0.202 (0.1952)	0.276*** (0.0793)
Trade openness	-0.0485 (0.0889)	0.2577*** (0.0223)	0.0163 (0.0331)
ToT index	0.00115*** (0.000436)	-0.00165*** (0.000620)	0.000563*** (0.000199)
Real effective exchange rate	-0.1207 (0.0829)	-0.0840** (0.1445)	-0.0352 (0.0240)
Total investment	-0.340 (0.241)	-0.713*** (0.221)	-0.558*** (0.177)
% of observation	60.25	39.75	100
Threshold estimate	0.5377	0.5377	
Threshold p-value	0.087	0.087	
Linearity p-value	0.00	0.00	

Notes: The slope coefficients estimated using difference GMM. Robust standard errors are in parentheses and asterisks denotes level of significance at standard conventional levels. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Our appreciation to Seo & Shin (2016) for providing the Stata codes for carrying out this regression.

Turning to the point estimates, Table 3.3 shows considerable variation in sign and magnitude as well as the level of significance of variables depending on whether they are in low or high debt regimes. For instance, fiscal balance continues to maintain a positive and significant effect on current account balance in the low debt regime, providing strong evidence of twin deficit hypothesis. This effect, however, dissipates in the high debt regime, as the coefficient turns insignificant, suggesting fiscal deficit's limited effect on the current account balance. The magnitude also declines from 0.26 in the low debt regime to 0.20 in the high debt regime. This implicitly suggests that at higher debt thresholds, fiscal policy is irrelevant in current account determination. This finding mirrors the Ricardian behaviour and is consistent with empirical findings by Nickel & Vansteenkiste, (2008) and Nickel & Tudyka (2014). Even though both studies are situated in industrialized countries with a much higher debt threshold level, the primary conclusion remains the same.

Other results show the coefficient on lagged dependent variable losing significance across the regimes as well as in total investment in the low debt regime. On the other hand, trade openness

and the REER now becomes significant in the high debt regime. A negative and significant REER suggests that a real depreciation leads to improvement in current account balance in a higher debt regime in line with most open economy macroeconomics models such as Mundell-Fleming's. Similarly, a positive and significant coefficient on trade openness at a high debt regime reflects that at a given exchange rate, more open economies are attractive to international trade due to reduced trade restrictions. In addition, the terms of trade remain significant but switches to negative sign in a high debt regime, implying that the terms of trade do not improve the current account at higher debt levels.

3.6 Conclusion

This chapter examined the effect of fiscal deficit on current account deficit and how this relationship is affected by different levels of public debt. A linear dynamic panel data model is estimated to address the first part of the objective; for the next part, a dynamic panel threshold model is estimated. A sample of 33 sub-Saharan African countries is selected for the period 2000-2016 for this study. The empirical results based on the linear model show that fiscal deficit worsens the current account and, therefore, the twin deficit hypothesis holds. However, the introduction of nonlinearities in the model shows a switch in behaviour. This subsequent analysis is based on different levels of indebtedness determined through endogenously estimated threshold debt level, which splits the sample into low and high debt regimes. This approach is advantageous over levels chosen arbitrarily as the data is allowed to speak for itself. The results from the dynamic panel threshold regression shows that at lower debt levels, the fiscal deficit continues to worsen the current account while at a higher debt level, fiscal deficit becomes ineffective on the current account. Intuitively, this reflects that the twin deficit hypothesis holds at low debt regime and, therefore, the economy behaves in a non-Ricardian manner. However, at a high debt regime the Ricardian hypothesis dominates. These results receive support in the literature and provide an explanation for the mixed findings common in empirical studies possibly the result of not allowing for threshold effects in these models. This study shows that fiscal policy can be an effective tool in containing current account deficit when the level of public debt is moderate, but its effectiveness becomes uncertain when the debt level escalates. As such, due diligence must be observed in the use of fiscal policy when the level of public debt reaches certain high levels. The next chapter extends this debate further and explores whether fiscal rules can be used as a policy option for addressing the perennial problem of fiscal deficit in the sub-Saharan Africa region.

Appendix B

Appendix A3.1: Theoretical framework

The Ricardian agent is assumed to face the following consumption function:

$$C_t^* = C_t^R - \gamma \bar{C}_{t-1} \quad (3.22)$$

Where γ captures degree of habit persistence on previous aggregate consumption

Substituting for C_t^R in (3.10) to obtain:

$$E_t \sum_{s=t}^{\infty} \frac{C_{s-1}^* + \gamma(\lambda C_{s-1}^{NR} + (1-\lambda)C_{s-1}^R)}{(1+r)^{s-t}} = (1+r)B_t^P + E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}},$$

Which can further be simplified to get:

$$\begin{aligned} E_t \sum_{s=t}^{\infty} \frac{C_s^*}{(1+r)^{s-t}} &= (1+r)B_t^P + E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} \dots \dots \dots \\ &\quad - \frac{1}{1+r} E_t \sum_{s=t}^{\infty} \frac{\gamma(\lambda C_s^{NR} + (1-\lambda)C_s^R)}{(1+r)^{s-t}} - \gamma \bar{C}_{t-1} \\ &= (1+r)B_t^P + E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} - \frac{\gamma\lambda}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} \dots \dots \dots \\ &\quad - \frac{\gamma(1-\lambda)}{1+r} \left[(1+r)B_t^P + E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} \right] - \gamma \bar{C}_{t-1} \\ &= [(1+r) - \gamma(1-\lambda)]B_t^P + \frac{1+r-\lambda}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} - \gamma \bar{C}_{t-1} \quad (3.22a) \end{aligned}$$

Where $\sum_{s=t}^{\infty} \frac{C_s}{(1+r)^{s-t}}$ is substituted in the second equation using ICA (3.10). Substituting (3.22a) into (3.22), the intertemporal budget constraint can be expressed as:

$$E_t \sum_{s=t}^{\infty} \frac{C_t^R - \gamma \bar{C}_{t-1}}{(1+r)^{s-t}} = [(1+r) - \gamma(1-\lambda)]B_t^P + \frac{1+r-\gamma}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}} - \gamma \bar{C}_{t-1}. \quad (3.23)$$

Using the Euler equation obtained in (3.11), the left-hand side of (3.23) can be simplified to obtain a consumption function of a representative Ricardian agent similar to (3.12) in the text. This is given by:

$$C_t^R = \frac{\gamma}{1+r} \bar{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P + \left(1 - \frac{\gamma}{1+r}\right) \frac{r}{1+r} E_t \sum_{s=t}^{\infty} \frac{Y_s - T_s - I_s}{(1+r)^{s-t}}. \quad (3.24)$$

Next is expression deriving the dynamics of current account from (3.12) and using the definition of permanent values $\tilde{X}_t = \frac{r}{1+r} \sum_{s=t}^{\infty} \frac{X_s}{(1+r)^{s-t}}$:

$$\begin{aligned} CA_t &= rB_t + NO_t - \bar{C}_t \\ &= rB_t + (1-\lambda)NO_t + \lambda(T_t - G_t) \dots \dots \dots \\ &\quad - (1-\lambda) \left[\frac{\lambda}{1+r} \bar{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P + \left(1 - \frac{\gamma}{1+r}\right) E_t(\tilde{Y}_t - \tilde{T}_t - \tilde{I}_t) \right] \\ &= rB_t + \lambda(T_t - G_t) \dots \\ &\quad - (1-\lambda) \left[\frac{\gamma}{1+r} \bar{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P - NO_t + \left(1 - \frac{\gamma}{1+r}\right) E_t(\tilde{Y}_t - \tilde{T}_t - \tilde{I}_t) \right] \end{aligned}$$

Using the government intertemporal budget constraint (3.15), it can be shown that:

$$\begin{aligned} E_t(\tilde{Y}_t - \tilde{T}_t - \tilde{I}_t) &= \frac{r}{1+r} E_t \left(\sum_{s=t}^{\infty} \frac{Y_s - G_s - I_s}{(1+r)^{s-t}} + (1+r)B_t^G \right) \\ &= E_t(\tilde{Y}_t - \tilde{T}_t - \tilde{I}_t) + rB_t^G \\ &= E_t N \tilde{O}_t + rB_t^G \end{aligned}$$

And substituting for $E_t(\tilde{Y}_t - \tilde{T}_t - \tilde{I}_t)$ in the current account dynamics:

$$\begin{aligned} CA_t &= rB_t + \lambda(T_t - G_t) \dots \\ &\quad - (1-\lambda) \left[\frac{\gamma}{1+r} \bar{C}_{t-1} + \left(1 - \frac{\gamma(1-\lambda)}{1+r}\right) r B_t^P - NO_t + \left(1 - \frac{\gamma}{1+r}\right) (E_t N \tilde{O}_t + rB_t^G) \right] \end{aligned}$$

Rearranging above further we get:

$$CA_t = rB_t + \lambda(T_t - G_t) \dots \dots \dots$$

$$-(1 - \lambda) \left[\frac{\gamma}{1+r} \bar{C}_{t-1} - \frac{\gamma}{1+r} NO_t - \left(1 - \frac{\gamma}{1+r}\right) (NO_t - E_t N \tilde{O}_t) + \left(1 - \frac{\gamma}{1+r}\right) rB_t + \lambda rB_t^P \right]$$

$$= rB_t + \lambda(T_t - G_t) \dots \dots \dots$$

$$-(1 - \lambda) \left[-\frac{\gamma}{1+r} CA_{t-1} - \frac{\gamma}{1+r} \Delta NO_t - \left(1 - \frac{\gamma}{1+r}\right) (NO_t - E_t N \tilde{O}_t) - \frac{\gamma}{1+r} CA_{t-1} + r((1 - \lambda)B_t^G) + \lambda rB_t^P \right]$$

$$= rB_t + \lambda(T_t - G_t) - (1 - \lambda)rB_t^G + \frac{\gamma(1 - \lambda)}{1+r} \Delta NO_t \dots$$

$$+(1 - \lambda) \left(1 - \frac{\gamma}{1+r}\right) (NO_t - E_t N \tilde{O}_t) + (1 - \lambda)\gamma CA_{t-1}$$

$$= (1 - \lambda)\gamma CA_{t-1} + \lambda(T_t + rB_t^G - G_t) + \frac{\gamma(1 - \lambda)}{1+r} \Delta NO_t$$

$$+ (1 - \lambda) \left(1 - \frac{\gamma}{1+r}\right) (NO_t - E_t N \tilde{O}_t)$$

This is similar to (3.18). Note that the expression $CA_{t-1} = B_t - B_{t-1} = rB_{t-1} + NO_{t-1} - \bar{C}_{t-1}$ is used.

Appendix A3.2: Description of Variables

Variable Name	Description	Units	Source
Current account balance	Current account balance is the sum of net exports of goods, services, net income and net current transfers as a share of GDP	share of GDP	WEO
Fiscal balance	The fiscal balance is constructed as the difference between general government revenue and expenditure expressed as a percentage of the GDP.	share of GDP	WEO
GDP growth rate	Annual percentage change of the GDP at constant prices.	% change	WEO
Real effective exchange rate (REER)	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs (2005=100)	index (2005=100)	UNCTAD
ToT index	Net barter terms of trade index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000.	index 2000=100	WDI
Trade openness	Trade openness is the sum of exports and imports measured as a share of GDP	share of GDP	WDI
Total investment	Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisition less disposals of valuables for a unit or sector	share of GDP	WEO
Public debt	Public debt is general government gross debt which comprise of all liabilities that require payments of interest and/or principal by the debtor to the creditor at a date or dates in future. The debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee scheme, and other account payable	share of GDP	WEO

Notes: WEO is the World Economic Outlook database, UNCTAD is United Nations Conference for Trade and Development Indicators database, WDI is the World Bank's World Development Indicators.

Appendix A3.3: List of sampled sub-Saharan Africa countries

Botswana	Gabon	Namibia	Togo
Burkina Faso	Gambia	Niger	Uganda
Burundi	Ghana	Nigeria	Zambia
Cabo Verde	Guinea-Bissau	Republic of Congo	
Cameroon	Kenya	Rwanda	
Central African Republic	Lesotho	Senegal	
Chad	Madagascar	Seychelles	
Comoros	Malawi	South Africa	
Côte d'Ivoire	Mali	Swaziland	
Equatorial Guinea	Mauritius	Tanzania	

Appendix A3.4: Descriptive Statistics for the period 2000-2016

Variable	Obs	Mean	Std.Dev	Min	Max
Current account balance	561	-0.051	0.098	-0.841	0.216
Fiscal balance	561	-0.018	0.061	-0.417	0.403
Trade openness	561	0.800	0.419	0.114	3.511
ToT index	561	118.476	40.844	21.397	269.679
Real effective exchange rate	561	104.300	21.015	59.993	239.466
GDP growth	561	0.046	0.067	-0.367	1.121
Total Investment	561	0.223	0.092	0.022	0.649
Public debt	561	58.672	48.397	0.474	344.370

Appendix A3.5: Pairwise correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Current account balance	1.000							
(2) Fiscal balance	0.336	1.000						
(3) Trade openness	-0.115	0.171	1.000					
(4) ToT index	0.180	0.100	-0.078	1.000				
(5) REER	0.001	-0.080	-0.300	0.074	1.000			
(6) GDP growth	-0.152	0.127	0.312	0.075	-0.071	1.000		
(7) Total Investment	-0.335	-0.009	0.460	0.155	-0.101	0.334	1.000	
(8) Public debt	-0.144	-0.186	0.004	-0.369	-0.130	-0.146	-0.221	1.000

Appendix A3.6: Panel unit root test results

Levin-Lin-Chu unit root test

Specification without trend					Specification with trend				
Current account			Fiscal balance		Current account			Fiscal balance	
Lags	chi_sq	p-value	chi_sq	p-value	Lags	chi_sq	p-value	chi_sq	p-value
1	-5.3252	0.000	-2.9384	0.002	1	-5.4143	0.000	-4.5219	0.000
2	-10.3581	0.000	-0.7207	0.2356	2	-7.5942	0.000	-2.4323	0.008
3	-3.0326	0.001	0.62	0.732	3	-0.3362	0.368	0.0005	0.500

Maddala and Wu (1999) unit root test (MW)

Specification without trend					Specification with trend				
Current account			Fiscal balance		Current account			Fiscal balance	
Lags	chi_sq	p-value	chi_sq	p-value	Lags	chi_sq	p-value	chi_sq	p-value
1	110.236	0.001	84.527	0.062	1	94.188	0.013	67.646	0.421
2	170.33	0.000	72.171	0.281	2	111.997	0.000	68.136	0.404
3	76.879	0.169	53.105	0.874	3	59.659	0.696	55.612	0.815

Notes: The null hypothesis of above tests is that there is a unit root in all countries against the alternative of stationarity in some countries. The lags are chosen according to Akaike information criterion (AIC).

Appendix A3.7: Trends of countries in each regime by year

Year	Low debt regime ($\leq 54\%$)		High debt regime ($> 54\%$)	
	Number of countries	Percentage	Number of countries	Percentage
2000	8	24	25	76
2001	7	21	26	79
2002	9	27	24	73
2003	9	27	24	73
2004	12	36	21	64
2005	17	52	16	48
2006	23	70	10	30
2007	23	70	10	30
2008	24	73	9	27
2009	26	79	7	21
2010	27	82	6	18
2011	28	85	5	15
2012	29	88	4	12
2013	27	82	6	18
2014	25	76	8	24
2015	22	67	11	33
2016	22	67	11	33

Note: Debt is defined as public debt as a share of GDP

Chapter 4

Fiscal Rules and Fiscal Performance: The Case of sub-Saharan Africa

4.1 Introduction

Persistently high levels of the fiscal deficit pose significant concerns to fiscal sustainability. Behind the predisposition of developing countries to deficit bias is the unlimited demands in a growing modern economy as well as in the perverse incentives available to policymakers due to weak institutions. Therefore, the logical remedy to fiscal problems would be to address the motivations behind them in the first place. However, in reality, the forces behind the deficit bias are usually systemic in government and so deeply entrenched in political institutions making it difficult to devise a universal solution (Debrun et al., 2008). Furthermore, political institutions are rigid and intractable given the intricate horse-trading and tedious legislative approvals required. Part of the menu of solutions is the reform of the fiscal framework by limiting discretionary decisions by policymakers. Fiscal rules can play a pivotal role in this regard by strengthening the fiscal institutions and placing limits on the major fiscal aggregates such as the revenue, expenditure and debt.

By impacting the fiscal deficit, fiscal rules can indirectly act as a potent tool for simultaneously addressing current account deficit. Through their disciplining effect, fiscal rules ensure that a country adheres to the set fiscal or debt limits which could contribute to an improvement in the fiscal balance (Debrun et al., 2008; Nerlich & Reuter, 2013). This can further have spillover effects on current account balance considering the close linkage between the current account and fiscal balances as shown in the chapter three.

