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Determinants of fiscal effort in sub-Saharan African countries: Does conflict matter?[1]

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Abstract: This study investigates the determinants of fiscal effort in sub-Saharan African (SSA) within the framework of fiscal reaction functions. Whereas previous studies focusing on SSA have mainly considered the economic non-debt determinants this study accounts for the role of conflict given its persistence in many SSA countries. It employs a variety of panel econometric methods that are applicable in tackling the problem of endogeneity. Specifically the study employs the instrumental variables fixed effects, the two-step generalised method of moments (GMM) and the traditional two-stage least squares techniques. Mainly the evidence shows that although SSA governments have made fiscal adjustments in response to the escalating levels of debt, conflict impacts negatively on this response in SSA. Furthermore, the results affirm the presence of fiscal fatigue in SSA's fiscal reaction function. Recommendations based on these findings are discussed.

Keywords: fiscal reaction functions, conflict, sub-Saharan Africa.

JEL codes: E62, H63, F51.

Introduction

Researchers and policymakers have increasingly placed emphasis on the issue of debt and fiscal sustainability since the outset of the global financial crisis. The sovereign debt crisis coupled with other fiscal issues such as the increased government age-related expenditure in Europe has tilted much of the literature to the case of European countries. Sub-Saharan African (SSA) countries, however, present an interesting case that warrants the attention of researchers. Following the debt relief initiatives provided in response to the debt crisis

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of previous decades, the sub-region's economy has faced growing vulnerabilities to the risks of rising levels of public debt. Total government gross debt has grown rather steadily since 2009[4] with remarkable compositional changes in the form of increased borrowing from private capital markets and from the domestic economy (IMF, 2015). This emerging debt problem no doubt undermines the debt relief efforts of the past but it would hardly come as a surprise to researchers such as Fedelina and Kudina (2003) who viewed the relief efforts as a basis rather than a guarantee for long terms sustainability. In their view SSA's long-term sustainability would depend on future macro policies, growth and financial aid. Accordingly the rising debt problem in recent years has been associated with dwindling prospects of economic growth and macroeconomic policy uncertainties (IMF, 2019).

According to some recent data published by the IMF (2019) several countries in the sub-region are either already in a debt distress or are faced with the risk of a debt distress.[5] Affected countries are mostly those that benefited from the previous relief efforts. In a bid to prevent an imminent debt crisis in SSA, the IMF and the World Bank have called for fiscal consolidation especially in countries experiencing growing risks of debt distress (IMF, 2017; World Bank, 2017). This study sets out to examine the determinants of fiscal effort in SSA within the established framework of fiscal reaction functions (FRFs) (Bohn, 1998; Mendoza & Ostry, 2008; D'Erasmo, Mendoza, & Zhang, 2015). FRFs are notable for their use in assessing the extent to which governments have responded in the past to growing levels of public debt. Within this framework researchers usually hypothesize that countries behave responsibly in terms of maintaining the debt to GDP ratio at a stable level by increasing the primary surplus when public debt service is increasing. FRFs are therefore used to examine the sustainability or otherwise of government debt.

While some fiscal effort is expectedly being made by SSA governments to prevent another debt crisis such efforts may not decisively address the short and long-term debt vulnerabilities. As observed by the IMF (2019), the fiscal adjustments being made in some SSA countries may rather be attributed to the improvements in commodity prices, particularly among oil-exporting countries. To deal more decisively with the growing debt vulnerabilities more effort is needed, particularly in the form of improvements in revenue generation. Unfortunately, the persistent problem of armed conflict among other socio-political issues may limit the effectiveness of such fiscal consolidation efforts in the sub-region.

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[4] According to the IMF (2019), SSA's government gross debt nearly doubled between 2009 and 2019, rising from 27.9% to 50.4% of GDP respectively (IMF, 2019).

[5] According to the report, Burundi, Cameroon, Cabo Verde, Central African Republic, Ethiopia, Gambia, Ghana, Sao Tome and Principe are in the first category while Chad, Congo Republic, Eritrea, Mozambique, South Sudan, and Zimbabwe are in the second category.

