Escalating Public Debt Levels and Fiscal Responses in Sub-Saharan African Countries

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Abstract

The pace of public debt accumulation in Sub-Saharan African (SSA) countries since 2010 presents worrisome debt sustainability concerns, with potential to undermine fiscal sustainability achieved over the last decade. The International Monetary Fund (IMF) and the World Bank have since called for fiscal consolidation in most SSA countries to ensure debt sustainability. Accordingly, this study seeks to assess how governments of SSA countries respond to the escalating public debt levels. The methodology applied entails estimating panel fiscal reaction functions using General Methods of Moments (GMM) technique for SSA countries for the period 2000 to 2016. These are complemented by single country regressions for selected countries. The results suggest that SSA countries have reacted to increases in public debt to GDP ratio by fiscal consolidation to maintain debt sustainability, though the reaction is lower than in most emerging and developed countries. This may reflect the difficulty to cut down on current public capital expenditures by most SSA countries. Moreover, the analysis finds that most SSA countries have been following pro-cyclical policies as depicted by an insignificant negative coefficient of the output gap. The policy implication from the analysis is the need for SSA to further strengthen fiscal consolidation to limit potential risk of debt distress.

Key Words: Public Debt, Fiscal Reaction, Primary Balance, Panel Regression

JEL Classification:

1. Introduction

The pace of public debt accumulation in most SSA countries following the Highly-Indebted Poor Country (HIPC) and Multilateral Debt Relief Initiatives (MDRI), presents debt sustainability concerns. Total public debt in Sub-Saharan Africa (SSA) increased from 26.5% of GDP in 2009 to 42.5% in 2016 (IMF, 2017a). The fiscal space brought by debt relief initiatives, coupled with improved global liquidity and robust growth rates, have resulted in these countries engaging in borrowing to finance infrastructure and development expenditures (IMF, 2015). The improved macroeconomic performance, supported by favourable international commodity prices, contributed to higher creditworthiness. At the same time, new borrowing opportunities emerged as a result of the accommodative liquidity conditions in international capital markets, the deepening of domestic financial markets for some SSA countries, and the growing lending activities of non-Paris Club countries (IMF, 2015).

The rapid increase in public debt has heightened debt sustainability challenges, with potential of throwing countries into the risk of committing costly mistakes of accumulating public debt to unstainable levels (IMF, 2009). The challenge has been exacerbated by the change in debt management landscape, which is now tilted towards non-concessional borrowing from non-Paris club creditors as opposed to concessional loans from international financial institutions and bilateral Paris Club creditors that countries have traditionally relied on. The challenge has also been worsened by recent developments on the financing landscape, where an increasing number of countries in SSA are accessing international capital markets. Deteriorating macro-financial factors such as falling economic growth rates, depreciating domestic currencies and increase in interest rates have also exacerbated the debt dynamics.

As a result, most country debt levels in SSA have surpassed or are likely, in the event of macroeconomic shocks, to exceed debt risk threshold levels as determined by the IMF and World Bank's Debt Sustainability Framework (DSF). The DSF for low income countries, which constitute most Sub-Saharan African countries, assesses the vulnerability to debt distress based on a Country Policy and Institutional Assessment (CPIA) rating developed by the World Bank. The respective public debt to GDP thresholds are 38% for countries rated as weak performers in terms of CPIA rating; 56% for medium CPIA rating; and 74% for strong CPIA rating. Debt distress assessment for SSA countries carried out by the IMF in 2016 showed that 32 countries were at moderate and or high risk of debt distress, while 4 were rated to be in debt

distress. The debt distress challenges witnessed among SSA countries has prompted the IMF and the World Bank to encourage those at high risk of debt distress to take appropriate actions to reduce fiscal deficits and public debt (IMF, 2017a and World Bank, 2017). The fiscal actions taken by governments to stabilise or reduce the public debt burden are commonly known as fiscal consolidation measures (Ostry et al., 2010) and are assessed using fiscal reaction functions. The fiscal reaction function is akin to an inbuilt mechanism used by governments to ensure that debt is stabilised. It is the adjustment in primary fiscal balance to manage and stabilise debt over time.

Empirically, panel fiscal reaction functions have been estimated in Europe and selected countries in both developed and developing economies. For instance, Checherita-Westphal and Ždarek (2015) used dynamic panel techniques of fiscal reaction function framework to euro area countries for the period 1970 to 2013. Adedeji and Williams (2007) undertook fiscal reaction functions empirical work for CFA Zone. Cizkowicz et al. (2015) assessed fiscal sustainability for 12 Euro countries for the period 1970-2013 using a panel framework. Fincke and Greiner (2009) studied the responsiveness of fiscal policy to increases in debt in selected countries in Africa and Latin America. The SSA countries studied included Botswana, Mauritius and Rwanda.

Against this backdrop, this paper seeks to assess the degree of fiscal consolidation by Sub-Saharan African countries to contain increases in public debt by estimating fiscal response functions for SSA. A deeper understanding of public debt dynamics and how governments respond to restore fiscal sustainability is critical for assessing risks to sovereign debt. The analysis is built on Bohn (1998), who investigated changes in fiscal policies and deficits following increases in public debt in the United States. The paper also makes reference to D'Erasmo, Mendoza and Zhang (2015), which is a more recent update of Bohn's findings, and Mendoza and Ostry (2008), which extended this analysis to a broad group of industrialised and emerging economies. The paper, however, extends the empirical analysis by applying both panel and selected countries fiscal reaction functions to gauge whether or not SSA countries responded appropriately to risk of debt distress signals. The selected countries are those with high risks of debt distress.

The rest of the paper is organised as follows: Section 2 provides stylised facts on fiscal responses to public debt, while Section 3 assesses both theoretical and empirical literature on fiscal responses. Section 4 highlights the methodology applied in the study and data sources and treatment. Section 5 describes and analyses the estimation results. Finally, Section 6 provides the conclusion and policy recommendations.

2. Public debt dynamics and fiscal responses

This section provides an assessment of drivers of public debt accumulation in SSA and preliminary evidence of the relationship between fiscal primary balance and public debt for the period 2000 to 2016. The study considers data for the entire period and for sub-periods. The sub-periods considered in the analysis are 2000 to 2008, which is a pre-global crisis period, and 2010 to 2016, a post-global crisis period. In most instances, the study used government data. The fiscal aggregates used in the study are unweighted averages for the region.

Risk of debt distress ratings

The recent increase in debt across SSA has resulted in many countries moving from low debt risk ratings to moderate and high debt risk ratings since 2013. The countries in moderate and high debt risk ratings and requiring significant fiscal consolidation as per IMF and World Bank recommendations include most Central African Economic and Monetary Community countries, oil exporters and commodity exporters, and other non-resource intensive countries such as Kenya, Malawi, Mozambique, Sao Tome and Principe and Cote d'Ivoire (IMF, 2017a).

Figure 1 shows the debt risk ratings for 45 countries for 2016 for which data is available.