As a tool of fiscal governance, properly designed and implemented fiscal rules can help reduce the fiscal deficit bias and mitigate the time inconsistency problem in fiscal policy as well as enhance the commitment of the fiscal authorities to fiscal adjustment (Ter-Minassian, 2010). In addition, rules can correct distorted incentive in policymaking such as the common pool problem and government shortsightedness. In other words, well designed fiscal rules can result in improved fiscal outcomes through disciplinary effect. Fiscal rules also act as a signaling device to economic

agents on the commitment of policymakers, which helps to strengthen institutions and increase credibility of policymakers.

Whereas fiscal rules can stem deficit bias, they come at the expense of macroeconomic stabilization and structural reforms that could otherwise provide future benefits to the economy. For instance, a rule which imposes spending cuts over public goods as well as programs associated with structural reforms may end up doing more harm than good to the economy (Beetsma & Debrun, 2004). Critics also argue that rules can limit the flexibility of policy makers to respond to economic shocks or even distract them from spending priorities. Moreover, fiscal rules can undermine transparency by encouraging ‘creative accounting’ which creates room for manipulation of accounts. Furthermore, fiscal rules can always be bypassed whenever the fiscal authorities decide to run deficits. Hence rules may sometimes not be effective enough to offer restraint on such behaviours (Krogstrup & Wälti, 2008).

Despite these misgivings, fiscal rules remain the best option for dealing with fiscal profligacy. They can contribute to improved fiscal outcomes because of their strong fiscal governance principles and fiscal disciplining effects. The empirical impact of fiscal rules on fiscal performance has received extensive coverage in the literature, though the studies are concentrated in the US, the EU and Latin America (Badinger & Reuter, 2015, 2017; Dabla-Norris et al., 2010; Debrun & Kumar, 2007a; V. Hagen, 2002; Hallerberg & Wolff, 2008; Sutherland, Price, & Joumard, 2005). In comparison, the sub-Saharan Africa region has not had similar attention. As such, the effectiveness of fiscal rules as a tool for instilling fiscal discipline is yet to be determined in this region despite the growing adoption in most countries. This study fills this gap in the literature by conducting a study with a specific focus on sub-Saharan Africa using the updated IMF fiscal rule dataset (Lledo et al., 2017). The data set is comprehensive and enables an assessment of various aspects of fiscal rules, both at national and supranational level. This study also contributes to the literature by comparing fiscal performance between countries with and without fiscal rules in the region using treatment effect method. This aspect of the study has not been performed in this region before.

To capture the effect of fiscal rule, a composite index of strength is constructed based on various characteristics of fiscal rule such as legal basis, coverage, escape clause, enforcement mechanism and institutions supporting the fiscal rules. The study uses fiscal balance as the fiscal aggregate for measuring fiscal performance and addresses three research questions. First, do fiscal rules improve fiscal performance? second, which types of fiscal rules have effect on fiscal performance? and finally, are there differences in fiscal performance between countries with and without fiscal rules?

The rest of this chapter is organized as follows. Section two discusses the concepts and design features of fiscal rules; section three presents the fiscal policy framework in sub-Saharan Africa; section four reviews the relevant literature on fiscal rules and fiscal performance. Section five describes the methodology of the study while section six presents and discusses the empirical results and the final section concludes the chapter.

4.2 Definition, Design Issues and Types of Fiscal Rules

This section provides the conceptual background to fiscal rules and a detailed discussion of the main features in the design of the rules.

4.2.1 Definition and types of fiscal rules

In broad terms, fiscal rules can be defined as long lasting constraints on fiscal policy through numerical limits on fiscal aggregates such as revenue, expenditure, debt or budget balance (Kopits & Symansky, 1998). The numerical limits set a boundary for fiscal policy that cannot be changed frequently and provide operational guidance. In a narrow sense, fiscal rules can either be numerical or procedural. Procedural rules focus on the processes under which fiscal procedures are conceived and implemented. For instance, they prescribe requirements for reporting on fiscal outcomes both during and at the end of a fiscal year. Their main aim is to ensure that there is transparency and accountability in the fiscal policy process. Numerical rules, on the other hand, impose explicit numerical targets or ceilings on fiscal aggregates. They set limits on the amount that can be spent or borrowed and targets for the level of revenue collection (Bergman et al., 2016). Henceforth, this paper narrows the focus to numerical rules whenever referring to fiscal rules.

The main objective of fiscal rules is to strengthen fiscal discipline by correcting distorted incentives of the policymakers and contain pressure to overspend in good times while also ensuring fiscal responsibility and debt sustainability. Other objectives include economic stabilization and promotion of intergenerational equity as well as provision of a credible medium-term anchor, a motive occasioned by the events of the 2007/8 Great Recession.

There are four major types of fiscal rules: debt rules, budget balance rules, expenditure rules and revenue rules (Lledó et al., 2017). The debt rule specifies a ceiling on the debt-to-GDP ratio of a country, which in most cases ranges between 50 and 70 percent of GDP. However, it usually takes time for debt levels to be affected by budgetary measures. As a result, it may not provide clear short-term operational guidance to policymakers. Furthermore, when debt is way below its ceiling, debt rule provides no binding guidance. The debt rule can also be affected by developments, such as interest rates changes and the exchange rate fluctuations beyond the control of policymakers.

The budget balance rule (or simply deficit rule) sets a limit on the size of the fiscal deficit. By imposing a constraint on fiscal deficit, it also influences the debt ratio. In contrast to debt rules, this rule is largely under the control of policymakers, thus providing clear operational guidance which can ensure that debt levels are within sustainable limits. The budget balance rules can further be specified as overall balance, primary budget balance (excluding interest payments), structural balance and cyclically adjusted balance. The overall balance and primary balance do not have economic stabilization features whereas structural and cyclically adjusted balance can account for economic shocks. The structural and cyclically adjusted balance rules are computationally complex especially in the calculation of output gap and, for this reason, only few countries implement them. A variant of the budget balance rule that exempts capital spending to promote long term growth is referred to as the golden rule. However, exempting capital spending could exacerbate debt sustainability concerns, and is hence at cross purposes with debt rule (Kumar et al., 2009).

The third category of fiscal rules is the expenditure rule which sets limit on total primary or current spending. Expenditure rule can either cap growth in real or nominal terms. Unlike the debt rule, this rule is not directly linked to the debt sustainability objective but provides the operational tool for fiscal consolidation and determining the size of government. Furthermore, it can help limit overspending in times of economic boom when revenues are high and therefore fiscal limits are easily met.

The final category is the revenue rule which either sets a floor on revenue target to ensure minimum revenue collection or a ceiling to prevent excessive tax burden on the population. Like the expenditure rule, this rule is also not directly linked to the debt sustainability objective. Implementing this rule could face operational difficulty because of cyclical nature of revenues with the business cycles which makes it difficult to set ceilings or floors. This rule is also prone to procyclicality because the ceilings and floors do not account for operations of economic stabilizers in a downturn or an upturn. Like the expenditure rule, this rule also targets the size of government. Unlike the other three rules, the revenue rule is not frequently used due to negligible impact on fiscal sustainability.

Due to trade-offs in fiscal rules, it is common for them to be implemented in combination rather than in isolation. Furthermore, even with all design features, not a single rule can meet all the objectives of fiscal sustainability and economic stabilization in isolation. Therefore, using a mix of fiscal rules is an appropriate option for addressing the gaps in single rules. For instance, combining the debt and expenditure rule can help not only with the debt sustainability objective but also provide policymakers with short-to medium-term operational guidance on the optimal size of government. Similar objectives can be met through a mix of debt and structural budget balance rules.

4.2.2 Fiscal rules characteristics and design issues

Political commitment enhances the efficacy of fiscal rules. Rules can reinforce the resolve of policymakers and politicians to govern the right way. However, rules cannot create commitment where none exists. Most countries fall within these two extremes; leaders are committed to being good stewards of the country's finances, but political pressure seems to be a hurdle in meeting this objective. This is the dilemma facing most countries. Rules can therefore be effective in such environments if well designed, internalized and enforced (Budina et al., 2013).

In designing fiscal rules, there is need to take into consideration some broad guiding principles (Kopits & Symansky, 1998). First is simplicity, which means that rules should be simple and easy to understand for ordinary members of the public as well as policymakers. Secondly, rules should promote the long-term sustainability objective of public finance as well as macroeconomic stabilization. Thirdly, it should be possible to translate the rule into clear guidance in the annual budget process. This means that the fiscal aggregate targeted by the rule should be largely under the purview of the policymakers. In addition, rules should have resilience, in that they should be permanent or be in place for a sustained period to be able to build credibility. This means that they should not be abandoned after a shock; although with escape clauses, they can be held in abeyance in difficult times. Finally, another important feature is that rules should be easy to monitor. This makes verification possible on a regular basis. This can only happen if they are simple as already mentioned.

The main features to consider in the design of fiscal rules include, legal basis, coverage, escape clause, enforcement mechanism and institutions supporting the fiscal rules. The legal basis provides an anchor for the rules. Fiscal rules can be set in law (regular or organic), in supranational or international treaties, in coalition agreements or as a political commitment. A strong legislative basis greatly supports the implementation of fiscal rule but is not necessarily a precondition for the introduction of fiscal rule. This is because a government can announce its commitment to achieving some fiscal target without necessarily enshrining it into a law. Such pronouncements can have more credibility if the government has stable tenure, stronger execution of the budgets and a broad political and social consensus is seen on the rule. That notwithstanding, a firm legal foundation for the rules significantly enhances their implementation and sustainability. How strong this legal foundation should be is the next question. The hierarchy of the laws establishing the rule is an important factor in this regard as it makes it less prone to amendments. For instance, rules enshrined in the constitution are extremely difficult to amend as they require some legislative majority compared to ones in ordinary laws. However, in the sub-Saharan Africa region, the national fiscal rules lack strong legal foundation. Whereas supranational rules are backed up by international treaties, only few countries with national rules have them backed up by statutory laws. The few exceptions are Tanzania, Mauritius, Cape Verde and Botswana. The rest either have coalition agreements or political commitment, which makes them susceptible to being abandoned at will.

Fiscal rules coverage or the scope of the rules is another feature that requires attention. It can be looked at from two dimensions. The first aspect of coverage is the level of government covered. For instance, do the rules cover central, general or sub-national government. In this case, rules coverage may be confined to fiscal operations of the central government, or alternatively may extend further to include the local government or even the entirety of public-sector entities such as state-owned enterprises. In a nutshell, the broader the coverage, the better the credibility of rules. Confining the rules to the central government may give a distorted picture of the overall fiscal stance of the government especially when sub-national fiscal authorities and social security funds also undertake fiscal operations. However, broader coverage of rules to general government may pose some challenges as this could require reliable and timely flow of information on the fiscal aggregates as well as effective mechanisms in the coordination of budgetary decisions

among different government units (Ter-Minassian, 2010). As far as sub-Saharan Africa is concerned, the fiscal rules coverage is narrower, with most concentration at the central government; only Mauritius has coverage up to the general government level. Best practices have shown that rules with broader coverage up to the sub-national level or even the entire public sector are more effective.

The second aspect of coverage is the number of fiscal aggregates covered, looking at the extent to which fiscal aggregates such as expenditure or revenues are excluded from targets. The most commonly excluded item is the capital expenditure because of its potential to contribute to the long-term growth of the economy. Another commonly excluded item is interest payments and cyclically sensitive expenditures.

The inclusion of escape clauses in the rules provide flexibility for dealing with exogenous shocks that may be real or financial and domestic or external. Examples include; political upheaval or civil war, large shifts in the terms of trade, catastrophes or even sudden stops among others. The fact that a country is exposed to unpredictable shocks should not preclude the application of fiscal rules. Rather, care should be made ex ante to deal with such circumstances when they arise. In addition, escape clauses should specify the nature and magnitude of the shock to be accommodated, the length of time for suspension of the rule and the roadmap to return to full implementation. Furthermore, the person responsible for activating the escape clause as well as monitoring the implementation should be known in advance.

Fiscal rules also need to have appropriate enforcement mechanisms to be effective. Enforcement mechanisms may take different forms. On the one hand, there may be a reputational cost for non-observance of the rules. This approach is more common in countries with well specified political and social consensus for social responsibility. On the other hand, criminal sanctions can be meted out on officials responsible for implementation. Such actions may however create undue risks to those officials especially if the deviation is occasioned by exogenous shocks. In between these two extremes are financial penalties which may be imposed on members of a monetary union (for instance, as in the EU's stability and Growth Pact) or on the sub-national government. However, enforcement of such penalties is rare due to lengthy and complicated procedures. A more

pragmatic approach would be to have a pre-specified automatic correction mechanism in the rules in case of deviations. For instance, Switzerland has a ‘debt brake’ option which requires that deviations from the structural budget balance be recorded in a notional account and when the cumulative sum of these deviations exceeds 6 percent of annual budgetary expenditures, then the government should institute remedial measures to get rid of these deviations within a period of three years (Danninger, 2002).

The effectiveness of fiscal rules also depends on strong supporting arrangements or institutions. For instance, an independent body such as a fiscal council with technical capacity can be assigned the responsibility for setting budget assumptions and providing fiscal forecasts. This greatly enhances credibility and ensures accuracy in budgetary aggregates. Another aspect of institutional arrangement is when the fiscal targets upon which fiscal rules are set is based on some economic framework or is integrated into a framework that includes the process for setting them, their linkage to the budget, and the way they are to be enforced or adjusted. Typically, such frameworks are incorporated into a medium-term expenditure process which covers three to five years. Fiscal rules tend to be more effective when based on a framework than if they derive from freestanding²² pronouncements. Framework based rules arise from a process that takes account of economic conditions, the budget situation, and political preferences. Therefore, these rules are likely to have greater flexibility and commitment than rules fixed in advance without due regard to circumstances in any given year. Furthermore, since they are adjusted periodically (i.e. annually, biannually), framed rules are more sensitive to shifts in political sentiments and other relevant conditions (Budina et al., 2013). This argument reinforces the belief that supranational rules, such as those promulgated by regional economic blocks are inherently weaker than country specific ones since the former lack frameworks. The fiscal responsibility law (FRL) is another institutional arrangement that can greatly enhance fiscal rules. The FRLs set out procedural and transparency requirements and the overall fiscal strategy of the government.

Several issues arise as to the timing of introducing fiscal rules. For instance, whether the rules should be introduced at the beginning of fiscal consolidation or when this is already in process.

²² Freestanding targets are determined independent of the fiscal policy process by independent fiscal institutions. Such limits are fixed in law, or in government directives, or imposed by supranational authority.

Additionally; should the introduction of rules occur during a period of high economic uncertainty, such as when the economy is in deep recession, or should it wait until the economy recovers. On the first issue of fiscal consolidation, arguments favor both viewpoints. One school of thought holds that the adoption of fiscal rules signals government commitment to fiscal consolidation, a fact that enhances the credibility of government. On the other hand, rules can be viewed as having a lock-in effect on the consolidation process that is already underway. The empirical evidence seems to agree with the latter argument that fiscal rules are more likely to be introduced by countries where fiscal consolidation is already underway rather than in those where it is beginning (Kumar et al., 2009). On the second point about whether fiscal rules can be introduced during a period of economic uncertainty or not, there is broad consensus that their introduction requires some level of stability in the economy. This is consistent with empirical evidence that the probability of introduction of rules is lower in countries facing output declines, large currency depreciation or even worsening terms of trade. Thus, the credibility of fiscal rule is enhanced when introduced at the beginning of a cyclical expansion. This is to avoid the perception of political expediency if fiscal rules are introduced during a downturn.

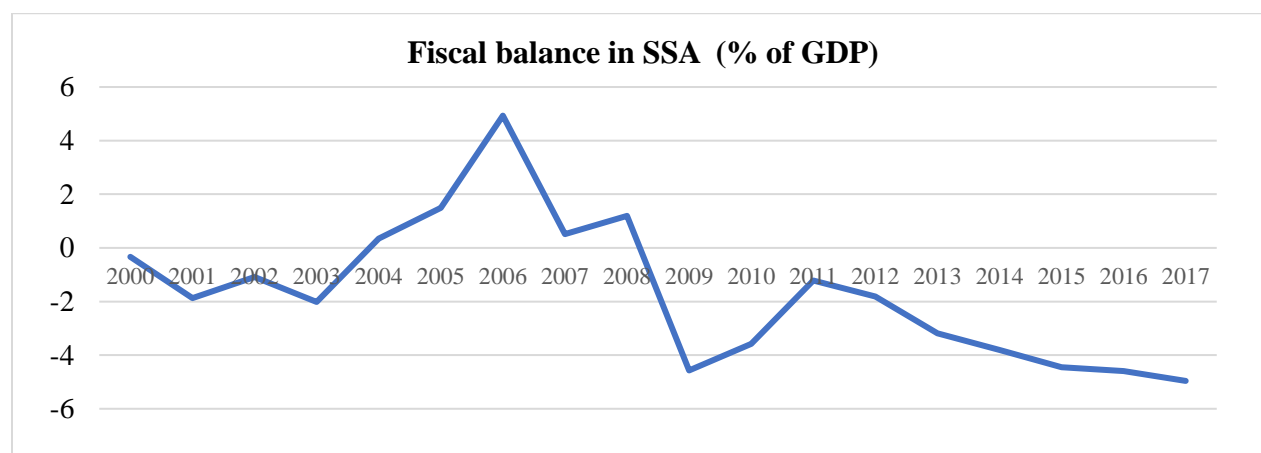
4.3 Fiscal Policy Framework in sub-Saharan Africa

This section describes stylized facts on fiscal policy framework in sub-Saharan Africa on two fronts. Firstly, the fiscal performance in the region is examined with a specific focus on fiscal deficit. Secondly, the status of fiscal rules adoption and implementation is assessed.