Whereas socio-political factors such as armed conflict have received a lot less focus in the literature on SSA they are likely to play a key role in the determination of the sub-region's fiscal sustainability. In particular violent conflict poses an increasing level of risk to public finances in SSA (Dunne, Nikolaidou, & Chiminya, 2018). Armed conflict is a pervasive problem across the globe particularly in recent years. In SSA the incidence and intensity of conflict which trended downwards during the early part of the 2000s has recently picked up momentum as has been observed in about two-thirds of the countries (IMF, 2019). Conflict has been shown to have many-sided economic effects including demographic, growth and fiscal performance effects (Chowdhury & Murshed, 2016; Barrett, 2018). In particular the fiscal effect of conflict is an important research topic because of the large impact of shock that violent conflict is capable of inflicting on the economy (Fang, Kothari, McLoughlin, & Yenice, 2020). SSA countries are faced with a double-edged task: that of fiscal consolidation on one hand to prevent a debt crisis and of ensuring that growth-related capital spending is not jeopardized by the efforts made towards fiscal consolidation. The renewed problem of conflict in recent years may hinder the realization of these objectives. For one, fiscal consolidation is difficult during a period of conflict due to the contractionary effect that it may have on the tax base (Ndikumana, 2001; IMF, 2019). For another, conflict is likely to divert government spending away from growth-enhancing capital spending towards defense spending, holding total spending unchanged (IMF, 2019).

The goal of this study is, therefore, to estimate a FRF for SSA which would account for the role of armed conflict. This is important because, as mentioned earlier, the recurrence of conflict and wars in the sub-region may tend to limit the effectiveness of fiscal consolidation which makes it a key factor to consider when assessing its debt sustainability. Previous studies, those focusing on SSA countries in particular, have focused mainly on the economic non-debt factors underlying fiscal effort (Adedeji & Williams, 2007; Burger, Stuart, Jooste, & Cuevas, 2012; Ogiji & Ajayi, 2020; Mupunga & Ngundu, 2020). The approach taken in this study is, therefore, likely to lead to some innovative results that will have useful policy implications for SSA. Thus, this study mainly contributes to the existing literature by considering the influence of conflict on the determination of fiscal effort in SSA.

The rest of the paper is organized as follows: Section 1 delves into the literature and considers both the theoretical and empirical aspects of the debate. Section 2 focuses on the model specification, data, and methods of analyses. Section 3 then turns to the presentation and discussion of findings. The paper then concludes, and discusses policy recommendations and avenues for further research.

1. Review of related literature

1.1. Theoretical literature

Researchers have been engaged with the issue of fiscal sustainability for quite a long time. The subject examines how the government can smoothly finance its budget over time without jeopardizing its fiscal position through the explosive growth of debt. Bohn (1998) postulates a simple framework for answering the debt sustainability question: does the government respond correctively to the changes in the debt-GDP ratio over time? This approach, now central to the analysis of fiscal sustainability, examines the reaction of the primary (non--interest) surplus to changes in public debt to income ratio, conditioning on the non-debt economic control variables. Equation (1) specifies Bohn's (1998) basic model that relates the primary balance to changes in public debt as follows:

$$pb_t = \varphi gd_t + \rho z_t + \epsilon_t \tag{1}$$

where pby_t represents the primary balance as a share of GDP, gd_t is the debt ratio, z_t captures other (non-debt) determinants of the primary balance, and ϵ_t denotes the error term. Assuming that the government satisfies the intertemporal budget constraint and the no-Ponzi condition,[6] fiscal solvency requires future primary surpluses to exceed deficits in present value terms, for any given amount of government debt today. Empirically a positive coefficient on $b_t(\varphi > 0)$ is sufficient for debt sustainability. Moreover φ should be less than unity ($\varphi < 1$) to avoid explosive growth of public assets over time. Essentially the value of the parameter φ determines the strength of response. A value between zero and one implies that fiscal policy is responsive to the growth of debt, while a value of zero or less implies either that the primary surplus is unresponsive to increases in the debt ratio or that the surplus is very small in response. Thus fiscal policy responds more forcefully to increases in the public debt the closer φ is to unity.