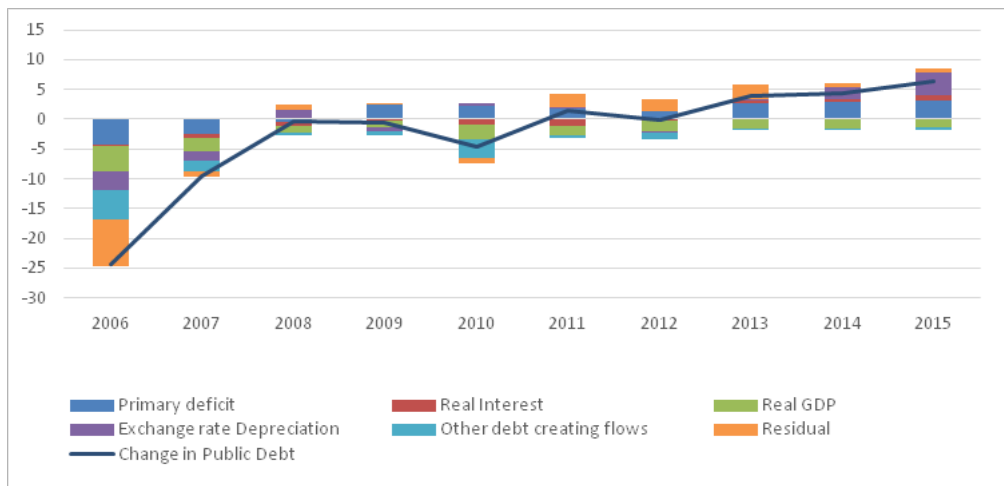Figure 1: Sub-Saharan African countries: Debt risk ratings for 2016
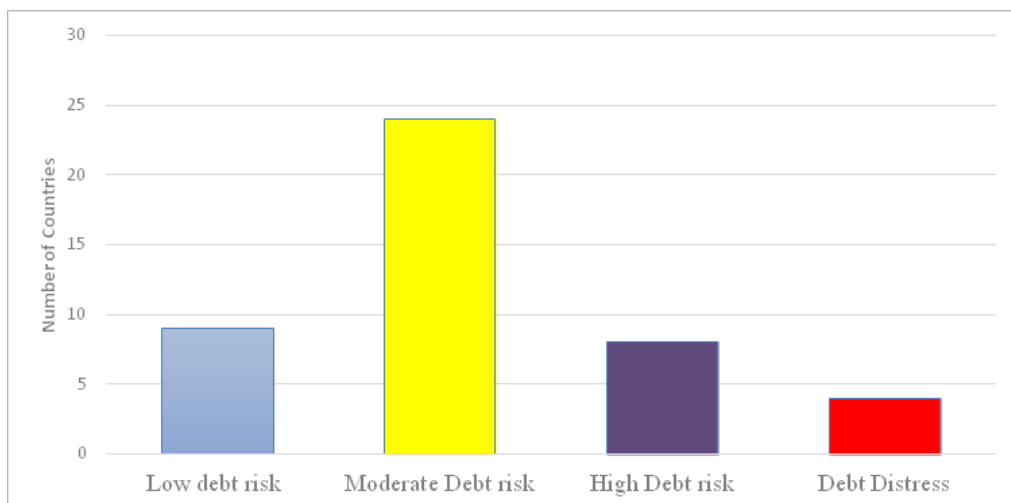
Source: Authors' analysis based on IMF and World Bank DSA reports, 2017

The IMF and World Bank Debt Sustainability Analysis (DSA) has shown that most countries with moderate and high debt risk ratings need to reduce fiscal deficits to guarantee debt sustainability.

Drivers of public debt accumulation in SSA

The SSA countries benefitted immensely from the HIPC debt relief initiative, which reduced debt burdens in the 2000s. Since the global financial crisis in 2008 and 2009, the debt dynamics have, however, changed as fewer countries have benefited from HIPC post-2007. As a result, debt dynamics in SSA have broadly reflected the impact of new borrowing shown by fiscal primary deficits and the developments in economic growth. Primary fiscal balances in SSA have been generally negative since 2009. Figure 2 shows developments of drivers of public debt dynamics in SSA, collated from individual country DSAs carried out by IMF and World Bank from 2006 to 2015.

Figure 2: Drivers of public debt dynamics in Sub-Saharan Africa[3]

Source: Authors' analysis based on IMF and World Bank DSA reports, 2017

Figure 2 confirms that debt accumulation in Sub-Saharan African countries is mainly driven by fiscal stance and the unexplained part or stock flow adjustment. The huge stock flow adjustment, particularly in 2006, reflects the debt relief initiatives and recognition of contingent liabilities that materialised into debt obligations but initially unbudgeted for as such. Automatic debt dynamics, notably changes in growth, exchange rates, price level and interest rates also play a crucial role in explaining debt dynamics. In particular, the sustained high growth rates experienced by most Sub-Saharan African countries in excess of 4% explain in large part the sustainable public debt positions in most economies. This supports the hypothesis that debt is helpful as long as it is being applied to fund productive activities.

Interest rates have generally been low and impacting marginally on debt dynamics. The significant positive economic growth rates in SSA have partially off-set the debt-creating impact of primary deficits. The slowdown in economic growth since 2014 may imply that fiscal deficits should be reduced to ensure fiscal sustainability.

Primary balance and government debt

Overall government debt in SSA declined from 65% of GDP in 2000 to 24% in 2008. The decline in debt to GDP ratio showed mainly the impact of debt relief initiatives. A total of 30 countries in SSA were given debt relief during this period. The decline in debt also reflected the impact of increase in GDP because of buoyant commodity prices and general improvement in macroeconomic management. The SSA GDP growth averaged 6% between 2000 and 2008, up from 2.1% during the period 1991 to 1999. In addition, the decline in overall debt was supported by improvement in primary fiscal balance, with fiscal surplus averaging 2.6% over the period 2000 to 2008. Figure 3 shows the relationship between gross public debt and primary deficit.

Figure 3: Gross government debt and primary balance as a percent of GDP
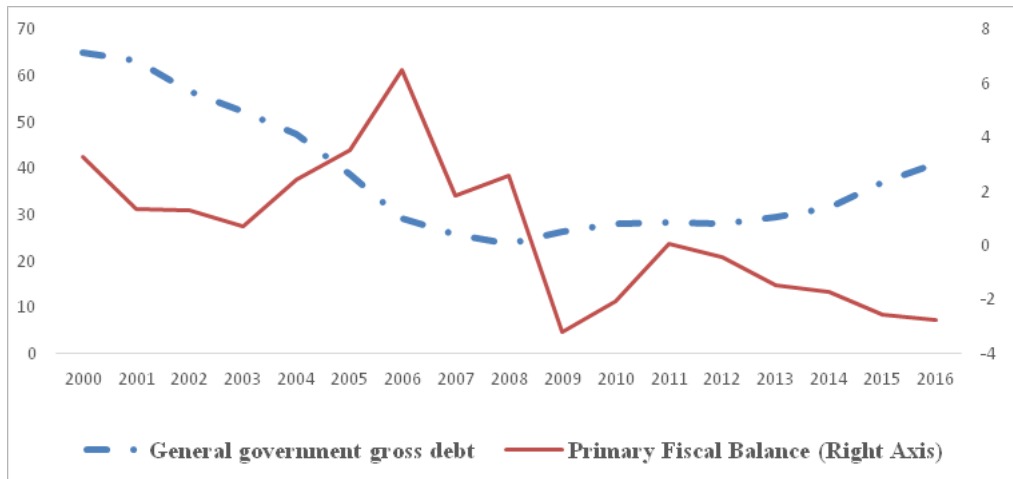
Source: IMF (2017b), World Economic Outlook database

Government debt has, however, been on a growing trend, rising from 24% in 2008 to 42.5% in 2016, reflecting in part waning GDP growth and increased borrowing on the international market. The GDP growth declined from 6% in the early 2000s to 4.4% between 2009 and 2016. Similarly, primary fiscal balance deteriorated from a surplus of 2.6% between 2000 and 2008 to a deficit of 1.7% for the period 2009 to 2016.

The developments in primary deficit mimic movements in government revenue and expenditure in SSA. Government expenditure was largely contained below revenue prior to 2008 but was mainly above revenue since 2009 as shown in Figure 4.

Figure 4: Government revenue vs government expenditure

To get a better understanding of the reaction of primary balance to increases in debt, it is important to plot primary balance against lagged debt. The analysis provides an insight into the behaviour of fiscal policy as debt rises. The relationship between primary fiscal balance and debt provides information about whether fiscal adjustment will be able to stabilise debt over time (Adams et al., 2010). The relationship can be positive or negative, linear or even non-linear (Ghosh et al., 2011 and Adams et al., 2010). If governments react to increased debt by fiscal consolidation, then the relationship would be positive. In these instances, as debt rises, the primary balance also increases. A scatter plot of primary balance and lagged debt for the overall SSA reflects that primary balance has been increasing as debt increases. The relationship shows that there may likely be a threshold where primary balance ceases to react to further increases in debt. Figure 5 shows a scatter plot for primary balances and lagged debt for SSA.