4.3.1 Fiscal performance evidence

Using fiscal balance as a measure of fiscal performance, there has been mixed evidence in sub-Saharan Africa over the past couple of decades. For the period under review between 2000 and 2017, the region was in deficit throughout except for a short-lived spell from 2004 to 2008 (Figure 4.1). Evidently, the magnitudes of the deficits were much larger in the later periods of 2008 onwards compared to early periods between 2000 and 2004. The moderate deficits in the earlier parts of the last decade are attributed to the boom in global commodity prices since most countries in the region are commodity exporters.

Figure 4.1: Trends in fiscal deficit in sub-Saharan Africa



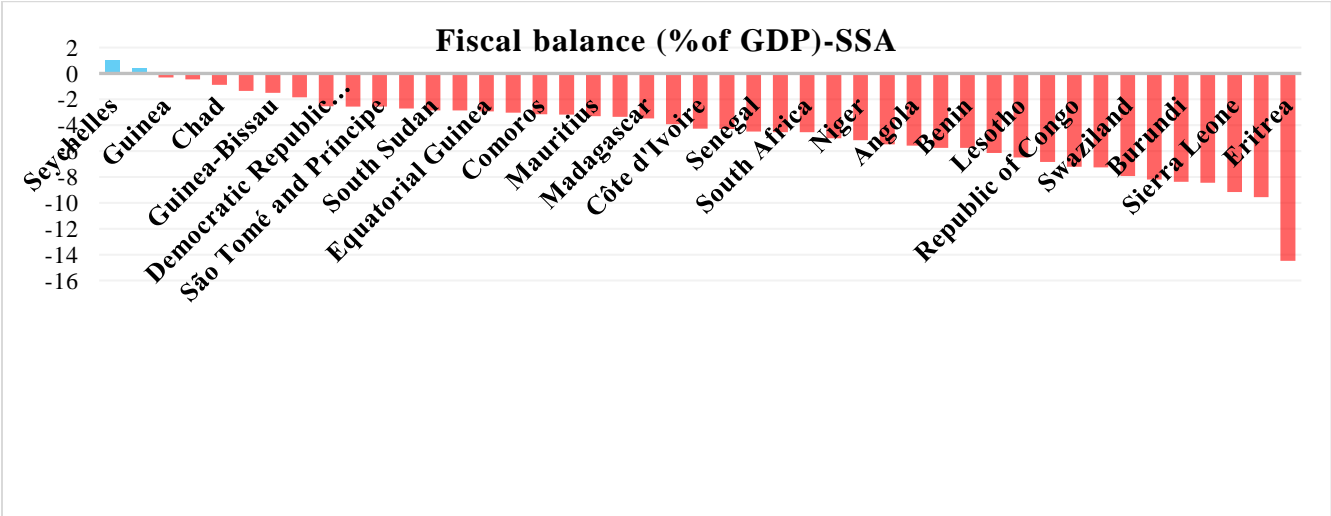
Source: WEO, April 2018

The sustained boom alongside improved growth on the world stage propelled the region into a fiscal surplus that for the first time, rose from 0.3 percent in 2004 to peak at 5 percent in 2006. At the height of the 2007/8 global financial crisis and ensuing global recession, the balance fell sharply to a deficit of 4.5 percent in 2009. Countries in sub-Saharan Africa embarked on fiscal stimulus programs to stimulate domestic demand. The program involved huge public expenditure outlays that weighed heavily on fiscal balance, which fell from a surplus of 1.2 percent in 2008 to

a deficit of 4.5 percent in 2009. There was a significant improvement after end of recession from a deficit of 4.5 percent to 1.2 percent in 2011. This improvement was however short-lived as the fiscal position again experienced a steep decline, hitting a bottom of 4.9 percent in 2017, a deterioration not experienced even during the 2008 great recession.

These aggregated figures reflect overall trends although they may mask cross country variations, which become clearer in Figure 4.2. As shown, majority of countries in the region experienced fiscal deficit in 2017, except for Botswana and Seychelles which had a 0.4 and 1 percent fiscal surplus respectively. The magnitude of the deficits was high in more than half of the countries exceeding 4 percent of GDP. An extreme case is seen in Eritrea which had the highest deficit of over 14 percent of GDP

Figure 4.2: Fiscal position for selected sub-Saharan African countries in 2017

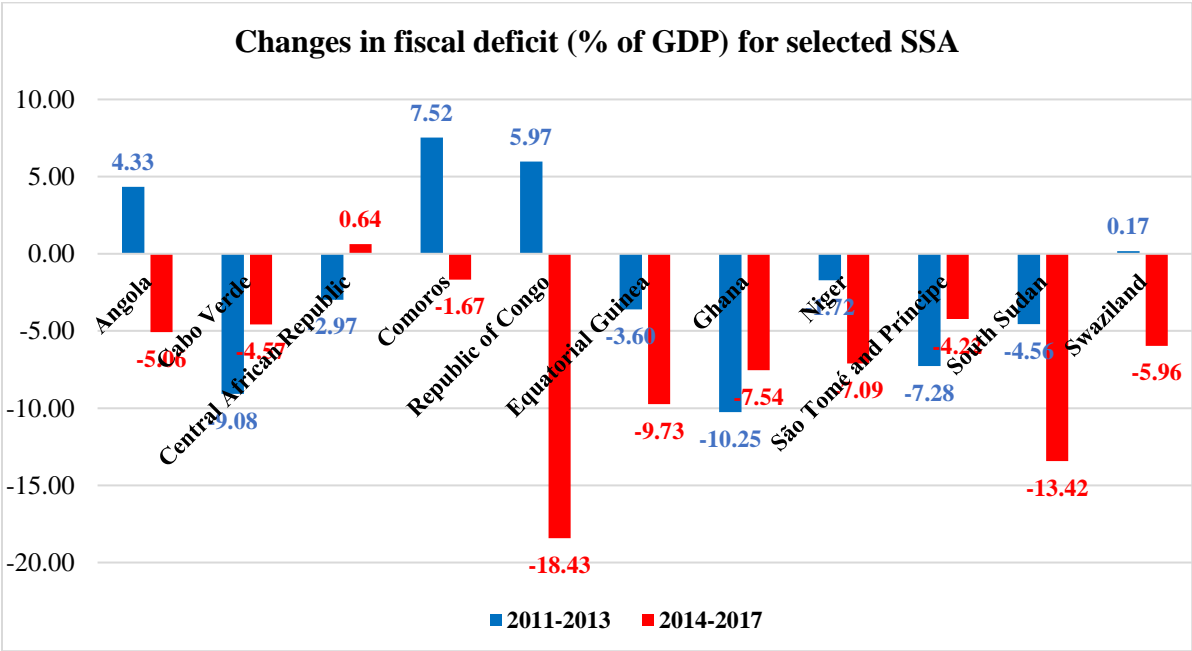


Source: WEO April 2018

Turning attention to movements in fiscal performance for selected countries, Figure 4.3 shows the changes in fiscal balances across countries during the periods 2011-2013 and 2014-2017. The largest deterioration occurred in the Republic of Congo (from an average surplus of 6 percent of GDP in 2011-2013 to a deficit of 18.4 percent in 2014-2017) and Angola (from an average surplus of 4.4 percent of GDP in 2011-2013 to a deficit of 5.1 percent in the 2014-2017 period). Other notable countries with large deterioration in fiscal balance include Comoros (from a surplus of 7.5 percent in 2011-2013 to a deficit of 1.7 percent in 2014-2017) and Equatorial Guinea (whose

deficit widened further from 3.6 percent in 2011-2013 to 9.7 percent in 2014-2017). In contrast, Ghana, the Central African Republic, and Cabo Verde registered significant improvements in their deficits. The deficit in Cabo Verde fell from an average of 9.1 percent of GDP in 2011-2013 to 4.6 percent in 2014-2017, which is an improvement of 4.5 percentage points of GDP. The Central African Republic improved from a deficit of 3 percent of GDP in 2011-2013 to a surplus of 0.6 percent in 2014-2017 while Ghana narrowed its deficit from 10.3 percent in 2011-2013 to 7.5 percent in the 2014-2017 period.

Figure 4.3: Trends in fiscal performance for selected sub-Saharan Africa countries

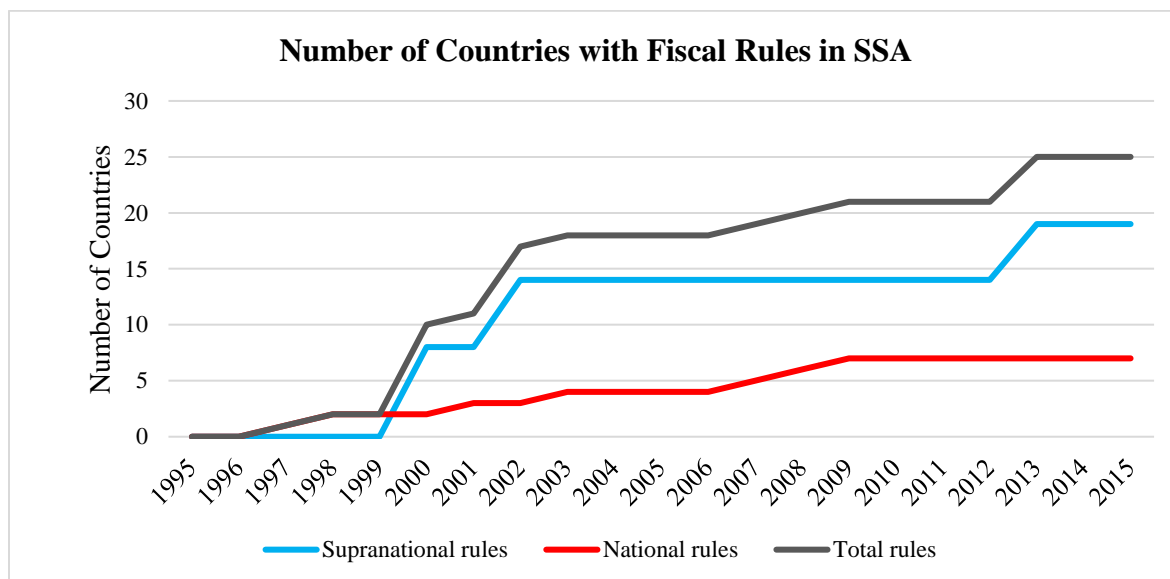


Source: WEO, April 2018

4.3.2 Fiscal rules adoption in sub-Saharan Africa

Until the last decade, fiscal rules were prevalent in advanced and emerging economies. Few countries in the sub-Saharan Africa region had fiscal rules. By the year 1999, only Kenya and Cabo Verde had adopted the rules. However, this trend has drastically changed over the past decade. Figure 4.4 shows the trend in the number of countries with fiscal rules in sub-Saharan Africa between 2000 and 2015. The number grew from 10 in 2000 to 25 countries in 2015 representing about 150 percent growth in adoption over a 15-year period. Majority of growth came from the supranational rules which expanded from 8 countries in 2000 to 19 countries in 2015, compared to national rules which grew from two to seven countries in 2015. During the same period, Kenya was the only country with both national and supranational rules.

Figure 4.4: Trends in number of countries with fiscal rules in the sub-Saharan Africa region



Source: IMF Fiscal Rule Dataset, 2017

Majority of countries with rules show more preference to supranational rules. These countries are confined within currency and monetary unions. The sole purpose of subjecting countries in a regional economic bloc to rules is to internalize the regional costs of fiscal indiscipline and establish a framework for the coordination of monetary and fiscal policy mix (Schaechter et al., 2012). Supranational rules also prevent member states from pursuing fiscal policies that are

inconsistent with the fiscal framework of the monetary union. The sub-Saharan Africa region has three main regional economic blocs with supranational rules. These are, the East African Monetary Union (EAMU)²³, the West African Economic and Monetary Union (WAEMU)²⁴ and the Central African Economic and Monetary Community (CEMAC)²⁵. The South African Development Community (SADC) as a regional economic bloc does not have formal supranational rules.

These supranational rules differ in design across the three monetary unions. In CEMAC, the structural fiscal balance of the central government is required to be in balance or surplus. The structural balance is calculated by replacing actual oil revenue by its three-year moving average. In addition, the non-oil basic fiscal balance should be in balance or surplus. The rules exclude public investment or other priority items from the ceiling. In addition, the rules require the stock of public debt to be kept below 70 percent of GDP. In EAMU, the fiscal convergence criteria require that member countries attain a target of 3 percent of GDP for the overall fiscal deficit (excluding grant) by the fiscal year 2020/21. In addition, the stock of public debt should not exceed 50 percent of GDP. In WAEMU, the fiscal convergence criteria set up since 2000 requires member countries to maintain the overall fiscal deficit (excluding budget grants and foreign-financed capital expenditures) of the central government to no more than 3 percent of GDP and the stock of total public debt should not exceed 70 percent of GDP. In addition, the rule sets a non-binding 20 percent floor on revenues. The rules also exclude public investment or other priority items from this ceiling. However, there is an escape clause for a temporary large fall of GDP and government revenue.

At country level, the adoption of national fiscal rules is meant to rein in growing fiscal deficits and public debt as well as to lock in the gains from fiscal consolidation. Though only few countries have national rules compared to supranational rules, there has been a significant increase from two countries in 2000 to seven countries in 2015 (see Figure 4.4). The countries with national rules include Kenya (since 1997) and Cabo Verde (since 1998). These two being the early countries to

²³ The EAMU is a six-member country union still under protocol set up in 2013. Though not yet a fully-fledged monetary union, the EAMU protocol sets the stage for a fully-fledged union in 2023. The members are Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda

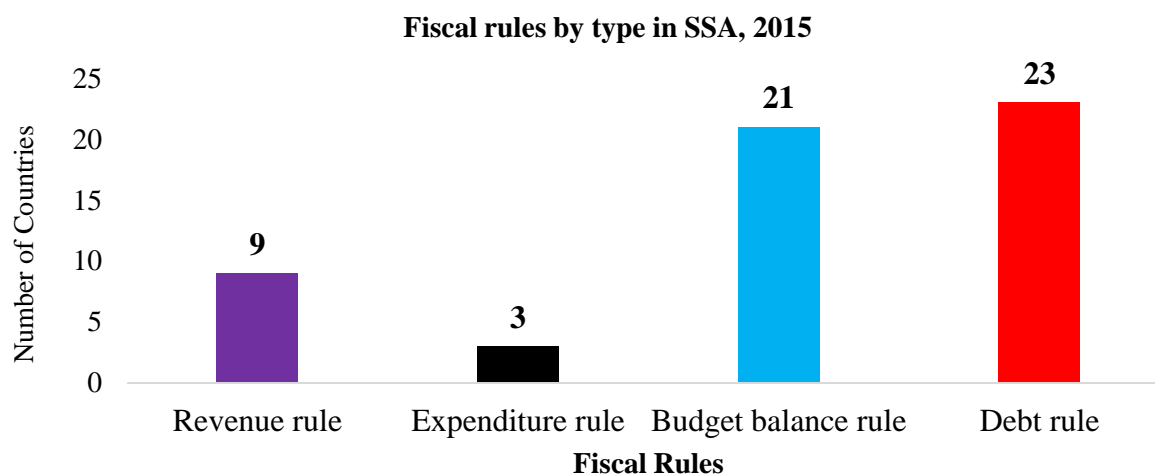
²⁴ The WAEMU is an eight-member country union since 2000 comprising Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo

²⁵ The CEMAC is a six-member country union which adopted the rules since 2002 and comprises Cameroon, Central African Republic, Chad, Republic of Congo, Equatorial Guinea and Gabon

roll out the rules. Others include Botswana (since 2008), Liberia (since 2009), Mauritius (since 2008), Namibia (since 2010) and Nigeria (since 2007).