It is important to note that the theoretical model in equation (1) may be affected in the short- to medium-term by the difference between the nominal interest rate and nominal economic growth rate, that is, the so-called interest-growth differential. Thus, a primary deficit in the short-term may not jeopardize fiscal solvency due to the positive difference between growth and the interest rate. Consistent with this it has been shown that the fiscal stability that is obtainable in some SSA countries in recent years is attributable to the favourable interest-growth differential (Ncube & Brixiová, 2015this article finds that the actual primary balances exceeded those required to keep public debt at the 2007

[6] This rules out the possibility that government can grow or roll it over indefinitely.

level in about half the countries studied, and in several cases, those needed to reduce public debt-to-GDP to sustainable thresholds. The interest rate-growth differential (Ncube & Brixiová, 2015; IMF, 2019). In the long-term however sustainability would require that the conditions outlined above are satisfied.

1.2. Empirical literature

Since the seminal study of Bohn (1998) a large body of empirical literature has been published in line with the argument that fiscal response tends to vary from one country or region to another due to the influence of country- or group-specific factors (Everaert & Jansen, 2018). Prior to Bohn's (1998) study the empirical approaches to the study of fiscal sustainability have employed time series techniques of unit root and co-integration (see e.g., Trehan & Walsh, 1988, 1991; Kremers, 1989). These tests have been criticized for requiring long time series which are oftentimes not available and for the difficulty of rejecting the null hypothesis of unit root due to the low power of the tests (Bohn, 1995; Adams, Ferrarini, & Park, 2010). The time series approaches also fail to address a critically important issue regarding the explicit fiscal reaction functions that shed light on government's behaviour when debt is growing (Bohn, 1998). These limitations have led to the popular debt-stabilizing primary balance approach to the assessment of debt sustainability (Bohn, 1998; Chalk & Hemming, 2000).

Using the FRF framework early researchers have attempted to examine fiscal sustainability with emphasis on purely macroeconomic factors. Such is the approach taken in the seminal work of Bohn (1998) who examines the behaviour of government in response to rapidly rising public debt. Upon the basis of Barro's (1979) tax-smoothing model Bohn (1998) addresses a potential omitted variables problem by accounting for economic factors such as business cycle conditions and temporary government spending shocks. Adapting this approach, several studies have assessed fiscal responses to growing public debt while accounting for a variety of conditioning variables depending on the context of the study. For example, Checherita-Westphal & Žďárek (2017) focusing on the Euro area countries consider a number of socio-political and institutional variables including an election year dummy and a measure of government stability in their FRF while Mupunga & Ngundu (2020) on SSA countries proxy for institutional quality using the World Bank's country policy and institutional assessment (CPIA) score. At its very core a FRF should account for both the willingness and ability of government to satisfy the constraints of fiscal sustainability (Checherita-Westphal & Žďárek, 2017). Within the context of SSA countries this will require the additional consideration of socio-political factors such as armed conflict.

Empirical studies have tended in general, to present a positive and significant estimate of φ but there are some variabilities to the magnitude of the es-

timate. For European countries Checherita-Westphal and Žďárek (2017) find from their review of the literature that the magnitude of φ varies between 0.01 and 0.1. Their study, albeit, presents an estimate ranging between 0.03-0.04 similar to that of the European Commission (2011). With an estimate ranging between 0.27 and 0.6, Berti, Colesnic, Desponts and Pamies (2016) conclude that the fiscal reaction of European countries has increased following the sovereign debt crisis. For SSA countries fiscal reaction tends to range from 0.01-0.03 according to Adedeji and Williams (2007) and Mupunga and Ngundu (2020). The magnitude of the fiscal response coefficient is likely to be affected by the non-debt variables being accounted for and depending on the extent to which the variables are important to a given context.