Figure 5: Primary balance and lagged debt (% of GDP)
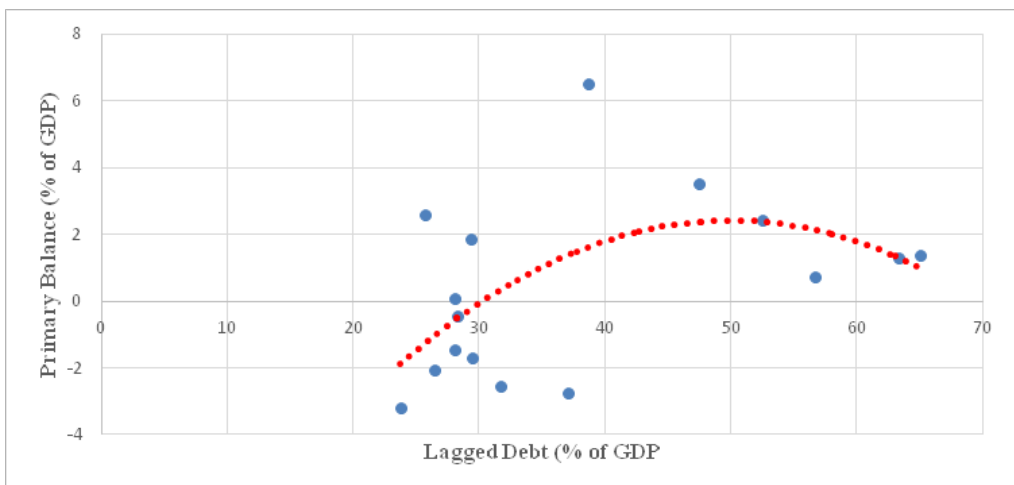
The relationship between primary balances and government debt can also be corroborated using cross country data. As shown in Figure 6, the relationship between average primary balances and gross public debt for 40 countries in the SSA for the period 2000 to 2016 shows that, in general, countries with higher debts tend to be running higher primary fiscal surpluses over the same period.

Figure 6 : Primary balances and gross public debt (% of GDP average for 2000 to 2016)
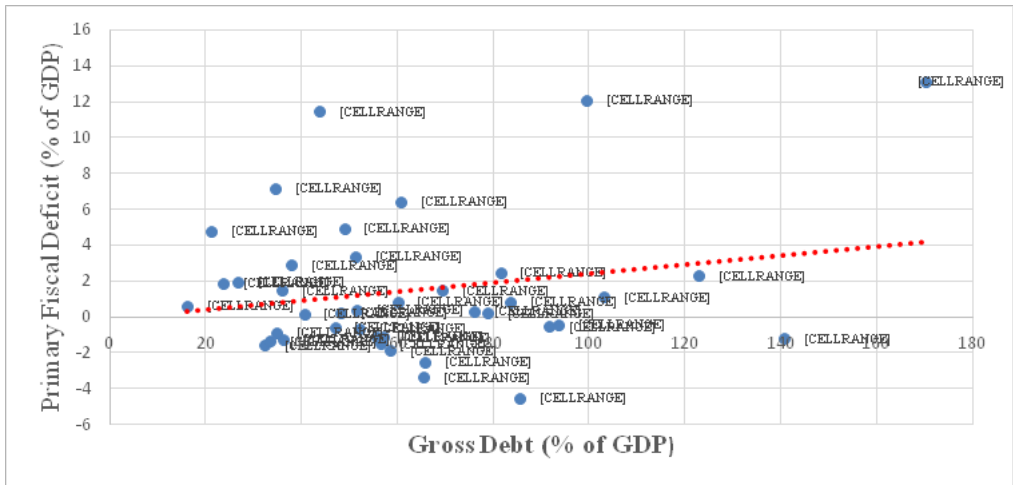
Source: Authors' analysis based on data from IMF (2017b), World Economic Outlook database

The positive relationship between primary balances and debt is also prevalent for sub-periods 2000 to 2008 and 2009 to 2016.

Figure 7: Primary balances and debt (2000 to 2008 country averages)
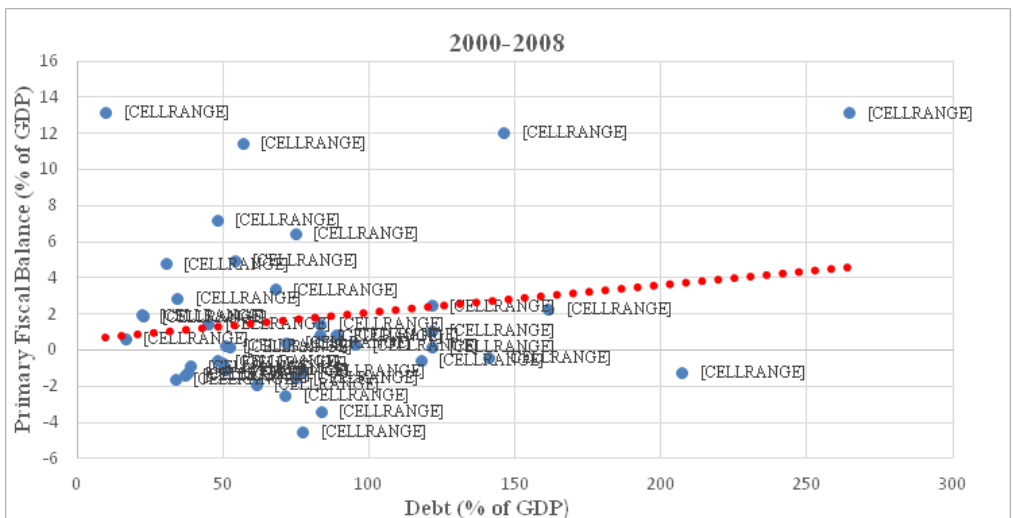
Source: Authors' analysis based on data from IMF (2017b), World Economic Outlook database

Figure 8: Primary balances and debt (2009 to 2016 country averages)
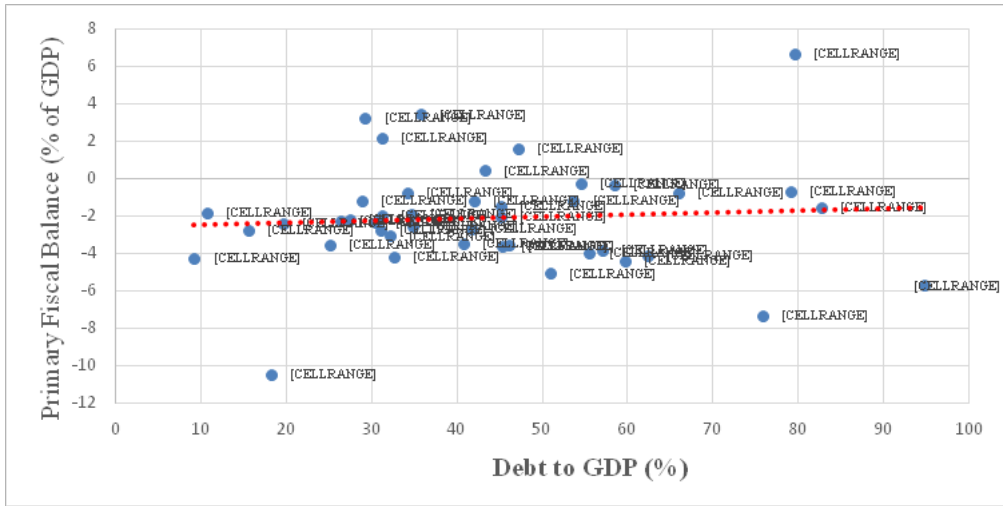
Source: Authors' analysis based on data from IMF (2017b), World Economic Outlook database

The two figures above show that, in general, primary balances tend to rise in response to increases in debt. The period 2000 to 2008, however, tends to show a stronger positive response of primary balances to debt compared to the period 2009 to 2016. In addition to the above, key structural information for the fiscal situation in SSA for the period 2000 to 2016 is examined. The information mainly relates to public debt and GDP per capita and government revenue across the region. Figure 9 shows a negative relationship between per capita GDP and debt ratio. There is some evidence in SSA that countries with low per capita incomes also have high public debt.