The pattern of the adoption of fiscal rules by type differs across countries in the region. The most common rule is budget balance and debt rule while expenditure and revenue rules are the least adopted (Figure 4.5). In 2015, there were 23 countries with debt rule compared to 21 with budget balance rule. On the other hand, only nine and three countries had revenue and expenditure rules respectively.

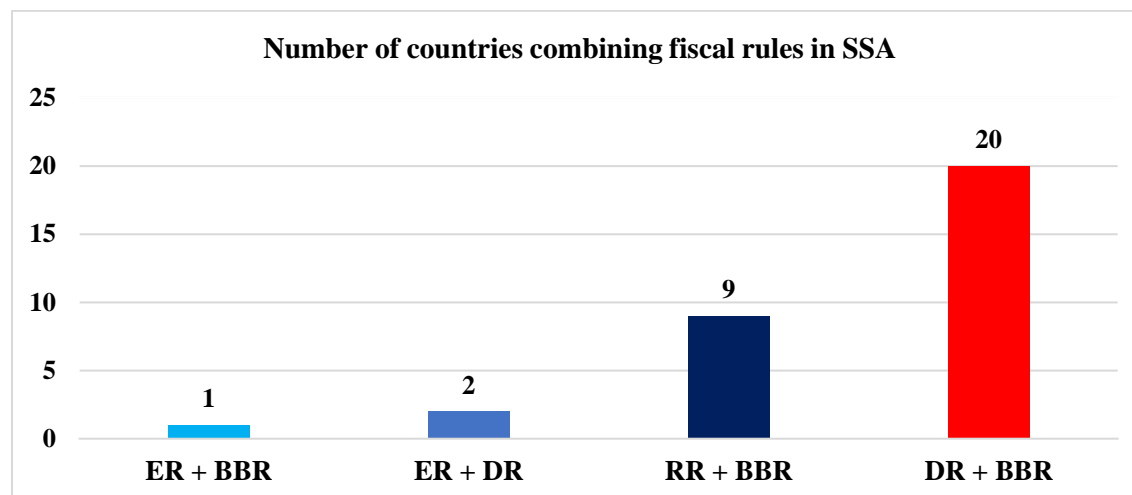
Figure 4.5: Types of fiscal rules in sub-Saharan Africa



Source: IMF, Fiscal Rules Dataset, 2017

Another apparent trend regarding fiscal rules adoption is that majority of countries prefer multiple as opposed to single rules. These choices are informed by different objectives and trade-offs found in rules. The budget balance and debt rule are the most common mix followed by the revenue and budget balance rule. There are 20 countries with a combination of debt and budget balance rules, followed by nine with revenue and budget balance and only two with expenditure and debt rule (Figure 4.6). A few other countries have single rules, including Nigeria (budget balance rule only) and Mauritius (debt rule only).

Figure 4.6: Fiscal Rules Combinations in sub-Saharan Africa, 2015



Source: IMF, Fiscal Rules Dataset, 2017

The fiscal targets for the rules vary across countries. In Botswana, there is a binding commitment on the level of public debt and two fiscal targets, namely total expenditure and budget balance as set out in the country's National Development Plan. The debt limit is set at 20 percent of GDP level while the fiscal framework sets a limit on central government expenditure at not more than 40 percent of GDP. In Cabo Verde, domestic borrowing should not exceed 3 percent of GDP and the stock of public debt should not exceed 60 percent of GDP (though this ceiling is not binding and does not require action). Kenya has policy goals for debt ratios although these are not binding and are subject to change; the limit on the stock of public debt is set at 45 percent of GDP. In addition, the government overdraft at the Central Bank of Kenya is limited to 5 percent of revenue of the previous year. Furthermore, total revenue collection is set at 21-22 percent of GDP. In Mauritius, the legally mandated debt ceiling until the end of 2017 was 60 percent of GDP, which was to be lowered to 50 percent of GDP starting in 2018. In addition, there is an escape clause for emergencies and large public investment projects. In Namibia, government expenditure should be below 30 percent of GDP. In addition, the stock of public debt should fall in the range of 25-30 percent of GDP. In Nigeria, the central government budget deficit should not exceed 3 percent of GDP.

4.4 Review of Literature

4.4.1 Theoretical literature

Economic theory provides explanations as to why an economy can experience fiscal deficit. According to Keynesian economics, fiscal policy is an important tool for stabilizing the economy. When the economy is in recession (period of low aggregate demand) running fiscal deficit is necessary to boost aggregate demand; running surplus (period of high aggregate demand) is necessary when the economy is in a boom to recover from inflationary pressures. In contrast, the neoclassical theory denies the stabilizing role of fiscal policy. Barro (1979), argues that taxes have distortionary effects in the labour market and that the welfare effects of these distortions increase when tax rates are changed continuously. As such, when the economy is faced with extraordinary situations like drought or war, taxes should be moderately raised and run deficits until the need for extraordinary spending abates. When the situation normalizes, the economy should run a surplus to repay the debt (Hallerberg et al., 2009).

Economic theories on government spending can also be used to explain deficit bias. For instance, Wagner's Law, also known as the law of increasing state spending, named after the German economist Adolph Wagner (1835-1917), argues that public expenditure rises constantly as the economy develops due to heavy demand for public goods and services. Another explanation is provided by the Baumol cost disease theory which attributes the deficit to productivity differences in the public and private sector. There is lower productivity in the public as compared to private sector; for parity to be realized in the two sectors, the share of government spending must rise.

Besides the conventional economic theories, deficit bias has been attributed to political economy factors (Eden et al., 2013). This is because politicians act as optimizing agents instead of benevolent planners. Thus, their actions lead to suboptimal economic outcomes that result in deficit bias (Krogstrup & Wälti, 2008). The most common political economy explanations are the common pool theory as advanced by Hallerberg & von Hagen (1999) and von Hagen & Harden (1995); the agency problem by von Hagen (2002); the time inconsistency theory of preferences by Alesina & Tabellini (1990); and the political competition and electoral system (Hallerberg et al., 2009).

The common pool problem arises when interest groups involved in budget making do not fully internalize the cost of their choices. Whereas the cost of public spending is borne by the national tax base (thus the costs are widely spread both geographically and across interest groups), the benefits accrue to a narrow interest group depending on the strength of the lobby (Morris et al., 2006). The interest groups could be line ministries, lobby groups or even political parties who compete for their own stake without due regard for how their choices contribute to higher spending which raises deficit further. The agency problem arises because voters (principal) elect politicians (agents) to make decisions about public spending on their behalf using their taxes. However, in this principal-agent relationship, politicians (through the policymakers) do not always carry out their delegated authority in the best interest of the voters. The politicians often do extract rents by misusing resources entrusted to them to pursue their own selfish interest, manifesting through corruption, undue perks or outright waste that eventually increases the deficit. Hence, voters may wish to mitigate these behaviors by subjecting politicians to rules that stipulate limits on their actions.

The time inconsistency problem as first advanced by Kydland & Prescott (1977) argues that ex-ante, the government may announce fiscal adjustments only to renege on such promises because of political and economic pressures (Schuknecht, 2004). The deficit bias may also arise due to government shortsightedness based on its tendency to discount future events such as public spending at a higher discount rate than the electorate. This could result in budgetary imbalances. Alesina & Tabellini (1990) also notes that government shortsightedness could be due to fear of losing an election. A related issue is that of election-budget cycle where deficits increase during or around the election period., a phenomenon also known as political business cycle. This happens especially if the governing party staring at election loss induces voters with tax cuts or pork barrel spending in the run-up to the election. Similar argument can also be attributed to information asymmetry existing between policy makers and the voters. Persson et al. (1997) notes that when citizens elect their leaders, they delegate decision-making on policy matters to the holders of public office. However, due to information asymmetry, policymakers have better information on the true fiscal position than the population at large; they can use this advantage to cut taxes or increase expenditures as an inducement just before election.

According to Hallerberg et al. (2009), political competition in government and the nature of the electoral system can contribute to fiscal deficit. This argument notes that coalition governments tend to be characterized by stiff political competition, polarization, disagreements and short tenures in office (due to lower probability of re-election). As a result, in the event of a negative fiscal shock hitting the economy, coalition partners may fail to agree on whose constituency should bear spending cuts or tax increases. On the contrary, a one-party government is more decisive on such matters. This further shows that there is a strong link between the electoral system and the number of parties in government on the one hand and fiscal deficit on the other. A minority government (associated with coalitions or proportional representation²⁶) tends to have larger deficits than a majority government (associated with single party or plurality²⁷).

Economic theory further explains that fiscal institutions can affect fiscal policy outcomes. For instance, the motivations underlying deficit bias can be constrained through the adoption of fiscal rules. von Hagen (2002) observes that the principal-agent problem that contributes to deficit bias can be addressed through the adoption of fiscal rules. Imposing fiscal rules ex-ante restricts the scope of choices available to elected politicians regarding public finances. Debrun & Kumar (2007) advances the signaling hypothesis of fiscal rules by demonstrating that governments adopt rules as a sign of commitment and transparency. Such measures reduce the risk of voters associating adverse budgetary outcomes with government incompetence; rather voters perceive the issues as arising from situations out of government control (idiosyncratic shocks). This enhances the re-election chances of the incumbent government and reduces the incentive to run excessive deficits. In this case, fiscal rule may be viewed as a signaling device that enhances fiscal performance by reducing the information asymmetry existing between voters and policymakers.

4.4.2 Empirical literature

The empirical literature on fiscal rules and fiscal performance can be grouped into three categories. The first presents the evidence of fiscal rules on fiscal performance. The second strand reviews various approaches for the construction of a fiscal rule index. The third strand looks at empirical

²⁶ Under proportional representation, the proportion of seats a party wins in electoral district corresponds to the votes the party receives in elections. Therefore, seats are distributed based on votes received.

²⁷ Under this system, only one representative is elected in the electoral district and all seats goes to the winner.

evidence of other factors with a potential effect on fiscal deficit including economic and political economy factors.

Early studies on this subject in the US focused on the effectiveness of borrowing constraints on fiscal deficits (Alt & Lowry, 1996; Bohn & Inman, 1996). The results show that states with tighter fiscal limits had greater fiscal discipline. This finding is also supported by Sutherland et al. (2005) whose findings show a negative correlation between fiscal rules and debt at the sub-national level. Recently, studies have investigated the link between fiscal rules and fiscal performance based on fiscal rules' measure of strength. For instance, von Hagen (2005) results suggest that an increase in the strength of fiscal rules improves fiscal balance. Similarly, Ayuso-i-Casals et al. (2006) arrives at same conclusion using fiscal rule indices based on the EU dataset. Debrun et al. (2008) examined the effects of national fiscal rules for EU countries based on survey dataset and found that rules have statistically significant positive impact on cyclically adjusted primary balances. Similar results were found by Badinger & Reuter (2017) for 74 countries spread across different economic groups and Krogstrup & Wälti (2008), who focused on 25 cantons in Switzerland.

On the other hand, a few other studies have found that fiscal rules do not necessarily lead to better fiscal outcomes. For instance Feld & Kirchgässner (2001) found that fiscal rules do not restrict the public debt of Swiss municipalities. Milesi-Ferretti (2003) observes that fiscal rules can prompt policymakers to come up with creative ways to bypass the restrictions especially when imposed in an environment devoid of transparency. The paper shows that when rules are imposed in such an environment, they create room for creative accounting and less fiscal adjustment. von Hagen & Wolff (2006) finds that creative accounting was common in EU members states after fiscal rules became effective and binding.

Empirical studies employ various approaches to capture fiscal rules in regression models. Some studies use dummy variables (Brzozowski & Siwińska-Gorzela, 2010; Gali & Perotti, 2003; Krogstrup & Wälti, 2008; Nerlich & Reuter, 2013) while others construct an index of strength. The drawback of using dummies is that they have limited information content and there is a limitation on the number that can be included in a regression. On the other hand, using a composite index retains most of the information in the data by exploiting the design characteristics of fiscal

rules. ACIR (1987) is a pioneer study on this approach to investigate fiscal discipline mechanisms in the US. Other studies that have used similar method include Alesina et al.(1999) in Latin America and Debrun et al. (2008) in the EU. These studies relied much on questionnaire-administered surveys to gather information from government agencies and fiscal experts.

Some studies have also used a fiscal rule index based on a common approach in natural and technical sciences known as partially ordered set (POSET). This approach uses set theory methodology to construct indices. Studies following this line include Badinger & Reuter (2015) and Badinger & Reuter (2017), both based on IMF Fiscal Rules dataset for the period 1985-2012. Although composite and POSET based indices differ in methodology, Badinger & Reuter (2017) shows that the two approaches are closely related and often arrive at quantitatively similar results. In this regard, this study adopts the composite index approach following Debrun et al. (2008).

Besides institutional variables like fiscal rules, Bohn (1998) notes that fiscal behavior can also be modelled as a reaction function of primary balance to economic and political variables. The economic factors controlled for in such a regression are debt ratio and output gap (Badinger & Reuter, 2015, 2017; Debrun & Kumar, 2007a; Debrun et al., 2008; Maltritz & Wuste, 2015). A positive response of fiscal balance to debt-to-GDP ratio signifies that a country is running a sustainable fiscal policy in the sense of satisfying IBC (Bohn, 1998). The output gap on the other hand controls for business cycle influence on fiscal policy.

The empirical evidence on influences of political economy factors on fiscal policy has also been examined. This strand of literature focuses on testing the common pool hypothesis and how political decisions contribute to deficit bias. The political factors tackled range from the type of government in place i.e. whether a majority or minority, the tenure of government as well as the polarization and fragmentation of the political system. Egger & Koethenbueger (2010), for instance, tests the common pool hypothesis using a panel of 2,056 municipalities in Germany's Free State of Bavaria and finds evidence that council size has a strong effect on municipal spending, which provides strong evidence of 'pork barrel spending'. Alesina & Perotti (1995) investigates the link between government type and fiscal stance based on a sample of 20 OECD countries between 1960 and 1992. The study finds evidence that coalition governments are associated with large fiscal deficits compared to single-party governments. Roubini & Sachs

(1989) and Grilli et al. (1991) all reach the same conclusion and further show that higher deficits are common on average in countries with a short tenure of government. The build-up of deficits in the period leading to a general election, also referred to as political business cycles, has featured prominently in this area of empirical research. Shi & Svensson (2006) finds evidence that the deficit increases on average by 1 percent of GDP in an election year and that the increase is more common in developing than developed countries. Similar evidence is also confirmed by Brender & Drazen (2005) and Debrun et al.(2008).

4.4.3 Overview of the literature

The general conclusion from the literature is that studies on the impact of fiscal rules on fiscal performance are concentrated in developed countries, especially EU and OECD countries; similar studies on sub-Saharan Africa are scarce. Furthermore, comparative studies on fiscal performance between countries with and without fiscal rules are not common. Such an exercise could give an unequivocal picture on the effectiveness of fiscal rules. In view of the foregoing, this analysis extends the literature by first investigating the impact of fiscal rules on fiscal performance with specific focus on sub-Saharan Africa region. The fiscal rule is measured using a composite index of strength constructed using updated fiscal rules dataset covering 1985-2015. As noted in the above reviewed empirical studies, there is no quantitative difference in either using the composite index approach of Debrun et al. (2008) or the POSET index approach of Badinger & Reuter (2017). Secondly, an assessment is done on whether there is any difference in fiscal performance between countries in the region with fiscal rules and those without fiscal rules. A treatment effect methodology is used to conduct this comparison which is another dimension that has not been explored before in sub-Saharan Africa.

4.5 Methodology

4.5.1 Theoretical framework

The theoretical framework underpinning the role of fiscal rules in fiscal policy is adopted from a political economy model²⁸ in the spirit of Alesina & Tabellini (1990) and extended by Debrun & Kumar (2007b). The analysis is based on a representative-agent model of a small open economy facing deficit bias due to electoral uncertainty of political parties. The prospect of not being re-elected into office significantly shortens the outlook of the party in power. Thus, the partisan policymaker representing the ruling party discounts future economic outcomes at a greater rate than is socially desirable. The resulting effect is that most of the resources are spent on current provision of public good, leading to a deficit bias; correspondingly, few resources are allocated for future investment projects. Altogether, this creates a justification for the introduction of some form of a fiscal restraint mechanism. The model further highlights the critical role of electorates viewed from the perspective of determining the extent of the bias (because of tolerance to policy failures) as well as selecting the enforcers of fiscal rules. Though highly stylized, the framework provides motivations and incentives facing a typical policymaker in implementing fiscal policy.

4.5.1.1 The Model

Private Agents

The model considers a small open economy existing for two periods with infinite number identical individuals who derive utility from consumption of both public and private goods. The representative individual preference is represented by a time separable utility function specified as:

$$U = E_0 \left[\sum_{t=1}^2 u(c_t) + v(q_t) \right], \quad (4.1)$$

Where c_t is consumption of private good in period t , while q_t is provision of public good in period t . The utility functions $u(\cdot)$ and $v(\cdot)$ satisfies the standard properties²⁹. E_0 is the expectation

²⁸ Such a model is adopted since politics matter a great deal in economic decisions made by policymakers. Political influence cannot be assumed.