Bohn (1998) makes an empirical comparison between evidence from a univariate and a multivariate model arguing that the former model suffers from omitted variable bias as the relationship between debt and the primary balance is blurred by business cycle fluctuations and temporary shocks to government spending—typically during wars and recession—in the spirit of the tax smoothing model (Barro, 1979). In the tax smoothing model the difference between the tax revenue and non-interest government spending (both as shares of GDP) yields the primary balance equation which accounts for temporary shocks to public expenditure and a cyclical indicator. Upon the basis of this FRF often include *inter alia* a business cycle variable, typically the output gap, and a proxy for expenditure shocks, typically the expenditure gap, to account for the deviations of government spending from its long-term trend.

There are two dominant features of the FRFs literature. One is that they are predominantly focused on the advanced countries (see e.g., Ghosh, Kim, Mendoza, Ostry, & Qureshi, 2013; D'Erasmo et al., 2015). The other is that they mostly account for purely macroeconomic non-debt determinants of the primary surplus and the. The outset of the European debt crisis has tilted the balance of the literature towards the Euro area countries (see e.g., Plodt & Reicher, 2014; Baldi & Staehr, 2016; Berti et al., 2016; Checherita-Westphal & Žďárek, 2017). There is a very limited focus on the case of SSA countries in the literature. This is a rather surprising realization considering the debt crisis and the consequent debt relief efforts of previous decades and the rapid pace in the growth of public debt in recent years.

Within the political economy literature focusing on public debt it has extensively been shown that an approach focusing purely on macroeconomic factors is not enough to explain the growth of debt in peace time (Alesina & Perotti, 1995; Alesina & Passalacqua, 2016). Analogously the non-debt determinants of the primary fiscal balance would cut across the macroeconomic, socio-political and institutional factors (Lledó & Poplawski-Ribeiro, 2011; Berti et al., 2016; Checherita-Westphal & Žďárek, 2017). This reasoning exemplifies the heterogeneity argument where authors like Everaert and Jansen (2018) for ex-

ample demonstrate that countries react heterogeneously to the growth of debt as a result of unique country—or perhaps region-specific factors. These variations in fiscal responses may bias the evidence of fiscal fatigue when heterogeneous slopes are modelled as homogeneous given that such evidence is not a generalizable characteristic of the fiscal reaction function (Everaert & Jansen, 2018). The heterogeneity argument has received considerable emphasis in the FRF literature. Researchers often compare evidence between countries-specific analysis using long time series and country panel analysis with a shorter duration. As Berti and others (2016) argue the choice between these two approaches boils down to the trade-off between the assumptions of time-invariance and country-invariance both of which are relatively restrictive. Whereas some studies take the panel[7] or time series[8] approach, it is not uncommon for researchers to consider both approaches in their empirical analysis (Medeiros, 2012; Berti et al., 2016; Mupunga & Ngundu, 2020).

Studies employing FRFs have also tackled the empirical question of fiscal fatigue. This aspect of the debate addresses the non-linearity in the debt-primary balance relationship. The argument here stems from the evidence of increasing fiscal response in the Euro area since the outset of the sovereign debt crisis (Baldi & Staehr, 2016; Berti et al., 2016; Checherita-Westphal & Žďárek, 2017). The fiscal fatigue debate thus considers the possibility that fiscal response may not continue indefinitely with the growth of the debt. Accordingly the primary balance may tend to decline as the debt ratio reaches a certain threshold. Fiscal response may even become negative beyond this threshold. Several empirical findings suggest that fiscal response starts to decline at debt-GDP thresholds of about 80-100% and turns to negative at 150-170% (Medeiros, 2012; Ghosh et al., 2013; Ghosh, Ostry, & Qureshi, 2013; Everaert & Jansen, 2018). Similarly, Mupunga and Ngundu (2020) present a threshold estimate of 90% for SSA countries beyond which the fiscal response becomes negative.