Figure 9: Public debt and per capita GDP (averages for 2000 to 2016)
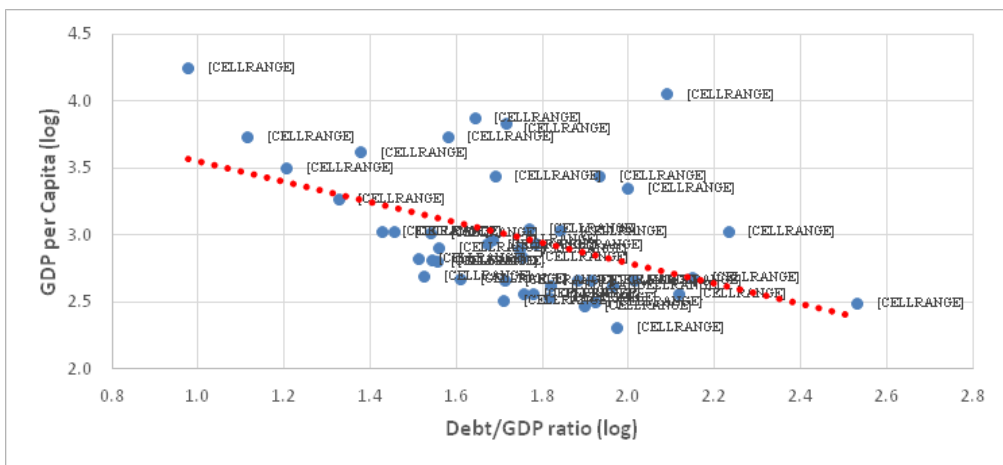
Source: Authors' analysis based on data from IMF (2017b), World Economic Outlook database

Figure 10 shows the relationship between debt to GDP and revenue to GDP. It shows lack of a clear relationship between debt and revenues to GDP in SSA. In general, this shows that there is no evidence that countries experiencing higher debt ratios also have higher revenues and therefore greater capacity to service the debt (Adams et al., 2010).

Figure 10: Public debt and government revenue ratios
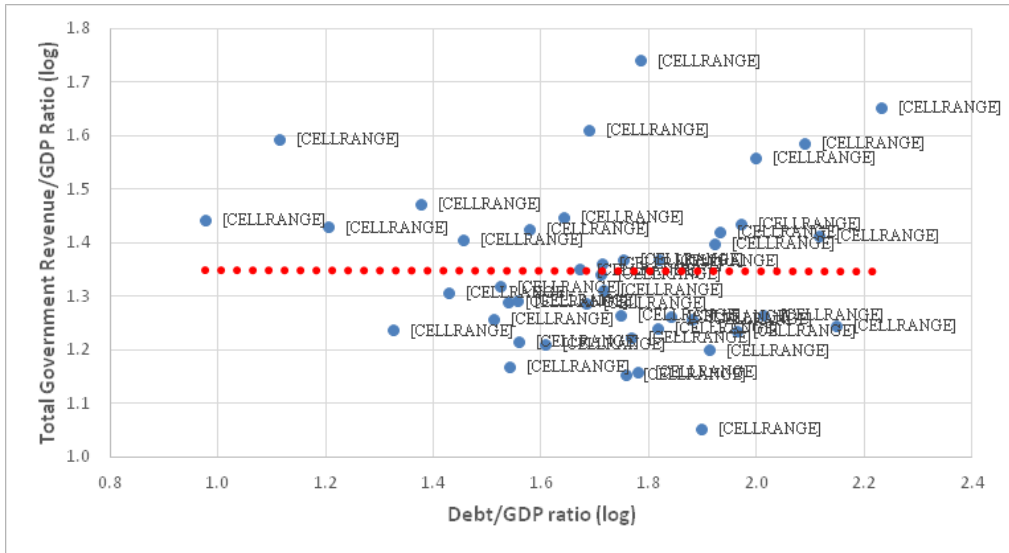
Source: Authors' analysis based on data from IMF (2017b), World Economic Outlook database

This section has reviewed the stylised facts on primary balance and debt in SSA. Primary balance, stock flow adjustment and economic growth have been the main drivers of debt dynamics in recent times. On balance, there is also preliminary evidence that there is a positive association between primary balance and debt in SSA.

3. Literature review

This section provides a brief review of the theoretical literature on debt creation process and fiscal responses. Budget deficits occur when government expenditure exceeds its revenue and the spending accumulation over time becomes debt. In this regard, governments adjust fiscal deficits to ensure that debt is manageable and sustainable over time. The fiscal behaviour with respect to increase in debt is known as the fiscal reaction function. The rationale of studying fiscal behaviour is to ascertain whether the fiscal primary balance reacts to public debt to ensure that debt is in check (Burger et al., 2011). The study of fiscal behaviour is concerned about the dynamic fiscal sustainability, which ensures that the budget does not lead to explosive increases in public debt over time.

The assessment of fiscal responses to debt increases is hinged on the fiscal reaction function proposed by Bohn (1998; 2005). The reaction function examines the response of the primary balance/GDP ratio to a change in the public debt/GDP ratio. Bohn (1995) shows that a sufficient condition to ensure fiscal sustainability is that the government responds systematically to increases in government debt by adjusting the primary balance (reducing the deficit or increasing the surplus net of interest payments). Empirically, the condition is assessed by running a regression of primary balance on lagged debt series. In case of a linear relationship, a positive and significant debt coefficient denotes a country that is committed to reduce or maintain steady debt-to-GDP ratios conditional on a set of other factors.

The fiscal reaction function is based on the budget constraint of government, which shows that abstracting from central bank financing, the difference between government revenue and expenditure is shown in changes in public debt as indicated in equation (1).

$$Z_t - G_t = -(D_{t+1} - D_t) \tag{1}$$

t = 1, 2, 3 …………...…….N

Where

Z_t = Government revenue

G_t = Government expenditure

D = Public debt

The equation 1 can be written as

$$D_t = D_{t-1} + i_t D_{t-1} - B_t \qquad (2)$$

Where B_t is primary balance and , i_t is nominal interest rate.

Equation 2 shows that the public debt dynamics are linked to the interest on public debt and the size of the primary balance. When the primary balance is zero, public debt will grow at a rate equivalent to the nominal interest rate.

Equation 2, when expressed as a ratio of GDP, becomes:

$$(D/Y_t) = ((1+i)(1+n))(D/Y)_{t-1} - (B/Y)_t$$

$$= ((1+r)(1+P)/(1+g)(1+p))(D/Y)_{t-1} - (B/Y)_t$$

$$= 1+r)/(1+g))(D/Y)_{t-1} \quad (B/Y)_t \qquad (3)$$

Where i and r are the nominal and real interest rates on government bonds; n and g are the nominal and real economic growth rates, p is inflation and Y is nominal GDP.

$$\Delta(D/Y)_t = [(r_t - g_t)/(1+g_t)](D/Y)_{t-1} - (B/Y)_t \qquad (4)$$

If we set $\alpha^* = r_t - g_t)/(1+g_t)$ and $\Delta(D/Y)_t = 0$, to get the primary balance required to ensure a stable debt/GDP ratio:

$$(B/Y)_t^{Required} = \alpha^*(D/Y)_{t-1} = [(r_t - g_t)/(1+g_t)](D/Y)_{t-1} \qquad (5)$$

To establish whether the government acted to keep its debt/GDP ratio stable over time, one can estimate what value α^* took into reality, thus:

$$(B/Y)_t^{Actual} = \alpha(D/Y)_{t-1} + \varepsilon t \qquad (6)$$

Equation 6 can be expanded to take into account inertia in government by including the lagged primary balance and a constant to allow for an explicit or implicit debt/

GDP target not equal to zero. The output gap is also included to control for fiscal stance over the cycle.

The fiscal reaction becomes:

$$(B/Y)_t^{Actual} = \alpha_1 + \alpha_2(B/Y)_{t-1}^{Actual} + \alpha_3(D/Y)_{t-1} + \alpha_4 y_{t-1} + \varepsilon t \qquad (7)$$

Fiscal policy is sustainable if α_3 is positive in value. For debt to be sustainable and not to explode over time, and where debt is unbounded and approaches negative infinity, α_3 should be less than unity. An α_3 value that lies between zero and one shows that the primary balance increases as debt ratio increases, thereby guaranteeing sustainability. A higher value of α_3 shows that fiscal policy is more responsive to increases in debt ratio. A zero and negative α_3 shows that fiscal policy does not react or reacts slowly to increases in debt. As in Adams et al. (2010), the values of α_3 can be used to score fiscal policy responses, while the values of α_4 measure the responses of fiscal policy to the business cycle. It measures whether fiscal policy is pro-cyclical or countercyclical in nature. A countercyclical fiscal policy is synonymous with fiscal sustainability.

It should, however, be noted that in the short term, the debt dynamics are also determined by the difference in interest rate on debt and growth rate of the economy. In instances where economic growth rate is above interest rate, debt to GDP may stabilise even when primary balance is in deficit. In such cases, an inadequate response of primary balance to debt increases may not in the short term destabilise debt to GDP ratio. This scenario leads to debt sustainability in the short term. However, for the long term, fiscal policy needs to respond to changes in debt. As highlighted by Ncube and Brixiova (2015), most SSA countries have had stable debt to GDP ratios since 2008, mainly due to positive growth-interest rate differentials despite increase in fiscal deficit.