²⁹ Assumed to be concave, strictly increasing and twice continuously differentiable with $u(0) = 0$, $u' > 0$, and $u'' < 0$; $v(0) = 0$, $v' > 0$, and $v'' < 0$.

operator based on information available at the beginning of the period. For simplicity, the real interest rate and the social discount rate are both assumed to be equal to unity. It is further assumed that the consumer can freely borrow in both domestic and international capital markets and maximize utility in (4.1) subject to the following IBC:

$$c_1 = (1 - \tau)y_1 + l, \quad (4.2a)$$

$$c_2 = (1 - \tau)y_2 - l, \quad (4.2b)$$

Where τ is a constant and exogenous income tax rate (this represent the size of the government), l is the stock of debt at the end of period 1, and y_t is personal income at time t . In addition, it is assumed that $c_t \geq 0, t = 1, 2$, which implies $-(1 - \tau)y_1 \leq l \leq (1 - \tau)y_2$. Period 1 income faces a random shock $\varepsilon \in [-\bar{\varepsilon}, \bar{\varepsilon}]$ with $\bar{\varepsilon} < 1$, while period 2 income is assumed to be deterministic³⁰:

$$y_1 = \bar{y}(1 + \varepsilon), \quad (4.2c)$$

$$y_2 = \bar{y}, \quad (4.2d)$$

The economy also has two political parties indexed by $Q = C, L$. Both parties share the preferences of individuals in this economy only to the extent that they are in power to deliver the public good. The public good is therefore identical irrespective of the party in power.

The Government

The fiscal policy in place is subject to a mechanism that discourages policymakers from accumulating debt b beyond a certain threshold \bar{b} . If this threshold is breached, there is a utility cost³¹ $S(b)$, with $S(b) = 0$, if $b \leq \bar{b}$, and $S(b) = k(b - \bar{b})$ with $k > 0$ if $b > \bar{b}$. The term $b - \bar{b}$ in this context is seen as a numerical fiscal rule, and k as enforcement mechanism, such that violation of the rule results in utility loss for the policymakers.

³⁰ This assumption is made to simplify computation. Making period 2 income random complicates the notation without adding additional insight.

³¹ Utility cost depends on the extent of the breach, i.e. the extent to which b exceeds \bar{b} .

The policymaker faces the following objective function (expressed in per-capita terms):

$$V_Q = E_0 \left[\sum_{t=1}^2 u(c_t) + v(q_{Q,t}) - S(b) \right], Q = C, L \quad (4.3)$$

Where $q_{C,t} = 0$ if $Q = L$ and $q_{L,t} = 0$ if $Q = C$. Private consumption, c_t enters policymaker's utility function because the preference of the consumer matters to the policymaker.

Assuming away borrowing restrictions both domestically and internationally, the governments' fiscal policy decisions are subject to the IBC:

$$q_{Q,1} = \tau y_1 + b - \delta_1, \quad (4.4a)$$

$$q_{Q,2} = \tau y_2 - b - \delta_2, \quad (4.4b)$$

Where δ_t is a random failure in delivery of the public good which can be attributed to unforeseen policy mistakes, administrative capacity weaknesses, or corrupt policymakers. To simplify the analysis, δ_t is uniformly distributed over the interval $[0: \bar{\delta}]$. Both parties face the same distribution of failure so that there is no distinction in 'types' (the competent and less competent for instance) between the two political parties. Further, a nonnegative constraint on public good provision is imposed such that, $q_t \geq 0$, $t = 1, 2$, implying $-\tau y_1 + \bar{\delta} \leq b \leq \tau y_2 - \bar{\delta}$.

The only source of inefficiency in this model is information asymmetry facing the voters about the ability of policymakers to efficiently deliver public goods. This is a common assumption in theoretical models of fiscal bias. A similar conclusion can be found in Morris et al. (2006). As a result, voters can only infer such an ability based on actual action. Particularly, they assign a non-zero probability to the fact that a policy failure beyond a certain threshold δ^+ signals an underlying lack of competence; in other words, such failures are considered too big to be purely random. Voters also ignore the true ex-ante probability distribution of δ , and whether there exists any difference in type among policymakers of different parties. However, they do observe b .

Formally, voters assign a fixed probability $\psi \in [0, 1/2]$ that a policy failure $\delta_t > \delta^+$ can occur under a competent government. At the end of period 1, individuals either re-elect the incumbent (in this case, party C by assumption) or vote it out. Party C will be re-elected if:

$$E_1[v(q_{c,2})] \geq E_1[v(q_{l,2})], \quad (4.5)$$

Where E_1 represents the expectations operator at the end of period 1. Expression 4.5 indicates that if the incumbent is believed to be more competent than the opponent, then the incumbent will be re-elected. While voter's belief about competence are the same for both parties at the beginning of period 1, they are updated following the realization of δ_1 . This result can be summarized in the form of a proposition: If $0 \leq \psi < 1/2$ and voters follow (4.5), then, at the beginning of period 1, the incumbent assigns a probability $r = 1 - (\delta^+/\bar{\delta})$ of not being re-elected. The probability r of losing elections depends on how flexibly voters assess policy failures.

This is the chain of events. In period 0, a representative constitutional convention (or a referendum) imposes a debt (or deficit) ceiling \bar{b} which carries a utility cost $S(b)$ when $b > \bar{b}$. At the beginning of period 1, Nature draws the governing party (C by assumption), then the shock ε is realized and government (policymakers) chooses b and $q_{c,1}$ to maximize V_c . After that, δ_1 materializes, and private consumers select l and c_1 to maximize their expected utility U . Finally, elections take place. In period 2, all debts are paid off and the world ends. The equilibrium is found by backward induction to ensure time-consistency.

4.5.1.2 Optimal fiscal policy under social planner

If the social planner is in charge, the first best solution results in optimal fiscal policy. In this case, electoral constraints and fiscal institutions play no role. The social planner selects public debt level b^* defined as:

$$b^* = \arg \max_b [2u(c_1^*) + v(\tau\bar{y}(1 + \varepsilon) + b - \bar{\delta}/2) + v(\tau\bar{y} - b - \bar{\delta}/2)] \quad (4.6)$$

The first order condition for (4.6) is:

$$v'(\tau\bar{y}(1 + \varepsilon) + b^* - \bar{\delta}/2) = v'(\tau\bar{y} - b^* - \bar{\delta}/2) \quad (4.7)$$

The socially optimal public debt b^* equates the marginal utility of additional deficit financed by public good provision in period 1 with the marginal disutility of forgone public provision in period 2 (because additional resources are allocated for debt repayment). The optimal policy achieves

$q_1^* = q_2^*$. Further simplification of (4.7) yields $b^* = -\tau\bar{y}\varepsilon/2$, implying that the optimal public debt is zero, and that deficits or surpluses are only used to smooth out the income shock.

4.5.1.3 Optimal fiscal policy under a partisan policymaker

In this political equilibrium, the policymaker is exposed to electoral uncertainty and possible costs of breaching the thresholds set by fiscal rules $S(b)$. Denoting b^{**} as the debt maximizing policymakers' expected utility, it can be shown that:

$$b^{**} = \arg \max_b [2u(c_1^*) + v(\tau\bar{y}(1 + \varepsilon) + b - \bar{\delta}/2) + (1 - r)v(\tau\bar{y} - b - \bar{\delta}/2) - S(b)] \quad (4.8)$$

Equation (4.8) shows that uncertainty about re-election brings the policymaker's discount factor $(1 - r)$ below the social discount factor. The first order condition for (4.8) becomes:

$$v'(\tau\bar{y}(1 + \varepsilon) + b^{**} - \bar{\delta}/2) = (1 - r)v'(\tau\bar{y} - b^{**} - \bar{\delta}/2) + S'(b^{**}) \quad (4.9)$$

Where $S(b^{**}) = 0$, if $b \leq \bar{b}$, and $S(b) = k(b - \bar{b})$ with $k > 0$ if $b > \bar{b}$.

Equation (4.9) implicitly defines b^{**} (and corresponding q_1^{**} and q_2^{**}) as a function of all other parameters and variables in the model.

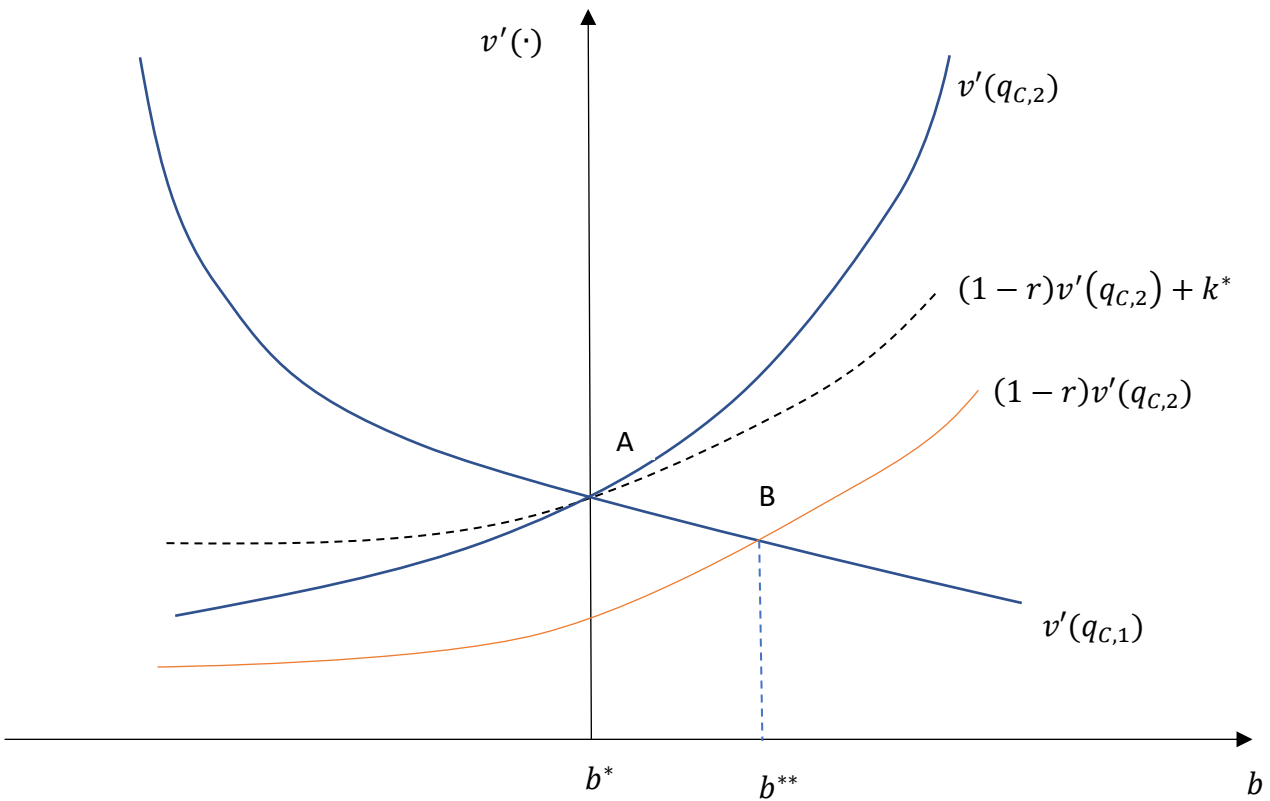
Applying implicit function theorem on (4.9) and totally differentiating it with respect to k yields;

$$\partial b^{**}/\partial k = [v''(q_{c,1}^{**}) + (1 - r)v''(q_{c,2}^{**})]^{-1} < 0 \quad (4.10)$$

Equation (4.10) shows that intense enforcement of fiscal rules (that is, higher k) reduces the deficit level b^{**} . Relating this result to equation (4.9), it shows that k making any deviation from the optimal debt level b^* is sufficiently costly enough to discourage deficit bias. The main conclusions from this analysis is that the level of debt b^{**} is sub-optimally higher than optimal level b^* if $b > \bar{b}$ but fiscal rules characterized by enforcement level k^* can bring it down to optimal level $b^{**} = b^*$.

Figure 4.7 shows a graphical representation of the foregoing analysis. The graph displays marginal utility function $v'(\cdot)$ in terms of b for $\varepsilon = 0$. The bold downward sloping curve from left to right represents marginal utility derived from the provision of public goods in period 1, $v'(q_{C,1})$, while the three upward sloping curves represent expected marginal utility for the provision of public goods in period 2 under different scenarios: a social planner (plain bold line), electoral uncertainty under fiscal rules (light dotted/dashed line) and electoral uncertainty without fiscal rules (orange line).

Figure 4.7: Fiscal policy under different political scenarios



Source: Adopted from Debrun & Kumar (2007b)

At each point of intersection, curves with opposite slopes represent a solution to the optimization problem, and its projection to the horizontal axis gives a corresponding deficit. Point A identifies the social planners' solution defined by (4.7). At this point, there is no electoral uncertainty and the equilibrium debt $b^* = 0$. However, with electoral uncertainty, the policymaker discounts the expected marginal utility for future goods provision more heavily than the social planner.

Consequently, the plain upward sloping thin curve (orange in colour) is flatter than the bold counterpart (for the social planner), leading to political equilibrium B, defined by (4.9), which has higher deficit, $b^{**} > b^*$. When enforcement $k > 0$ associated with fiscal rule which sets $b = b^*$ is introduced, the curve shifts up (dotted curve), reducing the equilibrium deficit to the optimal level $b^{**} = b^*$. As a result, the wedge between political and socially optimal discount factors is eliminated.

4.5.2 Summary and empirical implications of theoretical model

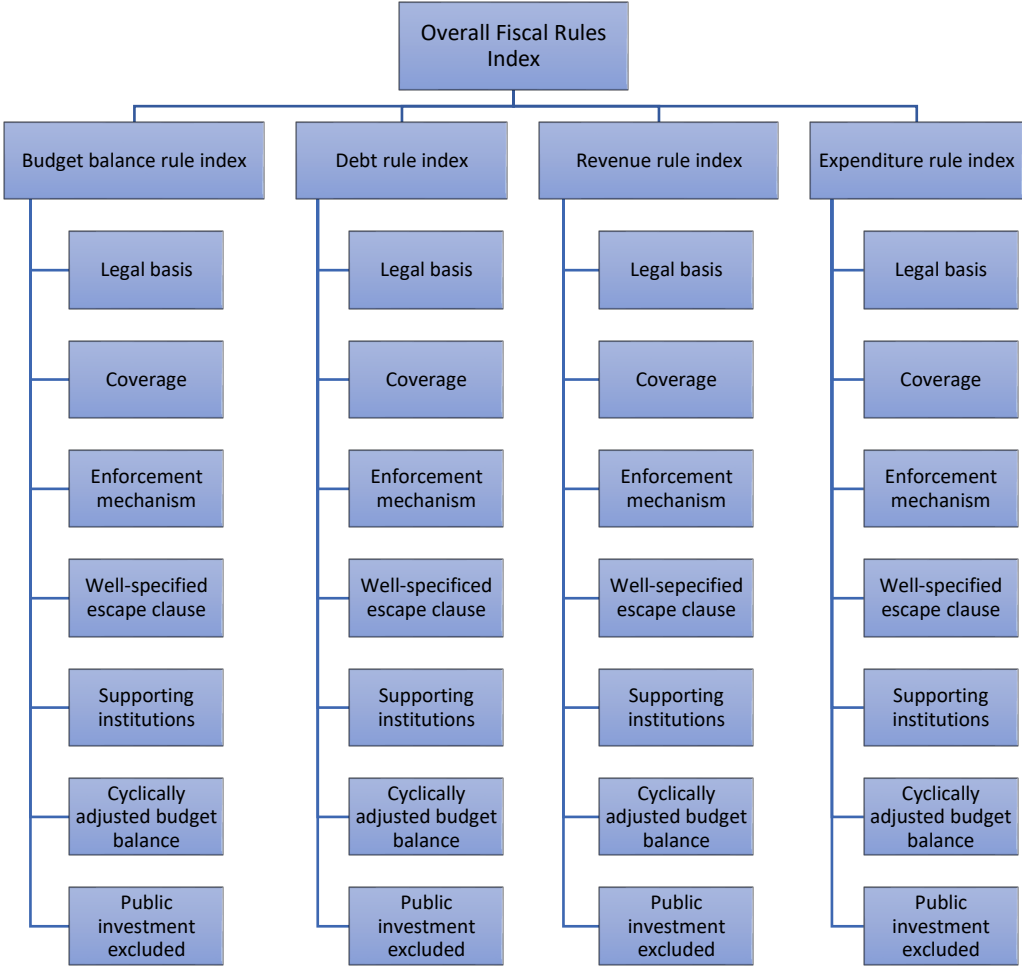
The model has important implications for fiscal outcomes. First, the model places electoral uncertainty at the heart of deficit bias due to the perceived risk of losing elections driving the discount rate of policymakers below the social optimum. The implication is that countries with higher political instability, and a high risk of losing election, are more likely to experience higher deficits on average. Secondly, fiscal rules can play a crucial role in mitigating the bias by increasing the marginal disutility of the policymaker. More importantly, it is not just the presence of fiscal rules per se that matters, but also their enforcement. Thus, the rules need to have strong enforcement mechanisms for them to be effective. Whereas this simplified model has emphasized on electoral uncertainty and fiscal rules as the main elements of fiscal outcomes, there are other factors that could affect fiscal outcomes. These are highlighted in section 4.6.