The question of whether the fiscal reaction function should be static or dynamic has also been addressed. Researchers tend to favour the dynamic approach given the inertia in fiscal policy which creates a lag in a government's response to changes in debt and other economic shocks. As a result the lag of the dependent variable has been included as an explanatory variable in many applications (see e.g., Égert, 2012; Berti et al., 2016; Checherita-Westphal & Žďárek, 2017). However studies such as those of Mendoza and Ostry (2008) and Ghosh and others (2013) have employed static models.

[7] See e.g., Checherita-Westphal and Žďárek (2017).

[8] See e.g., Burger and others (2012) and Ogiji and Ajayi (2020).

2. Model specification, data and methods of analysis

2.1. Model specification and data

The model employed in this study is built upon the debt-stabilizing framework in equation (1) following Bohn (1998). Essentially the approach focuses only on the economic determinants of fiscal adjustment, including public debt, a business cycle indicator and government spending shock. This basic framework is extended (in the spirit of Woo (2003)) to account for the role of armed conflict which is potentially an important socio-political determinant of fiscal effort in SSA countries. The model is specified as follows:

$$pb_{i,t} = \beta_0 + \beta_1 pb_{i,t-1} + \beta_2 gd_{i,t-1} + \phi x_{i,t} + \eta(con \times gd_{i,t}) + \delta_i + \eta_t + \epsilon_{i,t} \qquad (2)$$

where the dependent variable *pb* is the primary fiscal balance in percentage of GDP; δ_i and η_t are the country and time fixed effects respectively while $\epsilon_{i,t}$ are the error terms. To account for the dynamic behaviour of fiscal policy, i.e., the sluggish response of fiscal policy to changes in economic conditions, the model includes the lagged dependent variable ($pb_{i,t-1}$); the main variable of interest, $gd_{i,t-1}$ is the one year lag of gross government deb over GDP whose coefficient measures the reaction of fiscal policy to changes in the gross debt ratio and is expected to be positive a priori; its squared term ($gdsq_{i,t-1}$) is included in some specifications to test for the presence of fiscal fatigue in the model. Following the predominant approach in previous studies in $x_{i,t}$ a set of economic determinants of the primary balance are captured. This includes the output gap ($yg_{i,t}$) to account for cyclical conditions, the government expenditure gap ($gxg_{i,t}$) to proxy for the deviation of expenditure from its long-term trend, the current account balance over GDP ($cab_{i,t}$) to proxy for the twin deficits hypothesis, inflation rate ($inf_{i,t}$) as a measure of economic uncertainty and a crisis dummy ($gfc_{i,t}$) to account for the impact of the global financial crisis. The focus on SSA countries necessitates the inclusion of a debt relief dummy ($relief_{i,t}$) to account for the impact on debt sustainability of the HIPC and MDRI debt relief programmes. However, this dummy may tend to be omitted in some estimations due its time invariant nature.

The role of conflict (con_{it}) is explicitly modelled in equation (2) given its persistence in SSA countries over the decades. It is included non-linearly as an interaction term due its indirect influence on the main explanatory variable—the gross government debt. To account for its role therefore conflict is interacted with gross government debt ($con \cdot gd$) and used to measure the effect of conflict on the response of fiscal policy to public debt. Conflict is constructed (using the UCDP PRIO database) as a dummy variable which takes the value one if in any country-year fatalities of up to 25 battle deaths were recorded, otherwise, the value zero is given.

Overall the model includes the lagged dependent variable, the lag of government gross debt and its squared term, the output gap, government expenditure gap, current account balance, a crisis dummy, a relief dummy and an interaction term between conflict and government debt. A detailed description of variables and their sources is provided in Table A1 of the Appendix. The study mainly employs an unbalanced dataset on 41 SSA countries over 30 years spanning the period 1990–2019. The list of countries in the sample is provided in the appendix Table A2 which also identifies countries conflict-affected and non-affected countries during the study period. Specifically of the 41 countries in the overall sample, 24 are conflict-affected while 17 are non-conflict countries. Upon the basis of this distinction two sub-samples from the overall sample are constructed which are then used to carry out robustness checks on the main results. Table A3 of the Appendix presents descriptive statistics of variables of the main dataset.