The assessment of the response of primary balance to changes in debt is flexible and can be extended to examine issues such as fiscal space and fiscal fatigue by postulating a non-linear relationship between debt and primary balance. The non-linearity assumption allows for a threshold where reaction of primary balance to debt stock wanes as debt levels increase due to adjustment fatigue. This is known as the debt laffer curve effect, where there is a tipping point beyond which higher debt may not result in increased primary balance (Fournier and Fall, 2015; and Gosh et al., 2013).

The fiscal reaction function, however, does not take into account some dynamics that may result in inertia in government's response to increases in debt. The increase in debt per se may not be of concern if the borrowed funds are used to finance public investments such as critical infrastructure, which will generate positive returns in time for repayment. Thus, the slow response may mean that governments have ongoing public investments that may need to be completed before fiscal consolidation.

As argued by Easterly (1999), the reduction in debt levels because of fiscal consolidation should take into account changes in government's asset position. Easterly (1999) bemoaned the implementation of fiscal consolidation that results in fall in public investment and resultant decline in governments' asset stocks. In this regard, the decline in debt as a result of decrease in public investment contributes to fiscal sustainability but does not improve the government's balance sheet and may not be supportive of medium-term objectives.

Empirical research on fiscal responses to debt increases was popularised by the seminal paper by Bohn (1998; 2005). Other early notable empirical work on fiscal reaction functions include de Mello (2005) for Brazil. The applicability and use of fiscal reaction functions in assessing fiscal stability has increased significantly post the EU sovereign debt crisis in 2009. Consequently, most of the recent fiscal reaction functions have centred on EU countries. Prominent studies on fiscal reaction function in EU include Berti et al. (2016), Checherita-Westphal and Ždarek (2015) Fournier and Fall (2015), Baldi and Staehr (2015), and Gosh et al. (2011; 2013).

Berti et al. (2016) investigated fiscal reaction functions in European countries using panel regression techniques and single country regression for selected countries with long datasets. The panel regression covered mainly Central and Eastern European countries, which have limited data coverage. The General Method of Moments (GMM) estimation approach instrumenting for the lagged primary balance and lagged debt ratio estimation procedure was applied. This was important to deal with the likely challenges of heterogeneity and endogeneity in fiscal reaction functions. Robustness checks to estimation procedures were done through the Least Squares Dummy Variable (LSDVC) estimation technique. The study showed that most EU countries positively adjust their primary balance in line with rising public debt levels. Fiscal responsiveness to public debt was found to have increased after 2009 economic and financial crisis in the EU countries. Berti (2016) also found presence of fiscal fatigue in several EU countries.

Everaert and Jansen (2017), however, found that the number of countries that experienced fiscal fatigue fell in Europe when heterogeneous slopes are taken into account. The study used fiscal reaction functions in a panel of OECD countries for the period 1970 to 2014 to examine fiscal fatigue, taking into account heterogeneous slopes. They found that the quadratic and cubic debt-to-GDP terms that induced fiscal fatigue became insignificant when heterogeneous reaction to lagged debt was allowed for. Fiscal fatigue was only prevalent in 3 out of the 21 countries. The study shows that to adequately apply fiscal reaction functions to ascertain fiscal fatigue, there may be need to take into account determinants of the heterogeneous response to debt.

Checherita-Westphal and Ždarek (2015) used dynamic panel techniques of fiscal reaction function framework to Euro area countries for the period 1970 to 2013. The analysis also examined fiscal fatigue. The results showed that primary balance responded by 0.03–0.06 to 1 percentage point increase in the debt-to-GDP. The response, however, increased after the crisis of 2009. The authors found that evidence of fiscal fatigue was weaker.

Plodt and Reicher (2014) estimated fiscal policy reaction function for the Euro area and individual Euro area countries. In addition to responsiveness to debt-GDP ratio, the fiscal reaction function also took into account an anti-cyclical response of primary surpluses to the output gap and an exogenous fiscal policy shifter. They concluded that there exists a strong positive response of primary surpluses to the debt-GDP ratio. The results also showed a strong anti-cyclical response of primary surpluses to the output gap for the Euro area.

Adams et al. (2010) assessed the fiscal response to increases in debt in Asian countries for the period 1990 to 2008. The assessment used fiscal reaction functions of various forms, including linear and non-linear. The econometric procedure used a panel framework applying a Feasible Generalised Least Squares (FGLS) and System General Method of Moments (SGMM). Adams et al. (2010) found that primary balances reacted positively to debt and concluded that, generally, fiscal policy was sustainable in Asia in the short to medium term.

Despite the increased application of fiscal reaction function in fiscal sustainability analysis, mainly in advanced countries, its application in Africa has, however, been limited. Burger et al. (2011) estimated a fiscal reaction function for South Africa from 1946 to 2010. The paper applied different methodological techniques, including OLS, VAR, TAR, GMM, State-Space modelling and VECM. The authors concluded that South Africa had been running a sustainable fiscal policy with primary deficit responding significantly to changing debt levels. Recent studies by Burger et al. (2015), however, showed that the government of South Africa has been in high debt regime since 2010, and fiscal primary balance was largely unresponsive to debt/GDP ratio.

Fincke and Greiner (2009) studied the responsiveness of fiscal policy to increases in debt in selected countries in Africa and Latin America. The SSA countries studied included Botswana, Mauritius and Rwanda. The study showed that the debt profiles of all the three SSA countries seemed sustainable. The fiscal sustainability was more guaranteed in Botswana. Rwanda's fiscal policy was concluded to be sustainable, given a positive and statistically significant coefficient of debt. In Mauritius, however, the fiscal reaction coefficient was positive but insignificant.

Mutuku (2015) studied the fiscal reaction function for Kenya from 1970 to 2013 using a VAR and a VECM model. The results showed that fiscal policy is acyclical. Long run fiscal sustainability was affected by huge expenditures incurred during election cycles. Akosah (2015) also applied fiscal reaction function approach in analysing fiscal stability for Ghana. The study applied a cointegration procedure and found that fiscal policy was unstable before the adoption of Heavily Indebted Poor Countries' initiative in 2001, but relatively stabilised afterwards. Evidence of significant fiscal pressures were also observed during election cycles. The fiscal adjustment in Ghana was, however, very low, which called for curtailment of expenditure overruns, mainly during election cycles.

Fedelino and Kudina (2003) studied the relationship between fiscal policy and debt sustainability in HIPCs and found that debt levels were likely to remain unsustainable even after HIPC initiative. The assessment was done by computing the fiscal primary

position which was consistent with debt sustainability. The analytical framework involved making exogenous future assumptions on inflation, interest rate, growth and exchange rates. The importance of this analysis to this study is that it indicated that HIPCs may experience debt sustainability even after the initiative.

Loloh (2011) decomposed fiscal policy reaction to output conditions, fiscal policy inertia and the discretion of fiscal authorities in Ghana. The study used a Two Stage Least Squares (2SLS) to decompose fiscal policy. They found that government revenue was more responsive to output conditions than government expenditure. On the contrary, government expenditure was more persistent than government revenue. Loloh (2011) also found low discretion of fiscal policy, which may preclude response of fiscal policy to changes in economic situations.

Adedeji and Williams (2007) undertook fiscal reaction functions empirical work for CFA zone. They found that the coefficient of the lagged debt stock was significant and positive for both CEMAC and WAEMU. Control variables used in the analysis included economic growth and per capita GDP, openness, and the terms of trade. These were found to be important factors in explaining fiscal performance.

Ncube and Brixiová (2015) pointed out that the low debt to GDP ratios enjoyed by most SSA post-global financial crisis of 2008 were not a result of sustainable fiscal stance but rather favourable debt dynamics. They further argued that Africa's public debt-to-GDP ratio fell between 2008 and 2012 despite increased primary fiscal deficits because of favourable factors, including low or negative real interest rates and high growth rates.

The above empirical literature review shows that there is still a dearth of empirical evidence on the fiscal response to debt in SSA. In addition, the review of empirical literature shows that estimation of fiscal responses is done using both panel and single country studies. While country studies tend to better capture more aptly the fiscal responses in terms of the varying reaction, including non-linearities and natural patterns over time, it comes at a cost of reduced comparability and applicability to economic, institutional and political conditions. In addition, fiscal reaction functions are also data demanding, which may make single African country studies less reliable.