4.5.3 Construction of the fiscal rule index of strength

The stringency of fiscal rules is measured using a composite index of strength constructed in two stages following the approaches of Debrun et al (2008) and Schaechter et al. (2012). In the first stage, a sub-index is constructed by country for each year for the four types of fiscal rules, namely budget balance, debt, revenue and expenditure rules. This is done by assignment of scores to each of the seven supporting indicators to each rule (see flow chart in Figure 4.8 and Appendix A4.5), namely legal basis, coverage, enforcement mechanism, escape clause, supporting institutions, cyclically adjusted budget balance and rules excluding public investment. For legal basis and coverage, the scores assigned depend on their importance. For instance, the legal basis indicator is assigned a maximum score of four if the rule is enshrined in a constitution and a minimum score of one if it is based on coalition or political agreements. In this case, a lower score implies that the rule is not legally binding and therefore can be amended easily. A similar approach is used for

coverage indicator, where a rule covering the general government is assigned a higher score of two, compared to a score of one for the rule limited to the central government. On the other hand, the scores assigned to the rest of five indicators are binary in nature taking a value of one if the rule contain the indicator and zero if otherwise. The aggregate score for each rule is then computed by simple summation of all the scores assigned to its indicators, which are then standardized³² to generate the sub-index for the respective type of rule (Figure 4.8).

Figure 4.8: Fiscal rules sub-indices by type of rule



Source: Adopted from Schaechter et al. (2012)

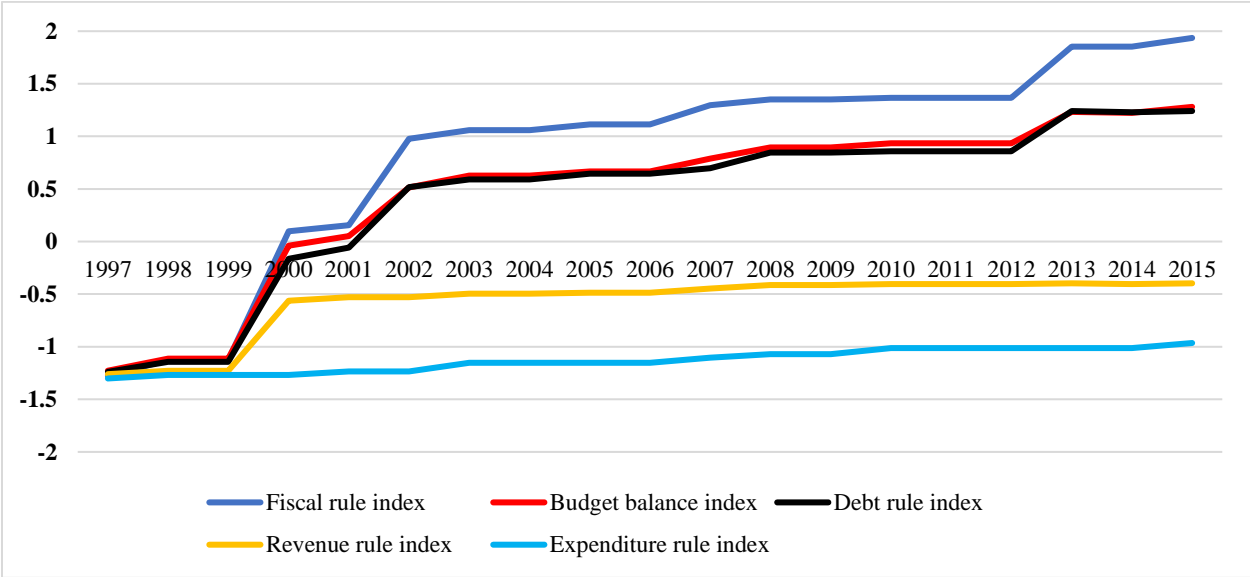
³² We use standard deviation from the mean scheme. This scheme imposes a standard normal distribution (i.e. a mean of 0 and a standard deviation of 1). See Freudenberg (2003) for more details on this scheme

In the second stage, the overall index of strength by country and year is derived by summation of respective sub-indices relating to the four types of fiscal rules. The following formula is used to derive the overall index of strength:

$$FI_{it} = \sum_{j=1}^4 X_{jit} \tag{4.11}$$

Where $FI_{i,t}$ is the overall fiscal rule index in country i in year t and X_{jit} is the sub-index for rule type j for country i in year t . The stringency index in equation (4.11) therefore captures both the characteristics and the number of rules in place each year for a given country. It is however important to note that the fiscal rule dataset used to construct these indices is only able to capture the countries which have the fiscal rules and not the extent of adherence or enforcement to the rules. As such a high index can be observed in a country with poor fiscal outcomes since the presence of a rule may not necessarily imply its enforcement.

Figure 4.9: Trends in evolution of aggregate fiscal rule index of strength (Annual average for SSA)



Source: Own computation

Figure 4.9 shows the evolution of the aggregate fiscal rule index over time in sub-Saharan Africa. The time varying index for the region is computed as a simple average across the countries in the region. Since the indices are standardized with a mean 0 and standard deviation of 1, an index below 0 is deemed to be below average while an index above 0 is deemed as above average. Thus,

the strength of a specific rule increases with the magnitude of its index. The figure shows that the overall fiscal rule index ranges between -1.3 and 1.9, between 1997 and 2015 respectively. This implies that fiscal rules have become comprehensive and robust in design over time in the region. This strengthening is particularly driven both by the budget balance and debt rules, which shows a considerable upward pattern over time. On the other hand, the revenue rule jumped only in 2000 and remained almost constant for the rest of the period while the expenditure rule has not had much growth in strength since countries begun adopting the rules.

4.6 Model Specification.

Following Bohn (1998) and (Debrun et al., 2008), fiscal behavior can be modelled as a reaction function of primary balance to economic, political and institutional variables. The inclusion of political variables is informed by the fact that fiscal policy decisions are influenced by political actors besides economic and institutional factors.

4.6.1 The baseline regression model

The basic regression model can generally be specified as:

$$y_{it} = \alpha + \gamma y_{it-1} + \delta fr_{it} + x'_{it}\beta + \eta_i + \varepsilon_{it}, \quad \varepsilon_{i,t} \sim iid(0, \sigma^2) \quad (4.12)$$

Where subscript i indexes country and t is time in years. y_{it} is the ratio of primary balance to GDP in country i and time t . fr_{it} is a measure of the fiscal rules index of strength and is time and country specific, $x_{i,t}$ is a vector of other controls drawn from economic theory and empirical studies. The controls include debt-to-GDP ratio, output gap, political stability index, legislative election dummy and district magnitude index. η_i is the unobserved country specific effects that represents country specific characteristics affecting fiscal policy but possibly omitted in $x_{i,t}$. $\varepsilon_{i,t}$ is an idiosyncratic error term. (A detailed discussion and description of the variables is given in section 4.6.4 and Appendix A4.1). The regression model (4.12) is estimated for period 1997-2015 to coincide with the implementation period of fiscal rules in sub-Saharan Africa.

Estimation of equation (4.12) poses some econometric issues. Considering the dynamic nature of the model, there is a potential problem for using fixed effects estimation. This estimator is

asymptotically inconsistent and contains a bias of order $O(T^{-1})$ also known as the Nickell bias following Nickell (1981). The lagged dependent variable included as one of the regressors and the possible correlation between country specific effects and regressors gives rise to a potential endogeneity problem. The other econometric issue imminent in our empirical strategy is endogeneity arising from the fiscal rules. First is reverse causality because of the possibility that fiscal outcomes are in fact driving fiscal rules and not the other way. For instance, a government facing fiscal deficit is more likely to adopt the rules than the one which is not. In such a case the adoption of fiscal rules is driven by the circumstance of the economy rather than by rules adopted to change conditions in the economy (Dabla-Norris et al., 2010). Similarly, a government with a deep preference for fiscal discipline is more likely to adopt the rules than those without this inclination. Equally possible is that countries with a good spell of fiscal performance are more likely to adopt fiscal rules to lock in the gains of fiscal consolidation. Hence, a positive correlation between fiscal rules and fiscal performance could reflect a reverse causality running from fiscal performance to fiscal rules. The second potential problem is omitted variable bias due to the exclusion of variables driving the relationship between fiscal rules and fiscal performance. Failure to account for these factors could overstate the effect of fiscal rules. Lastly, it is possible for the fiscal rule index to have measurement errors. All these issues, if not dealt with, could result in biased and inconsistent estimates. Addressing them requires the identification of a proper instrument that is correlated with fiscal rules but uncorrelated with the error term.

As a result, an instrumental variable approach in estimation of equation (4.12) is necessary. One of the candidates for this is the instrumental variable (IV) estimator proposed by Anderson & Hsiao (1982). The Anderson-Hsiao (AH) estimator addresses the Nickell bias through first difference transformation of (4.12). Thereafter, it uses the second and third lags of the dependent variable as instruments either in the form of differences or lagged levels. This helps to deal with the induced correlation between lagged dependent variable and the error term as a result of difference transformation. In addition to internal instruments, this estimator also allows for external instruments. This estimator provides consistent estimates as N and T or both tends to infinity. The other alternative estimator is the GMM estimator for dynamic panels (Arellano & Bover, 1995; Blundell & Bond, 1998). The GMM estimator is based on the same transformation as the AH estimator, with the only difference being that it uses more orthogonality conditions and

instruments. The GMM estimator also produces consistent estimates in dynamic panels. Furthermore, it generates robust results in the presence of omitted variable bias and simultaneity problem; also, GMM estimator uses lags of the regressors as instruments.

4.6.2 Difference in differences model

The next empirical strategy involves a comparison of fiscal performance between countries with and without fiscal rules. This exercise is undertaken using the difference in differences (DiD) technique. The approach compares the differences in fiscal outcomes in the period before and after the adoption of fiscal rules for countries with and without the fiscal rules. According to Villa (2016), the DiD approach splits the sample into two groups of i units, namely a treated group which receives the treatment ($Z_i = 1$) and a control group which does not receive the treatment or is not affected by the policy intervention ($Z_i = 0$). Letting the period before and after intervention be defined by an indicator variable $D = 0$ and $D = 1$, respectively and the outcome variable be represented by Y_{it} , the treatment effect is the difference in the average outcome for treated and control groups before and after the intervention. Further defining the period before and after intervention as $t = 0$ and $t = 1$ respectively, the DiD treatment effect can be expressed as:

$$\begin{aligned} \delta = \{ & E(Y_{it=1} | D_{it=1} = 1, Z_i = 1) - E(Y_{it=1} | D_{it=1} = 0, Z_i = 0) \} \\ & - \{ E(Y_{it=0} | D_{it=0} = 0, Z_i = 1) - E(Y_{it=0} | D_{it=0} = 0, Z_i = 0) \} \end{aligned} \quad (4.13)$$

Additional control covariates (X_i) can be added to the DiD framework (4.13) to help with identification strategy, however these should not be affected by the treatment.

$$\begin{aligned} \delta = \{ & E(Y_{it=1} | D_{it=1} = 1, Z_i = 1, X_i) - E(Y_{it=1} | D_{it=1} = 0, Z_i = 0, X_i) \} \\ & - \{ E(Y_{it=0} | D_{it=0} = 0, Z_i = 1, X_i) - E(Y_{it=0} | D_{it=0} = 0, Z_i = 0, X_i) \} \end{aligned} \quad (4.14)$$

Equation (4.14) is estimated using a linear regression model described as follows. A sample of 40 sub-Saharan African countries is selected and divided into treatment and control groups. The treatment group comprises 24 countries implementing fiscal rules while the control group comprises the remaining 16 countries that do not have fiscal rules (see Appendix A4.2 for selected countries). The period covered is 1980-2015, with the period for the implementation of the fiscal

rules commencing in 1997. These effects are then captured using two dummy variables. *TREAT* is a dummy variable that takes a value of 1 if the country implements fiscal rules and zero otherwise. Similarly, *PERIOD* is a dummy variable that takes a value of 1 for years 1997-2015 and zero otherwise (i.e. period 1980-1996). The treatment effect estimation model can then be specified as follows:

$$y_{it} = \beta_1 + \beta_2 PERIOD_i + \beta_3 TREAT_i + \delta (PERIOD_i \times TREAT_i) + \gamma' x_{it} + \varepsilon_{it} \quad 4.15$$

Where the outcome variable y_{it} is the primary balance as previously defined and the coefficient δ as defined in (4.14) is the DiD estimator for the treatment effect that captures the change in fiscal balance due to the implementation of fiscal rules. In addition, x_{it} is a vector of controls that are not affected by the treatment. The estimated coefficients in (4.15) have the following interpretation:

- $\hat{\beta}_1$ is the mean outcome of the control group before the introduction of fiscal rules
- $\hat{\beta}_1 + \hat{\beta}_2$ is the mean outcome of the control group after the introduction of fiscal rules
- $\hat{\beta}_3$ is the difference between the treated and control groups before the introduction of fiscal rules
- $\hat{\beta}_1 + \hat{\beta}_3$ is the mean outcome of the treated group before the introduction of fiscal rules
- $\hat{\beta}_1 + \hat{\beta}_2 + \hat{\beta}_3 + \delta$ is the mean outcome of the treated group after the introduction of fiscal rules
- δ is the DiD estimator

4.6.3 Data

The baseline regression and the DiD model uses annual secondary data covering different periods, owing to the distinct nature of empirical analysis in this chapter. For the baseline regression (4.12), the variable of interest is the fiscal rule index of strength whose construction is discussed in section 4.5.3. The dataset used for this index is drawn from the fiscal rule database of the IMF for period 1985-2015. This dataset is an updated version of the previous one covering 1985-2012. This latest database is more comprehensive covering additional countries and time periods between 1997 and 2015 in the sub-Saharan Africa region. Other databases used include the WEO, the WGI and the Database of Political Institutions. The variables extracted from these databases are described in

Appendix A4.1.

The second part of our empirical strategy involves using the treatment effects model to compare the fiscal performance between countries with and without fiscal rules. For this exercise, the sample comprises of two sets of countries, i.e. 24 countries with fiscal rules and 16 countries without the rules. This brings the total sample used in this study to 40³³ countries out of the 46 in sub-Saharan Africa (see Appendix A4.2 for the list of selected countries). Furthermore, the period of coverage is extended to include the period before and after the adoption of the rules. For this reason, the period before adoption runs between 1980 and 1996, while the period of adoption runs between 1997 and 2015. Hence, the full sample period is 1980-2015.

4.6.4 Definition and measurement of variables

Primary balance is the dependent variable and is expressed as a share of GDP. It measures the difference between total government revenue and expenditures excluding interest payments for outstanding debt. Interest payments are excluded because they relate to past debt (except for short-term debt) and, therefore, do not depict the current situation. Primary fiscal balance is used as an indicator of fiscal performance and is expected to react to economic, institutional and political variables in the fiscal policy reaction function (Bohn, 1998; Debrun et al., 2008).

Public debt is measured as general government gross debt as a share of GDP and is lagged one period. It consists of all liabilities that require payments or payments of interest and/or principal by the government to creditors at dates in the future. Public debt is expected to have a positive relationship with the fiscal balance signifying that the economy is meeting its solvency requirement and IBC (Bohn, 1998).

Output gap is lagged one period and measured as the difference between the actual output and potential output. It captures the effect of a cyclical fluctuation or business cycle on fiscal performance. Output gap is constructed using the Hodrick-Prescott (HP) filter. Thus, a positive output gap implies that GDP growth is above potential output and vice versa. According to the standard Keynesian economics, economies should run fiscal surplus during expansion and deficits

³³ Liberia even though is one of the countries that implements the fiscal rules is dropped from the sample due to several years of missing data

during contraction. However, stylized facts from developing economies show a tendency towards procyclical fiscal policy, in that there is increased spending pressure during economic expansion and cut backs during contraction (Alesina et al., 2008; Ilzetzki & Vegh, 2008). Thus, the output gap is expected to have a negative relationship with fiscal performance.