2.2. Estimation methods

In estimating fiscal reaction functions previous studies have confronted a variety of potential empirical data issues, mainly of endogeneity and cross-section dependence. By implication several estimation methods have been employed in a bid to address these issues. In a dynamic panel framework it is important to address the so-called Nickell bias arising from the inclusion of the lagged dependent variable (Nickell, 1981). Another potentially endogenous variable is the output gap. This arises from the problem of reverse causality—fiscal policy affects the output gap which is itself affected by fiscal policy. Also the current account balance is a potential endogenous variable based on the twin deficit hypothesis.[9] The second potential issue of concern apart from endogeneity is that of cross-sectional dependence which is capable of jeopardizing the efficiency and consistency of estimates (Chudik & Pesaran, 2015; Eberhardt & Presbitero, 2015). Luckily preliminary tests for the presence of could not reject the null of cross-section independence (see the Appendix Table A4 for the results). The study therefore focuses on addressing the potential issue of endogeneity.

Given the outlined sources of endogeneity in the model a variety of instrumental variables techniques applicable within the panel data framework were relied upon. The instrumental variables fixed effect (FE-IV) approach was used at the beginning. By employing this technique, the study takes into cognisance the Nickell bias criticism. Although there is the consideration that the bias may become negligible when the time dimension of the panel is large, that is, when T is greater than 20 (Bond, 2002) there is the contrary evidence demonstrating that the bias may remain substantial even when $T = 30$ (Judson & Owen,

[9] Fiscal deficit resulting for example from a tax reduction may lead to the deterioration of the current account.

1999). Alternatively, two instrumental variables techniques, namely the two-step generalised method of moments (GMM) and the traditional two-stage least squares (2SLS) method are employed. The two-step GMM has relative efficiency gains over the traditional 2SLS method (Hayashi, 2000). In any case both estimations are robust to the presence of heteroscedasticity and autocorrelation.

Turning to the variables included in the instrument set, the lagged dependent variable is instrumented with the second and third lags of the dependent variable. The output gap is instrumented with its first and second lags as in Checherita-Westphal & Žďárek (2017) and the second lag of the proxy for output gap used in Plodt & Reicher (2014).[10] For the current account balance the first and second lags are employed as instruments. Tests for the validity of instruments, namely the Sargan / Hansen tests for over-identifying restrictions and the Kleibergen-Paap LM test for weak instruments, are reported for each of the estimations as postestimation diagnostics.

3. Estimation results

As discussed earlier various estimation techniques have been employed to aid comparability of the estimates. Results are presented in two stages; stage 1 employs the entire sample comprising 41 SSA countries from 1990–2019 while stage 2 divides the sample between conflict-affect and nonaffected countries. The second stage results are however reserved for robustness checks given the conjecture that conflict is a key variable in the model. Table 1 presents findings from three alternative panel estimation methods; the fixed effects IV, the two-step GMM and the traditional 2SLS methods each of which addresses the issue of endogeneity using instrumental variables. Results are presented from a linear specification (Panel A) and a non-linear specification (Panel B). As earlier explained the presence of fiscal fatigue is examined by including the squared term of government gross debt in the specification.

Panel A which presents results from a linear specification and shows that the fiscal response coefficient (the coefficient of lagged government debt) is positive and significant in accordance with the expectation, and this is regardless of the method of estimation used. This affirms that SSA countries have been fiscally responsive in terms of initiating fiscal adjustments in response to the rising debt in the sub-region. This finding has also been reported in previous studies focusing on SSA (Adedeji & Williams, 2007; Mupunga & Ngundu, 2020). The estimated fiscal response coefficient ranges from 0.014–0.027 in this group of estimations. The coefficient tends to be smaller (0.014–0.016) in the

[10] Plodt & Reicher (2014) employ the output growth gap $\left(\frac{Y^p_{t-1}}{Y^p_t} - \frac{Y_{t-1}}{Y_t}\right)$ as proxy for output gap.