4. Methodology

The methodology applied in this paper follows the empirical work of Berti et al. (2016). The approach uses both panel data techniques and single country regressions. Berti et al. (2016) argued that single country fiscal reaction functions are mostly suitable for countries with long time data series. As such, the limited time series data on some key variables underlies the need for panel data analysis. Although the fiscal responses to debt undertaken for one country usually provide a suitable framework for analysing country-specific responses of fiscal policy to increases in debt, the tool becomes unreliable for limited data series. In addition, panel data is suitable as it would facilitate capturing of common policy responses for the relatively recent past than country-specific ones for very long dated periods, characterised by completely different historical conditions. The panel data is done for 34 countries for the period 2000 to 2016.

In this view, the panel framework for SSA countries is augmented by single country regressions for selected countries. The countries were selected based on debt distress risk ratings. Countries with moderate and high debt risk ratings and for which the IMF and the World Bank have recommended strong fiscal consolidations were selected. The countries were also chosen in such a way as to include the various fiscal frameworks in SSA. The single country regressions required long-time data series, and in this regard single country regressions period of study ran from 1986 to 2016. In this study, five (5) individual country regressions were run. They were for Ghana (high debt risk), Ethiopia (high debt risk), Zambia (high debt risk), Cameroon (high debt risk) and Mozambique (debt distress). The debt risk ratings are for 2017.

Model Specification

Following several studies, Berti et al. (2016) and IMF (2015), the econometric specification for panel framework is as follows:

$$pb_{i,t} = \alpha + pb_{i,t-1} + \beta d_{it-1} + \lambda ygap_{i,t} + X_{i,t}\delta + D_{i,t}\Omega + \mho_i + \varepsilon_{i,t} \qquad (8)$$

Where

$pb_{i,t}$ is a primary balance to GDP ratio

$pb_{i,t-1}$ is a lagged primary balance to GDP ratio

βd_{it-1} is a gross government debt to GDP ratio at time t-1

$gap_{i,t}$ is the output gap as a percentage of GDP

$X_{i,t}$ is a set of control variables

$D_{i,t}$ is a vector of dummies

$\mho_i$ is a fixed country effect, and

$\varepsilon_{i,t}$ is a random error and $\varepsilon_{i,t} - N(0, \delta^2{}_{i,t})$

Choice of independent and control variables

The lagged primary deficit coefficient $pb_{i,t-1}$ measures inertia of fiscal policy. The parameter β is the main coefficient of interest and shows how the government responds to changes in public debt-to-GDP ratio. The lagged gross government debt (as a % of actual output), βd_{it-1}, the coefficient of debt, should, according to Bohn (1998; 2005), be positive and significant to ensure sustainability. A positive fiscal response also suggests that the government has been making concerted efforts to reduce its expenditure or raise revenue to counteract the changes in public debt (Izák, 2009). Moreover, a positive and significant coefficient of the lagged public debt variable can be interpreted as a government that engages in fiscal austerity to reduce public debt levels. The need for the fiscal reaction function is particularly important since prudent debt management has little meaning in the presence of fiscal ill-irresponsibly and uncoordinated borrowing.

As noted by Bohn (1998), the primary balance is also affected by other factors such as the level of economic activity. The output gap, $ygap_{i,t}$, captures the influence of the business cycles (Bohn, 1998; Burger et al., 2011). If the coefficient of the output gap is positive, it implies that fiscal policy is countercyclical in nature. Countercyclical fiscal policy is synonymous with fiscal stability. An expenditure gap was also included to capture deviation of government expenditure from long-run trend. The expenditure gap is expected to be negatively related to the primary balance.

Other factors included, both economic and non-economic, to avoid bias due to omitted variables, are mainly based on previous studies such as Berti et al. (2016) and Adedeji and Williams (2007). The current account balance is included to control for the "twin deficits" effect (Mendoza and Ostry, 2008 or European Commission, 2015a). The coefficient of the current account is expected to be positive.

International commodity prices are also included as most SSA countries are commodity exporting countries. Specific commodity price index is used for each country depending on its nature of exports. The rise in international commodity prices is expected to result in increased fiscal revenue. Thus, a positive relationship is envisaged between primary balance and international commodity price.

The impact of institutions is captured using Country Policy and Institutional Assessment (CPIA) by the World Bank. In this study, CPIA ratings for the budget and management institutions are applied. The sign of the CPIA coefficient can either be positive or negative. An improvement in CPIA may imply that the country has robust institutions that can enable it to enforce fiscal discipline and increase fiscal surpluses when debt increases. An improvement in the CPIA ratings means that the country's debt carrying capacity increases and therefore its debt sustainable threshold as determined by IMF and World Bank increases. In this instance, an improvement in CPIA may be associated with a decline in fiscal surpluses as the country takes more debt. Given that CPIA data was available from 2005 to 2016, it was only included in 2 of the 5 panel models estimated. In addition, country dummy to take into account the impact of multilateral debt relief under HIPC was included.

International sovereign debt issuances

The study also examined the impact of issuance of sovereign debt on the international market on the response of primary fiscal balance to debt ratio before debut sovereign debt issuance and after. This was done through modifying equation (8) by using an interactive dummy term, which takes a value of 0 before sovereign debut and 1 thereafter as illustrated in equation (9) in the results and analysis section. The study augmented the usual fiscal response function by an interactive dummy variable for debut international bond issuance. With a view to meeting significant development needs, some SSA countries issued debut international bonds. The primary reason was to acquire resources for capital projects. Capital projects require massive amounts, which are not available in the local markets. In addition, the decline in concessional financing as some SSA countries progressed from low to middle income status means that international bonds became an attractive financing option. The international sovereign bonds were mostly denominated in US dollar, fixed-coupon bullet securities, with maturity ranging from 5 to 10 years and sub-investment grade rating.

Following IMF (2015), the model specification to take into account international bond debut issuances is as follows:

$$pb_{it} = pb_{i,t-1} + (\beta_1 + \beta_2 * D1_{i,t})d_{i,t-1} + \lambda gap_{i,t} + X_{i,t}\delta + D_{i,t}\Omega + \mho_i + \varepsilon_{i,t} \quad (9)$$

where other variables are as in equation (8) and $D1_{i,t}$ is the dummy interaction variable set to one at the time of and after a debut sovereign bond issuance and zero before issuances. The $d_{i,t-1}$ is still lagged debt, implying that β_1 and $\beta_1 + \beta_2$, are the coefficients of showing degree of fiscal consolidation. The specification allows for comparison of fiscal responses before international sovereign bond as given by β_1 and after bond issuances, as given by coefficients $\beta_1 + \beta_2$.

Non-linear relationship

The study also examined whether fiscal response to increases in debt can be non-linear by including a quadratic lagged debt term. It seeks to establish whether there is a threshold beyond which primary balance stops responding positively to increases in debt.

$$pb_{i,t} = \alpha + pb_{i,t-1} + \beta d_{t-1}^2 + \varepsilon_{i,t} \tag{10}$$

where other variables are defined as before and d_{t-1}^2 is the lagged debt squared to take into account non-linearities in fiscal responses.

Econometric estimation problems

The main problem that has been highlighted in literature with respect to modelling fiscal reaction functions is the issue of endogeneity, which is likely to stem from the interactions between the variables entering the equation. Medeiros (2012) highlighted three possible sources of endogeneity in the fiscal reaction function specification. These include the contemporaneity of the output gap and the fiscal policy shock, dependence of lagged debt on past values of the primary balance (so-called reverse causality issue) and persistence of errors, making lagged debt endogenous. To deal with the issues of endogeneity, the GMM estimation procedure is applied.

Robustness checks

Following several studies (Berti et al., 2016; IMF, 2015; Burger et al., 2011; Adams et al., 2010) on fiscal reaction, robustness checks for the sensitivity of results to estimation methods were done using ordinary least squares and Feasible GLS.