Fiscal rule index is the variable of interest in this study. It measures the overall index of the strength of fiscal rules. It is constructed as a composite index based on aggregation of the four types of rule namely, budget balance, debt rule, revenue rule and expenditure rule. (see section 4.5.3 and Appendix A4.5 for more details on how the index is developed). A priori expectation is that fiscal rules contribute to improved fiscal performance by instilling fiscal discipline (Badinger & Reuter, 2015; Debrun & Kumar, 2007a; Debrun et al., 2008).

Political stability index measures perceptions of the likelihood of political instability and politically motivated violence, including terrorism. It ranges between -2.5 to 2.5, with political stability increasing towards 2.5. The index is obtained from WGI database. Political stability matters for fiscal outcomes as it influences the degree by which the incumbent can use debt strategically to influence the policy choices of the successor (Alesina & Tabellini, 1990). As noted in the theoretical framework, the incentive to incur deficits and leave behind debt is larger the lower the chances of re-election. This index therefore captures the uncertainty of losing an election and is expected to have a positive influence on fiscal performance because more politically stable governments are likely to run low fiscal deficits. The empirical evidence on this index is however mixed. Some studies find that political stability improves the fiscal balance (Grilli et al., 1991; Hallerberg & von Hagen, 1999) while other studies find no evidence of its influence (Ricciuti, 2004).

Legislative election is a dummy variable which takes a value of 1, in a given country in a given year of general election and 0 otherwise. This variable captures political business cycles in the economy. It is common to find high budget deficits in the run-up to or during an election year. The legislative election dummy is expected to have a negative effect on fiscal outcomes as shown by Debrun et al. (2008).

District magnitude index measures the average size of parliamentary seats per electoral district or constituency. It explores the link between the electoral system and fiscal outcomes while also capturing the voter preferences in policymaking. An important dimension of electoral system is the electoral formula and district magnitude. The three main forms of electoral formulas are: the plurality system (where only one representative is elected in the electoral district and all seats go to the winner), the proportional representation system (where seats are distributed in proportion to the votes) and a mixed system which is a combination of both. The district magnitude is a more continuous representation of the electoral systems between the two polar cases of pure plurality system and proportional representation. The implication is that an electoral system with large district magnitude index, i.e. where the number of representatives elected per district is large (proportional representation), is associated with multi-party systems or minority governments. As a result, this system tends to have governments with shorter tenures than single party majority (associated with plurality). Hence, a high district magnitude index is expected to be associated with coalition or minority governments with unstable tenures, low probability of re-election and therefore high deficits (Stein et al., 1998). This conclusion has received empirical support from Debrun et al. (2008), while Badinger & Reuter (2015) and Nerlich & Reuter (2015) finds no evidence.

PERIOD is a dummy variable that takes a value of 1 for the period 1997-2015 and zero otherwise. The dummy captures the period before and after introduction of fiscal rules

TREAT is a dummy variable that takes a value of 1 if the country implements fiscal rules and zero otherwise.

4.7 Empirical Results

This section reports and discusses empirical results based on the fiscal rule model as well as the difference in differences regression.

4.7.1 Baseline regression model

The empirical results for the baseline model that explores the effect of fiscal rules on fiscal balance are presented in Table 4.1. The table reports three estimators, namely the two-stage instrumental variable (IV) regression (first column), the difference general method of moments (GMM) estimator (second column) and the fixed effects (FE) estimator (third column).

Table 4.1: Dynamic panel model-baseline specification

Estimator	IV (1)	GMM (2)	FE (3)
Lagged primary balance	0.561*** (0.0796)	0.439*** (0.0367)	0.414** (0.158)
Lagged public debt	0.0331** (0.0159)	0.0169*** (0.00488)	0.00494 (0.0177)
Lagged output-gap	-0.153*** (0.0433)	-0.101*** (0.00963)	-0.108** (0.0486)
Fiscal rule index	0.0889** (0.0378)	0.0156*** (0.00372)	0.0128** (0.00582)
Political stability	0.00984 (0.0121)	0.00461 (0.00338)	0.00131 (0.00831)
Legislative election	-0.0113 (0.0107)	-0.0103*** (0.00200)	-0.00817 (0.00499)
District magnitude	-0.00415 (0.00948)	-0.00375 (0.00235)	-0.00354 (0.00214)
Observations	339	329	353
sarganp	0.577		
estatp	0.00290		
hansenp		1.000	
ar1p		0.0237	
ar2p		0.0804	

Notes: The dependent variable is primary balance. Standard errors are in parentheses and asterisks denote the level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01.

The point estimate for the variable of interest that captures the effect of fiscal rules, as represented by the fiscal rule index of strength is positive and significant across the three estimators. The estimate based on IV regression shows a much larger effect of fiscal rule index at 0.09 compared to 0.02 and 0.01 for the GMM and FE estimators respectively. These results equally confirm that fiscal rules positively impact fiscal performance, in line with the political economy model

discussed earlier and previous empirical studies (Badinger & Reuter, 2015; Dabla-Norris et al., 2010; Debrun & Kumar, 2007a; Debrun et al., 2008). Due to endogeneity concerns on fiscal rules, external instruments are used in the IV regression. Performing the Durbin-Wu Hausman test for endogeneity shows that endogeneity of fiscal rules cannot be rejected (p -value of 0.00290 rejects the null hypothesis that fiscal rule is exogenous). Following Debrun et al., (2008), two institutional variables are chosen as instruments, namely fractionalization index and government effectiveness. The selected instruments are tested for meeting requirements for validity, i.e. the instrument should be correlated with fiscal rules but orthogonal to the errors. The Sargan test of overidentifying restrictions confirms that these instruments are indeed valid. With a p -value of 0.577, the null hypothesis that the instruments are valid cannot be rejected.

Table 4.1 also presents results for the control variables. Across all the three estimators, the results show a positive and significant coefficient for the lagged primary balance. The coefficient is highest under IV estimator at 0.56 and lowest under FE estimator at 0.41. This finding implies that the fiscal balance exhibits a significant degree of persistence. Public debt has a positive and significant effect on fiscal balance according to both IV and GMM estimators. This is consistent with the solvency requirement that a country should respond to rising debts by running a fiscal surplus (Bohn, 1998). The output gap has a negative and significant sign across all the three estimators, confirming most findings from empirical studies of the tendency of fiscal policy to be procyclical in developing countries (Alesina et al., 2008; Ilzetzki & Vegh, 2008). The coefficient on the legislative election dummy is negative and highly significant according to the GMM model. This is in line with a priori expectation of high budget deficits in the run-up to an election or during election year. This empirical regularity captures political business cycles in the economy and is consistent with empirical findings in Debrun et al. (2008). Despite the two remaining political variables (political stability and the district magnitude index) having correct signs, they are both insignificant.

4.7.2 Fiscal rule impact by type

Further analysis is done to identify the specific impact of the four types of rules. The findings are reported in Table 4.2, based on the IV regression. The coefficient on the budget balance, debt and revenue rule have a significant positive sign at a 5-percent level of significance. The coefficient

on expenditure rule is, however, not significant despite having right sign. Incidentally, the three sets of rules with a significant impact on fiscal balance are the most commonly adopted in the sub-Saharan Africa region.

Table 4.2: Effect of fiscal rules on fiscal performance- by type of rule

Type of rule	Budget Balance Rule (1)	Debt Rule (2)	Revenue Rule (3)	Expenditure Rule (4)	Overall Index (5)
Lagged primary balance	0.560*** (0.0725)	0.536*** (0.0817)	0.583*** (0.0834)	0.580*** (0.0986)	0.561*** (0.0796)
Lagged public debt	0.0347** (0.0152)	0.0369** (0.0171)	0.0255* (0.0149)	0.00110 (0.0206)	0.0331** (0.0159)
Lagged output-gap	-0.135*** (0.0363)	-0.137*** (0.0402)	-0.130*** (0.0393)	-0.212 (0.151)	-0.153*** (0.0433)
Political stability	0.0116 (0.0112)	0.00853 (0.0123)	0.0122 (0.0127)	-0.00509 (0.0166)	0.00984 (0.0121)
Legislative election	-0.00915 (0.00959)	-0.0104 (0.0109)	-0.00802 (0.0107)	-0.0150 (0.0184)	-0.0113 (0.0107)
District magnitude	-0.00177 (0.00867)	-0.00169 (0.00979)	-0.0121 (0.0105)	-0.00705 (0.0114)	-0.00415 (0.00948)
Budget balance rule index	0.0662** (0.0280)				
Debt rule index		0.0886** (0.0378)			
Revenue rule index			0.125** (0.0565)		
Expenditure rule index				0.0933 (0.111)	
Fiscal rule index					0.0889** (0.0378)
Observations	339	339	339	339	339
sarganp	0.230	0.895	0.442	0.0506	0.577
estatp	0.00780	0.00254	0.00248	0.209	0.00290

Notes: The dependent variable is primary balance. The model estimated using 2SLS and fiscal rules instrumented using government effectiveness and fractionalization index. Standard errors are in parentheses and asterisks denotes the level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01.

4.7.3 Fiscal rule impact by national versus supranational rules

Table 4.3 reports the effect of fiscal rules by national versus supranational levels. The results show a significant and positive effect for supranational rules. However, there is no effect derived from the national rules suggesting that most of the strength of fiscal rules comes from the supranational rules. This comes as no surprise considering that only few countries have national rules compared to supranational ones. As of late 2015, only 7 out of the total 25 countries with fiscal rules had national rules while the remaining 19 countries had supranational rules. Kenya had both national and supranational rules. This finding further reveal that supranational rules have better

enforcement mechanism compared to the national rules in the sub-Saharan Africa. This is because supranational rules are usually anchored on international treaties that are not easy to modify without broad consensus from the Member States. On the contrary, national rules are prone to manipulation, especially in an environment with weak institutions. Hence their efficacy depends on the commitment of policymakers and the strength of institutions monitoring their implementation. If there are vulnerabilities in these institutions, then it is possible for the executive to defy the rules without any repercussions. On the other hand, there seems to be more commitment with supranational rules due to independent surveillance and enforcement mechanism that require countries to meet their obligations as set out in a treaty which establishes the rules within the regional economic bloc.

Table 4.3: Effect of fiscal rules on fiscal performance - national vs supranational rules

Fiscal Rule	Full sample (1)	National rules (2)	Supranational rules (3)
Lagged primary balance	0.561*** (0.0796)	0.588*** (0.0916)	0.558*** (0.0839)
Lagged public debt	0.0331** (0.0159)	0.0930*** (0.0344)	0.0329** (0.0165)
Lagged output-gap	-0.153*** (0.0433)	0.0273 (0.0576)	-0.109*** (0.0374)
Fiscal rule index strength	0.0889** (0.0378)	-0.00305 (0.0180)	0.0802** (0.0321)
Political stability	0.00984 (0.0121)	0.00786 (0.0161)	0.0102 (0.0123)
Legislative election	-0.0113 (0.0107)	-0.00981 (0.00847)	-0.00462 (0.0113)
District magnitude	-0.00415 (0.00948)	-0.153 (0.126)	-0.00266 (0.00915)
Observations	339	89	266
sarganp	0.577	0.554	0.229
estatp	0.00290	0.990	0.00453

Notes: The dependent variable is primary balance. The model estimated using 2SLS and fiscal rules instrumented using government effectiveness and fractionalization index. Standard errors are in parentheses and asterisks denote the level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01.

4.7.4 Robustness check

This exercise tests whether the choice of method of constructing the fiscal rule index may alter our general finding from the previous section that fiscal rules improve fiscal performance. The possibility that the method used may not have correctly captured the strength of the fiscal rule cannot be ignored. To examine such a possibility, the baseline regression is repeated but, this time

using a fiscal rule index constructed using an alternative method based on the principal component analysis (PCA)³⁴. Table 4.4 presents the results that show close similarity to earlier findings. The fiscal rules index based on the PCA method is still positive and significant according to all the three estimators. The other covariates also continue to maintain the same sign and level of significance. This implies that the earlier findings are robust to alternative methods of fiscal rule index construction.

Table 4.4: Effect of fiscal rules (PCA based index) on fiscal performance

Estimator	IV (1)	GMM (2)	FE (3)
Lagged primary balance	0.563*** (0.0804)	0.438*** (0.0375)	0.414** (0.158)
Lagged public debt	0.0324** (0.0159)	0.0166*** (0.00507)	0.00496 (0.0177)
Lagged output-gap	-0.157*** (0.0446)	-0.100*** (0.0104)	-0.107** (0.0485)
Fiscal rule index (PCA)	0.0546** (0.0234)	0.00918*** (0.00234)	0.00734** (0.00347)
Political stability	0.00966 (0.0121)	0.00465 (0.00339)	0.00132 (0.00832)
Legislative election	-0.0116 (0.0109)	-0.0101*** (0.00187)	-0.00816 (0.00500)
District magnitude	-0.00453 (0.00957)	-0.00382 (0.00238)	-0.00358 (0.00215)
Observations	339	329	353
sarganp	0.596		
estatp	0.00275		
hansenp		1.000	
ar1p		0.0239	
ar2p		0.0808	

Notes: The dependent variable is primary balance. Robust standard errors are in parentheses and asterisks denotes the level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01. Year dummies although controlled for in the regression(s), are not reported.

4.7.5 Is there any difference in fiscal performance between countries with and without fiscal rules?

This question is addressed using DiD model specified in equation (4.15). The empirical findings for this regression are presented in Table 4.5 showing the mean value of the primary balance for both the control and treated groups before and after the introduction of fiscal rules in the sub-Saharan Africa region. The model in the first column includes controls while the second column

³⁴ This is a statistical method of index construction whose underlying idea is to account for the highest possible variation in the original data (indicator set) using the smallest possible number of factors usually referred to as principal components. The factors selected are those with eigenvalues greater than one.

does not include them. The results indicate a significant difference in the mean estimates between the countries that implement the rules and those that do not. Turning to the first column, the results shows that the mean value of the primary balance is 26 percent lower for the treated group compared to the control group prior to adopting the rules. However, the mean value improves significantly after the introduction of fiscal rules. The gap narrows to 0.9 percent, representing a 25-percentage point improvement in primary balance for the treated group relative to the control group. This is shown by a positive and highly significant DiD estimate for the treatment effect at 0.25, signifying a 25 percent improvement.

Table 4.5: Difference in differences estimation results

Outcome Variable: Primary balance	(1)	(2)
Diff-in-diff	0.252*** (0.0955)	0.207*** (0.0714)
Covariates	Yes	No
Observations	723	973
Before treatment		
Mean control (C)	0.0283	-0.0157
Mean treated (T)	-0.232	-0.211
Diff (T-C)	-0.261	-0.195
After treatment		
Mean control (C)	0.048	-0.0156
Mean treated (T)	0.0389	-0.00404
Diff (T-C)	-0.00917	0.0116

Notes: The outcome variable is primary balance. The covariates include public debt, output gap, legislative election and district magnitude. Robust standard errors are in parentheses and asterisks denote the level of significance at standard conventional levels. * p < 0.1, ** p < 0.05, *** p < 0.01.

These results continue to hold even when the control variables are omitted from the model albeit with a reduced magnitude of 0.21 which is still highly significant. Generally, these findings are suggestive of the fact that fiscal rules could be driving the difference in fiscal performance between the countries that have adopted fiscal rules and those that have not adopted them. Therefore, adoption of fiscal rules could be a panacea for persistent fiscal deficits in the region.

Whereas the empirical results suggest that sub-Saharan African countries are beginning to reap the benefits of embracing the rules, more effort still needs to be put in place to make them even more effective. Most countries in the region with rules still face institutional weaknesses and design

challenges. As shown by the non-significance of national rules and pointed out in the background to this chapter, there are several design gaps that need to be addressed. For instance, the sanction mechanism is not well defined and where one exists is not punitive enough to deter fiscal indiscipline. As a result, those charged with implementing the rules do not have an incentive to enforce them. To be effective, the opportunity cost of defiance should be as high as possible to encourage compliance. The scope of the coverage of rules in the region is also narrow, with most rules concentrated within the central government. Only Mauritius has a broad coverage of up to the general government level. Best practices have shown that rules with broader coverage of up to the sub-national level or even the entire public sector are more effective given that these layers of government also act as quasi-fiscal entities.

Most rules also lack a strong legal foundation. For instance, none of countries in the region have their rules backed up by the constitution. Whereas this is not a strict prerequisite for adopting the rules in the first place, the consensus is that a strong legal anchor insulates the rules from political pressure. Only countries with supranational rules can be said to have relatively firm legal status as these are substantiated by international treaties that cannot be modified without consensus from the Member States. Most national rules are anchored in statutory law which is relatively lower in hierarchy compared to international treaties. The countries whose rules are backed up by statutory laws include Tanzania, Mauritius, Cape Verde and Botswana. The rest, however, have weaker legal framework as their rules are either backed up by coalition agreements or political commitments.