Data sources

The panel fiscal reaction function was estimated for SSA countries using annual data from 2000 to 2016 for the primary balance, public debt as ratios to GDP and control variables. Annual data was used to capture budgetary years. For country-specific fiscal reaction functions, the data range from 1986 to 2016 were used. The public debt data was obtained from IMF historical public debt database and, for the latest figures, from the IMF World Economic Outlook (IMF, 2017). The data on other control variables was obtained from IMF World Economic Outlook (IMF, 2017) and the World Bank economic database. Given the data gaps and outliers, the panel regression for SSA was run for a sample of 34 countries, for the main results. The sample was reduced to 32 for the

regression with CPIA, since some middle income countries did not have CPIA scores. The output and expenditure gaps were obtained using Hodrick Prescot (HP) Filter after extending the data using IMF medium term forecasts to take into account end point bias of the filter. The data was subjected to preliminary data analysis such as unit roots using Augmented Dickey-Fuller test.

5. Results and analysis

This section presents the main econometric results of the fiscal policy response functions to increases in debt in SSA. The estimates are based mainly on GMM estimation technique. The results from other estimation techniques such as ordinary least squares are included for robustness check. Other variants of the equation are also reported, taking into account the availability of data. In particular, an additional equation is included to take into account the effect of institutions, since data on CPIA was only available from 2005 from the World Bank. The impact of issuance of international sovereign debt is analysed using a fiscal response function with an interactive sovereign dummy term. To shed some light on the possibility of heterogeneity in fiscal responses within the SSA region, country-specific fiscal responses for selected countries are reported.

Table 1 shows the main results of fiscal responses to debt, taking into account different estimation techniques, control variables and interaction effects.

Table 1: Panel fiscal reaction function for SSA

	OLS	GMM	GMM_1	GMM_CPIA	GMM –ID
Dependant Variable = Fiscal Balance					
Lagged Primary Balance	0.506359*** (0.035511)	0.71698*** (0.075187)	0.578387*** (0.038902)	0.473924*** (0.098019)	0.422859*** (0.052055)
Lagged Debt	0.014972*** (0.005168)	0.016098*** (0.002268)	0.014748*** (0.003950)	0.011823** (0.005788)	0.011834*** (0.004038)
Dummy Sovereign Debt*Lagged Debt					-0.018097 (0.019511)
CPIA				-0.841206*** (0.318217)	-0.479844* (0.290863)
Output Gap	-0.023171 (0.045238)	-0.079454*** (0.019570)	-0.045305 (0.034718)	-0.013835 (0.027937)	-0.013607 (0.038451)
Expenditure Gap	-0.180208*** (0.056320)				-0.155419*** (0.048197)
Change in Commodity Prices	0.037810*** (0.009738)		0.026495*** (0.008221)	0.019687** (0.007786)	0.009353* (0.005246)

Table 1 Continued

	OLS	GMM	GMM_1	GMM_CPIA	GMM –ID
Current Account	0.066733***		0.033698	0.034045*	0.082803
	(0.021687)		(0.018736)	(0.017403)	(0.020098)
Constant	-0.961629***	-1.289977	-0.715964***	1.317301	0.706922
	(0.377015)	(0.252338)	(0.253155)	(1.109564)	(0.4891)
Dummy HIPC	-0.131019		-0.600897***		
	(0.383733)		(0.195108)		
Dummy Sovereign Debut Issuance					0.238069
					(0.864290)
R-squared	0.381022	0.408831	0.500928	0.412152	0.417072
Durbin-Watson stat	2.077373	2.379427	2.202858	2.019363	2.124225

Figures in parenthesis are standard errors. *significant at 10%; **significant at 5% and *** significant at 1%.
OLS–Ordinary least squares.
GMM–only lagged debt and output gap.
GMM_1–include other control variables–commodity prices, HIPC dummy, Current Account.
GMM_CPIA–include other control variables and institutional variable –CPIA – budget and management institutions –fiscal institutional framework.
GMM–ID Sovereign, including interactive dummy variable for debut bond issuances to account for impact of bond issuance on fiscal responses in SSA.

The estimated results suggest that primary balances in SSA countries respond significantly to escalating debt levels. This implies that SSA countries improve fiscal balances in response to increasing public debt. Importantly, it means that countries respond in a stabilising manner to increases in debt. This is in line with IMF's own observation that fiscal deficits in SSA began stabilising in 2017 as countries undertook fiscal consolidation measures (IMF, 2017). Most countries have instituted expenditure cuts to rein in spending and ensure fiscal sustainability. There has been, however, considerably less effort in raising non-commodity revenues. The evidence is consistent across all the panel, with the coefficient of lagged debt to GDP estimated at between 0.0118 and 0.0244. The coefficients are in line with most studies in fiscal responses to debt in developing countries (IMF, 2015; Adams et al., 2010). The coefficient of lagged debt from panel regressions were found to be significant at 5% across all the estimations.

The coefficient of the output gap was found to be negative in 4 out of the 5 regressions. In all the regressions, the coefficient was, however, found to be insignificant. The results suggest that fiscal policy in SSA countries was mainly pro-cyclical for the period 2000 to 2016. As argued in Konuki and Villafuerte (2016), excessive pro-cyclicality can be detrimental to fiscal sustainability. Pro-cyclical policy tends to amplify the underlying business cycle. A negative coefficient means that the fiscal stance is tightened or loosened during economic downturns and upturns, respectively.

The coefficient of commodity price was positive as expected. The increase in commodity prices are associated with improved primary balance. The current was also found to be positively correlated with fiscal primary balance. The improvement in CPIA was found to result in deterioration in fiscal deficits. This is because the CPIA is used by the World Bank and the IMF to determine the level of debt that countries can carry. The increase in CPIA rating results in increased borrowing power, which leads to increased primary fiscal deficits.

The coefficient of the dummy term for HIPC initiatives was negative. This means that multilateral debt initiatives resulted in increased borrowing space for countries that benefited. This resulted in the countries increasing the their debts and therefore experiencing higher fiscal deficits.

To take into account the impact of international bond issuance on fiscal responses in SSA, the study augmented the usual fiscal response function by an interactive dummy variable for debut international bond issuance. With a view to meeting significant development needs, some SSA countries issued debut international bonds. The primary reason was to acquire resources for capital projects. Capital projects require massive amounts, which are not available in local markets. In addition, the decline in concessional financing as some SSA countries progressed from low to middle income status meant that international bonds became an attractive financing option. The international sovereign bonds were mostly denominated in US dollar, fixed-coupon bullet securities, with maturity ranging from 5 to 10 years and sub-investment grade rating. The structure of the international bonds largely reflect the practices established by international financial centres.

The coefficient of interactive dummy term to examine the impact of sovereign bond issuances on fiscal reaction to debt increases was negative though insignificant. Overall, the response of fiscal policy after bond issuances $(\beta_1 + \beta_2)$ was weaker as it was -0.006. This means that increase in sources of funding of budget deficits enhances the flexibility of the conduct of discretionary fiscal policy and therefore the reduced response of fiscal policy to increases in debt.

The study also considered the possibility that fiscal response to increases in debt can be non-linear by including a quadratic lagged debt term as given by equation (10). The coefficient of the lagged quadratic debt term was negative, suggesting a typical inverted U-shape response function where fiscal response parameter initially rises with debt and then falls as debt reaches certain threshold. Figure 11 shows the response of primary balance to increases in debt in SSA. It shows that primary fiscal balance reacts positively to increases in debt up to around 90%, and after that, the response becomes negative. Mendoza and Ostry (2008) found a 90% debt threshold wherein "fiscal fatigue" sets in.

Figure 11: Primary balance response function
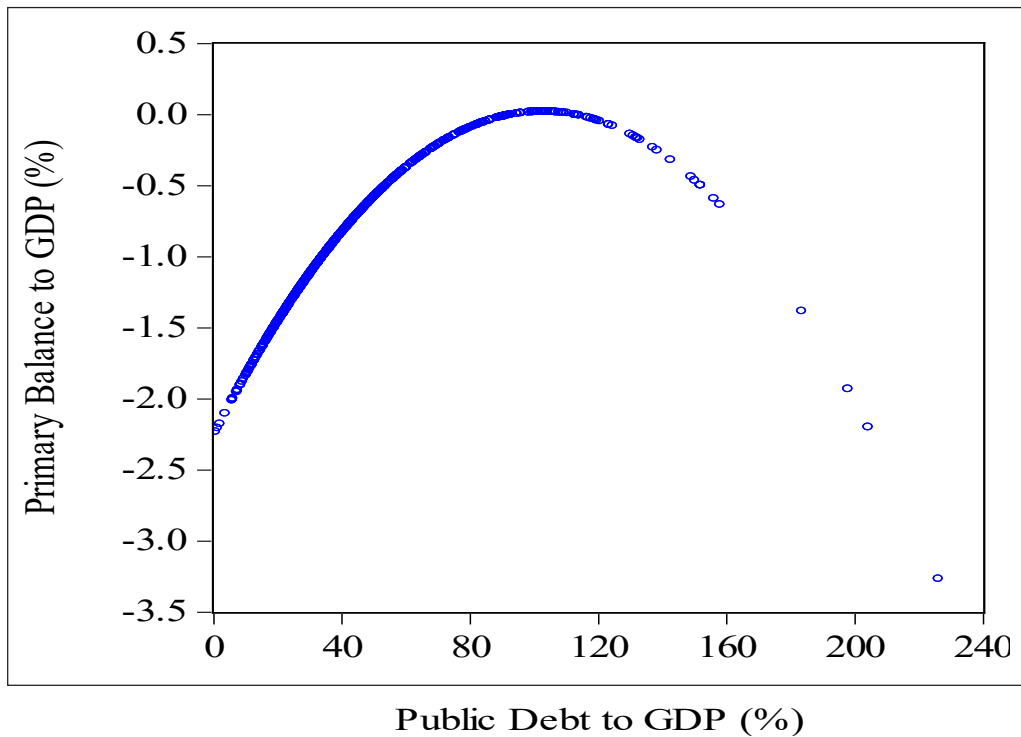
Source: Authors' estimations

Country-specific econometric results

The results from panel regression were buttressed by country-specific regressions. The results suggest that the selected countries have also been taking appropriate steps in responding to escalating debt levels. However, fiscal stance varies, with some countries undertaking countercyclical fiscal policies while others are pro-cyclical. The country regressions were done for Ghana, Ethiopia, Zambia, Cameroon and Mozambique. The results are consistent with general findings from the panel framework for the SSA region, and the coefficient of lagged debt is positive and, in most cases, significant. When the debt to GDP ratio increases by 1%, the primary balances to GDP ratio respond by increasing between 0.011% and 0.0145%. For Ghana, the estimates of 0.011% are broadly similar to 016% found by Asiama et al. (2014). The coefficient for lagged debt for Mozambique is positive but not significant, which means that fiscal consolidation in the country is very much slower.

The range is, however, considerably lower than most results from developed and emerging studies, such as Lestari (2014), who finds a reaction of 0.046%, in 0.030% in Brazil (de Mello 2005) and 0.040% for South Africa (Burger et al. 2011). The lower range may reflect how difficult it is to unwind running public investments, which have medium to long-term positive impact on growth. Much of the increase in borrowing since the 2000s have been driven by huge public capital projects being undertaken in most SSA countries.

The slower fiscal response thus reflects the caution in fiscal consolidation needed to ensure that expenditure cuts do not result in reductions in net public assets due to lower public investment. Thus, the lower coefficient of lagged debt reflects the need to ring-fence public investment to ensure that current and earmarked public investments are completed. This may mean that fiscal response, which the IMF called "delayed fiscal adjustment" (IMF, 2017), might actually be an appropriate fiscal path to ensure that current public capital projects are not abruptly disrupted with a negative effect on growth. The lower coefficient may also reflect the failure by many SSA countries to increase non-commodity revenue to reduce fiscal deficit. Most fiscal consolidation efforts have been skewed towards expenditure cuts. There a is need to increase non-commodity revenues and enhance efficiency in public spending to ensure sustainability of fiscal consolidation efforts. What is critical is to ensure prioritisation, efficiency and greater value for money to optimise future positive returns from public investments.

Table 2: Fiscal reaction functions for individual SSA countries

	Ghana	Zambia	Ethiopia	Cameroon	Mozambique
Dependant Variable = Primary Balance					
Lagged Primary Balance	0.396493*** (0.045521)	-0.119461* (0.056298)	0.135723 (0.158844)	0.384241*** (0.044605)	0.348842*** (0.067786)
Lagged Debt	0.011187*** (0.001932)	0.014574*** (0.004305)	0.011859* (0.005795)	-0.04095*** (0.010013)	0.002435 (0.003752)
Output Gap	-0.118652** (0.043596)	-0.142403 (0.204995)	0.070576** (0.026938)	0.245418*** (0.040381)	0.026074 (0.063259)
Expenditure Gap	-0.110287** (0.047981)	-0.343593 (0.437147)	-0.347878*** 0.107933	-1.342504*** (0.101306)	-0.361896*** (0.119173)
Current Account	0.358164*** (0.063942)	0.471859*** (0.072854)	0.245805** (0.092878)	0.035681 (0.097520)	-0.012766 (0.018328)
Dummy Debut Sovereign debt	-1.808956 (0.425992)	-6.861791*** (0.779727)			-2.658543* (1.445446)
Dummy HIPC	-1.043385*** (0.300123)	-0.600897*** (0.195108)	3.009669*** 0.889406	5.864778*** (0.540267)	0.260599 (0.687976)
Dummy Elections	-1.043385 (0.300123)	1.143516 (1.010408)	-0.355628 (0.331437)	-0.448132** (0.151908)	-0.870379* (0.443416)
Constant	-0.683261** (0.275539)	2.093805 (0.985041)	-3.571370*** 0.852543	0.795541*** (0.1927)	-3.227046*** (0.936007)
R-squared	0.595873	0.4678	0.457557	0.451937	0.493567
Durbin-Watson stat	2.352855	1.803164	1.809980	1.559105	1.844670

*significant at 10%; **significant at 5% and *** significant at 1%.
** Figures in parentheses are standard errors
The country regressions were done mainly using the General Methods of Moments

Based on individual country regressions, two countries, namely Ghana and Zambia, were found to have pro-cyclical fiscal policies, while Ethiopia, Cameroon and Mozambique showed evidence of countercyclical policies, though in most instances the coefficient on output gap in either cases seemed generally insignificant. The results are consistent with those of Konuki and Villafuerte (2016), who concluded that fiscal pro-cyclicality in SSA was more pronounced in rich mineral and oil commodity countries.

6. Conclusion and policy implications

This paper assessed the drivers of public debt accumulation and actions that Sub-Saharan African countries have been taking to respond to escalating public debt levels. The paper was motivated by the recent increase in public debt in most countries in SSA, which has resulted in serious concerns regarding fiscal sustainability for the region. It also assessed the extent to which SSA countries were heeding the call for fiscal consolidation by multilateral institutions, mainly IMF and World Bank, as debt approached distress thresholds. Precisely, the study estimated fiscal reaction function for SSA, to gauge whether fiscal policy responses in SSA countries could generate primary surpluses in the short-run and achieve fiscal sustainability in the long-run.

The results suggest that SSA countries have generally been taking fiscal actions to control escalating public debt to ensure sustainability. The results indicate also that the primary fiscal balance responds positively and significantly to increases in debt in SSA. However, the findings suggest that fiscal consolidation has been slower in SSA, with the coefficient of lagged debt to GDP at about 0.011% compared to most study findings for emerging and advanced countries' coefficients of above 0.02%. This may reflect the difficulties in cutting public investments despite looming debt sustainability issues. The results suggest the need for SSA countries to further strengthen their fiscal consolidation efforts to ensure sustained fiscal and debt sustainability. As such, SSA countries may have been gradual in their cut of expenditure with a view to ring-fencing public investments in order not to disrupt on-going projects.

The results also depict some evidence of fiscal fatigue at debt levels exceeding 90% of GDP. This finding is consistent with the growth maximising public debt levels, which showed that public debt levels in excess of 90% of GDP become a drag to economic activity. Within the context of this paper, results suggest that countries forgo the consolidation efforts when debt to GDP ratios have accelerated to levels exceeding 90% of GDP.

The fiscal policy in SSA is mainly pro-cyclical, which does not augur well with fiscal sustainability. A pro-cyclical fiscal policy moves in line with business cycle, resulting in amplification of the fiscal challenge. In addition, the response of the primary fiscal balance becomes weaker after the debut sovereign debt issuance by SSA countries. Improvements in CPIA ratings have also resulted in increased primary deficits as countries' capacity to carry more debt increases.

The significant contribution of automatic debt dynamics, such as interest rate growth differential and exchange rate, in driving debt, suggests the need for SSA countries to also pay particular attention to macro-financial variables.

Notes

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3. The debt drivers were calculated for 34 countries where data was available.

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Mission

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