In terms of supporting institutions, few countries have an independent body to set budget assumption or fiscal responsibility laws. Rather, the executive sets most of the assumptions and implements them at the same time. This could open windows for manipulation as there are minimal checks and balances. The critical watchdog role played by independent fiscal institutions cannot be overemphasized. It is of concern that so far only Kenya³⁵ and South Africa³⁶ have fiscal councils that can play the role of an independent fiscal watchdogs. However, most of these institutions exist in developed countries like for instance, the Congressional Budget Office in the US.

³⁵ The Parliamentary Budget Office act as a fiscal institution in Kenya

³⁶ South Africa has procedural fiscal rules rather than numerical fiscal rules.

4.8 Conclusion

This chapter sought to examine the overall impact of fiscal rules on fiscal performance in the sub-Saharan Africa region. In addition, it sought to assess if there are any significant differences in fiscal performance between countries with and without the fiscal rules. Fiscal balance was used as a measure of fiscal performance while a composite fiscal rule index of strength was constructed and used to capture the effect of fiscal rules. The index was constructed using the updated IMF Fiscal Rules dataset. In the baseline regression, a fiscal policy reaction function was estimated to examine the effect of fiscal rules on fiscal performance. The regression results closely mirror most empirical findings in previous studies, showing that fiscal rules improve fiscal performance. The budget balance, debt and revenue rules were especially found to have a positive impact on fiscal performance. Further analysis was done based on national versus supranational rules. Only rules at the supranational level were found to have significant positive effect on fiscal balance while there was no evidence for effectiveness of rules at the national level. These results suggest that supranational rules are more effective than national rules perhaps due to design weaknesses and weak enforcement mechanisms at the country level. The next empirical strategy involved a comparison of fiscal performance between countries that have fiscal rules and those that have none. A difference in differences model was estimated, and the results show better fiscal performance for countries with fiscal rules compared to those without fiscal rules. The main conclusion from this chapter is that fiscal rules have been effective in instilling fiscal discipline in the sub-Saharan Africa region. As such, fiscal rules should be considered as a viable policy option for addressing perennial fiscal deficit challenges as well as persistent current account deficit given that fiscal deficit also drives the current account in the region.

Appendix C

Appendix A4.1: Description of variables

Variable Name	Description	Source
Primary fiscal balance (% of GDP)	The primary fiscal balance is constructed as the difference between general government revenue and expenditure excluding interest payments on outstanding debt expressed as a percentage of GDP.	WEO
Public debt (% of GDP)	Public debt is general government debt as a share of GDP	WEO
Output Gap	Measured as the difference between the annual actual output in the economy and potential output. The potential output estimated using the Hodrick-Prescott (HP) filter.	Own computation
Fiscal rule index	A composite index measuring the strength of fiscal rules. This index comprises of the four rule types: budget balance, debt rule, revenue rule and expenditure rule.	Own computation
Political stability index	Measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. The indicator ranges between -2.5 to 2.5, with political stability increasing towards 2.5.	WGI
Legislative election	A dummy variable which takes the value of 1, in a given country in a given year of general election and 0 if otherwise	DPI
District magnitude index	Measures the average size of parliamentary seats per electoral district or constituency.	DPI

Notes: WEO is April 2018 World Economic Outlook database; WGI is Worldwide Governance Indicators, DPI is Database of Political institutions

Appendix A4.2: List of selected sub-Saharan Africa countries

Countries with Fiscal rules	Countries without fiscal rules
Benin	Angola
Botswana	Comoros
Burkina Faso	Democratic Republic of the Congo
Burundi	Eritrea
Cabo Verde	Ethiopia
Cameroon	Gambia
Central African Republic	Ghana
Chad	Guinea
Cote d'Ivoire	Lesotho
Equatorial Guinea	Madagascar
Gabon	Malawi
Guinea Bissau	Mozambique
Kenya	Sierra Leone
Mali	South Africa
Mauritius	Swaziland
Namibia	Zambia
Niger	
Nigeria	
Republic of Congo	
Rwanda	
Senegal	
Tanzania	
Togo	
Uganda	

Appendix A4.3: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Primary balance	440	-0.004	0.066	-0.410	0.406
Public debt	454	0.606	0.552	0.005	4.349
Output-gap	456	-0.022	0.141	-0.542	0.879
Fiscal rule index	456	0.518	0.994	-0.784	2.363
Political stability	384	-0.471	0.926	-2.699	1.219
Legislative election	456	0.197	0.398	0.000	1.000
District magnitude	422	1.043	1.105	-0.329	3.970

Appendix A4.4: Pairwise Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Primary balance	1.000						
(2) Public debt	-0.037	1.000					
(3) Output-gap	0.458*	-0.143*	1.000				
(4) Fiscal rule index	-0.051	-0.189*	0.043	1.000			
(5) Political stability	-0.054	-0.203*	0.049	0.176*	1.000		
(6) Legislative election	0.004	-0.026	-0.017	0.028	-0.003	1.000	
(7) District magnitude	0.017	0.096*	-0.075	-0.010	0.159*	-0.014	1.000

* shows significance at the .05 level

Appendix A4.5: Criteria and scores for construction of fiscal rule index of strength

Type of Rules:

BBR= Budget balance rule, DR= Debt rule, ER=Expenditure rule, RR= Revenue rule

Criterion 1: Legal basis of the rule

4: Constitutional, 3: International treaty, 2: Statutory law, 1: Either coalition agreement or political commitment

Criterion 2: Coverage

2: General government or wider

1: Central government. The score is adjusted upward to account for similar rules applying to different levels

Criterion 3: Enforcement- Are there enforcement mechanisms in place?

The score of this criterion is constructed as a simple average of the two sub-elements below

Formal enforcement procedure; (Yes: 1, No: 0)

Monitoring of compliance outside the government; (Yes: 1, No: 0)

Criterion 4: Well-specified escape clause

Are there well-specified escape clause; (Yes: 1, No: 0)

Criterion 5: Supporting procedures/ institutions

The score of this criterion is constructed as a simple average of the three sub-elements below

Multi-year expenditure ceiling in place; (Yes: 1, No: 0)

Independent body sets budget assumptions; (Yes: 1, No: 0)

Fiscal responsibility laws present; (Yes: 1, No: 0)

Criterion 6: Fiscal balances defined in cyclically adjusted terms

Yes: 1, No:0

Criterion 7: Rules excludes public investment or other priority items from ceiling

Yes: 1, No: 0

Chapter 5

General Conclusion and Policy Implications

5.1 Summary of Findings

This thesis contributes to the literature on current account dynamics and fiscal rules in the sub-Saharan Africa region. The choice of the region is motivated by the fact that it has been characterized by large and persistent current account and fiscal deficits over the past two decades. In addition, the region has also experienced a renewed upsurge in levels of public debt. The coexistence of growing public debt with large and persistent current account and fiscal deficit poses significant downside risks to macroeconomic stability and limits the policy options available to policymakers in case of adverse shock. Adoption of fiscal rules is therefore seen as one way of mitigating these risks. This is because fiscal rules can rein in discretionary fiscal policies that breed government failures and incentive structures that encourage deficit bias. Through their positive impact on fiscal outcomes, fiscal rules can also indirectly impact the current account considering the direct linkage between current account and fiscal balance. This thesis interrogates the foregoing issues within a broad context of three interrelated empirical chapters. The study adopts a regionwide approach, covering a group of countries in the larger sub-Saharan Africa region, a novel approach as most studies on this subject are concentrated in developed countries; of the few studies in this region, most are country specific. In addition, this is the first study in sub-Saharan Africa to explore the link between current account and fiscal deficit on the one hand and public debt on the other. Furthermore, this study performs a comprehensive assessment of the effectiveness of fiscal rules in this region.

Chapter two examines the sustainability of current account balances in the sub-Saharan Africa region. In addition, it evaluates the strength of sustainability of these balances and the pattern of their adjustment. The test for sustainability involves checking the violation of the intertemporal budget constraint (IBC). This is the common approach in the literature and it involves checking whether past current account series follow a stationary process or if there is cointegration between the components of the current account (Taylor, 2002; Trehan & Walsh, 1991). This evidence

provides a basis for the conclusion that the current account balance is consistent with solvency and is therefore sustainable. This chapter adopts the cointegration approach as it enables us to study the dynamics of current account adjustment as well as the strength of sustainability. A test for cointegrating relationship between exports and imports is carried out within a panel error correction framework on a sample of 35 sub-Saharan African countries for the period 1980-2017. The results reveal that a significant number of countries (16 out of 35) face unsustainable balances; for those with sustainable balances, their balances are only weakly sustainable. These findings are consistent with observed trends in the region over the last two decades, over which countries have been facing large and persistent current account deficits. The results further reveal a slow pattern of adjustment back to equilibrium as it takes on average six years for a complete adjustment back to long-run equilibrium in case of a short-run disturbance. This situation is likely to result in a prolonged spell of current account deficits and a build-up of external debt, since emerging deficits are not cleared quickly. Such a situation, if not addressed, could crowd out private consumption and investment, which could have a negative impact on GDP growth. It could also impair the ability of these countries to service their debt, thereby also increasing the probability of debt distress. Furthermore, the rising levels of external debt raises the vulnerability of these countries to exogenous shocks. These findings motivated our next chapter, which sought to find out whether the activities of the public sector could have contributed to this current account situation based on the dominant role played by the public sector in the region's economic activities.

Chapter three, therefore, examines the effect of fiscal deficit on current account deficit and how this relationship is affected by different levels of public debt. A linear dynamic panel data model is estimated to address the first part of the objective; for the second part, a dynamic panel threshold model is estimated. A sample of 33 sub-Saharan African countries is selected for the period 2000-2016. The empirical results for the linear model show that fiscal deficit worsens the current account and therefore the twin deficit hypothesis holds. However, the introduction of nonlinearities in the model shows a switch in behaviour. The non-linear effects are captured using different levels of indebtedness in the sample. The threshold level of debt is estimated endogenously at 54 percent, thus splitting the sample into either low or high debt regimes depending on whether observations fall below or above this threshold. The estimated threshold level does not depart much from the rule of thumb level of 55 percent recommended by the IMF. Besides, the approach used in this

study comes with the additional advantage that the threshold level is not arbitrary and therefore the data is allowed to 'speak' for itself. The results from the dynamic panel threshold regression shows that at a lower debt regime, fiscal deficit continues to worsen the current account while at a higher debt regime, the pattern changes. At higher levels of debt, fiscal deficit has no significant effect on current account as it loses significance. Intuitively, this shows that at a low debt regime, the twin deficit hypothesis holds while at a high debt regime the Ricardian hypothesis prevails. This implicitly points to the unreliability of fiscal policy when the level of public debt becomes large. Theoretically, according to Sutherland (1997), the impact of fiscal expansion on private consumption depends on debt levels. At moderate levels, fiscal policy has Keynesian effects because the current generation of consumers discounts future taxes with the knowledge that they may not be alive in future when taxes are raised. However, when debt rises to extreme levels, the current generation of consumers knows that there is a high probability that they will be alive to pay the extra taxes. In such an environment, households are likely to save more to offset future tax increase. The rise in private savings, in this case, reduces consumption, leading to improvements in the current account. Hence, when debt grows out of bounds, fiscal deficit could be contractionary. These findings receive support in empirical studies and further explain the reason for mixed results on the effect of fiscal deficit on current account deficit. A possible explanation is that different debt regimes are not accounted for in these models.

Chapter four examines the overall impact of fiscal rules on fiscal performance in the sub-Saharan Africa region. In addition, this chapter carries out an assessment as to whether there are differences in fiscal performance between countries with and without the fiscal rules. Having noted in the previous chapter that fiscal deficit plays a role in worsening external balances, this chapter attempts to test whether the fiscal rules measures so far adopted by countries have had any significant impacts on fiscal performance. In this case, fiscal balance is used as a measure of fiscal performance while a time varying composite fiscal rule index of strength is used to capture the effects of the fiscal rules. The fiscal rule index is constructed based on the updated IMF Fiscal Rules Dataset. In the baseline regression, a fiscal policy reaction function is estimated on a sample of 24 countries that implement the rules for the period 1997-2015. The regression results closely mirror empirical findings in the previous studies showing that fiscal rules improve fiscal performance. The budget balance, debt and revenue rules are found to have positive and significant

effects on fiscal performance. The regression is also performed based on national and supranational rules. Only rules at the supranational level are found to have significant effect. The fact that national rules do not have significant impact on fiscal performance could be attributed to weak enforcement at the country level compared to supranational level. As such their efficacy depends on the commitment of policymakers and the strength of institutions monitoring their implementation. On the contrary, the fact that supranational rules are usually anchored in international treaties makes them difficult to modify without broad consensus from the Member States. The second part of empirical strategy in this chapter compares the fiscal performance between countries that have fiscal rules and those that have none. The sample is expanded to include 16 additional countries that do not implement the rules and uses this set of countries as the control group in this experiment. The sample period is also expanded to cover 1980-2015. A difference in differences model is estimated, and the results show that there is a significant improvement in the fiscal balance for countries with fiscal rules (treated group) compared to those without fiscal rules (control group). The main conclusion from this exercise is that fiscal rules have been effective in instilling fiscal discipline in the sub-Saharan region.

5.2 Policy Implications

Several policy implications can be drawn from this thesis. Chapter two concludes that current account balances are generally weakly sustainable in the sub-Saharan Africa region with some countries running unsustainable balances. Furthermore, countries in this region experience a gradual adjustment of current account imbalances back to equilibrium in the event of a disequilibrium. It implies that these economies could be facing a bigger structural problem than just short-term disequilibrium. Therefore, rather than relying solely on short term macroeconomic policies to address these problems, there is a need for structural reforms such as productivity improvement and trade reform such as the diversification of exports.

In chapter three, the general conclusion is that the relationship between fiscal balance and current account depends on the level of indebtedness in the economy. This is because current account response to fiscal balance differs depending on debt levels. At moderate levels of debt, fiscal deficit worsens the current account while, current account does not respond to fiscal deficit when debt level exceeds some threshold. This conclusion shows that fiscal policy can be an effective tool in

containing current account deficit when the level of public debt is moderate, but its effectiveness becomes uncertain when the debt level grows out of bounds. Although, the extent in this context is relative, as countries have different tolerance levels for debt depending on macroeconomic fundamentals, what is certain is that when debt exceeds some thresholds, it triggers unfavourable effects on the economy. There is, therefore, a need for due diligence in the use of fiscal policy as a policy option when public debt reaches excessive levels. In addition, there is also need for fiscal adjustment and consolidation sooner rather than later as the level of debt gets out of hand due to limited alternatives for policy makers to stabilize the economy.

In the fourth chapter, the findings show that fiscal rules have a significant impact on fiscal performance and can therefore be an effective tool for dealing with deficit bias prevalent in the sub-Saharan Africa region. Hence, there is merit in adopting the fiscal rules. Furthermore, the results also reveal that supranational rules are more effective compared to the national counterparts. This could be attributed to institutional weaknesses and design gaps common with national rules. More substantial attention is required to address these design gaps and strengthen the institutional mechanisms anchoring the national fiscal rules.

5.3 Limitations of the Study and Areas for Further Research

There are some limitations emerging from the empirical chapters in this thesis. In chapter two, the intertemporal budget constraint (IBC) is used as the criteria for sustainability assessment. According to the IBC approach, a country is deemed to be running sustainable balances even if it is presently experiencing persistent deficits; so long as it can generate sufficient surpluses at least once in future even if it means a distant future. This criterion imposes a rather weak condition and so relying on it alone may not fully capture the comprehensive extent of sustainability. As an extension, this study recommends that further studies should consider more robust criteria such as comparing the observed paths of current account with the equilibrium benchmark that is based on optimal decisions of economic agents and macroeconomic fundamentals. In this case, any misalignment would give a better indication as to whether the observed current account trajectory is in line with the optimal sustainable path or not.

While fiscal rules are meant to stem the discretionary component of fiscal policy, primary fiscal balance is used as a measure of fiscal policy in chapter four. This measure includes both discretionary and non-discretionary components such as cyclical fluctuations. Thus, using primary balance as a measure of the discretionary component of fiscal policy may be misleading. As an extension, this study recommends that future research should use a cyclically adjusted fiscal balance instead. Again, this thesis defines fiscal performance in a narrower sense to mean fiscal balance. In addition to fiscal balance, the definition of fiscal performance can also broadly encompass government spending and public debt. Future research should therefore consider a broader measure of fiscal performance that encompasses government expenditure and public debt as these aggregates also capture fiscal performance.

Finally, the general inference drawn from the empirical chapters in this thesis is that there is a potential, but unexplored relationship between current account and fiscal rules because fiscal balance is so closely linked to both current account balance and fiscal rules. This study therefore recommends that future research should consider a formal study examining the effect of fiscal rules on current account.

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