Table 1. Empirical results from a linear and nonlinear model (1990–2019)

Variables	Panel A: Linear model				Panel B: Nonlinear model			
	FE-IV	FE-IV2	GMM	2SLS	FE-IV	FE-IV2	GMM	2SLS
pb(t–1)	0.737***	0.764***	0.762***	0.735***	0.666***	0.674***	0.722***	0.734***
	(0.047)	(0.016)	(0.098)	(0.091)	(0.009)	(0.011)	(0.076)	(0.078)
yg	0.011	0.007	0.040	0.009	0.008	0.010	0.041	0.010
	(0.016)	(0.009)	(0.092)	(0.006)	(0.0071)	(0.011)	(0.096)	(0.014)
cab	0.292	0.166	0.113	0.182	0.166***	0.167***	0.083	0.163
	(0.282)	(0.112)	(0.112)	(0.174)	(0.061)	(0.059)	(0.110)	(0.166)
gd(t–1)	0.023*	0.027*	0.016**	0.014**	0.048***	0.047***	0.034***	0.041***
	(0.012)	(0.015)	(0.007)	(0.007)	(0.011)	(0.011)	(0.012)	(0.016)
gdsq(t–1)					–0.000***	–0.000***	–0.000**	–0.000**
					(0.000)	(0.000)	(0.000)	(0.000)
g · g	–0.590***	–0.575***	–0.481***	–0.568***	–0.453***	–0.455***	–0.509***	–0.497***
	(0.072)	(0.047)	(0.051)	(0.067)	(0.053)	(0.049)	(0.081)	(0.051)
gfc	0.429	0.344	–0.024	0.059	0.485	0.519*	0.122	0.332
	(0.479)	(0.387)	(0.395)	(0.472)	(0.320)	(0.316)	(0.458)	(0.549)
inf	–0.000	–0.000	0.000	0.000	–0.000	–0.000	0.000	–0.000
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)

con · gd	−0.009*	−0.011*	−0.008*	−0.008*	−0.008*	−0.008*	−0.009**	−0.009**
	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
year	0.026	0.055**	0.041	0.012	0.044**	0.091**	0.022	0.027
	(0.028)	(0.028)	(0.044)	(0.032)	(0.022)	(0.037)	(0.034)	(0.039)
relief			−0.233	0.067			−0.546	−0.379
			(0.765)	(1.048)			(0.794)	(0.940)
Constant	−51.39	−111.4**	−83.08	−23.91	−89.43**	−185.0**	−44.34	−54.48
	(57.84)	(55.82)	(88.55)	(64.43)	(44.66)	(74.34)	(69.02)	(78.61)
R-squared	0.92	0.92	0.82	0.912	0.88	0.86	0.848	0.837
FE	no	yes	yes	no	no	yes	no	no
S/H test	1.743	1.743	3.551	2.659	2.466	1.699	3.238	3.346
S/H test [*p*-value]	[0.187]	[0.187]	[0.169]	[0.103]	[0.291]	[0.428]	[0.356]	[0.356]
K-P	16.150	18.390	22.654	17.523	18.740	17.900	18.904	18.934
K-P test [*p*-value]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.001]
Observations	972	972	972	972	972	972	972	972

Note: *, **, *** denote significance at 10%, 5% and 1% respectively. In parenthesis are standard errors—clustered in the fixed effects regressions and robust in the GMM and 2SLS regressions; *p*-values in squared bracket. FE denotes time fixed effects. S/H test denotes the Sargan / Hansen tests of over-identifying restrictions. Its null hypothesis is that instruments are valid; K-P denotes the Kleibergen-Paap LM test for weakness of instruments. Its null hypothesis is that instruments are weak.

Source: Own work.

GMM and 2SLS estimations relative to the one-way and two-way fixed-effects IV estimations where the estimate ranges from 0.023–0.027.

The fiscal response coefficient tends to vary substantially between the linear and non-linear specifications. In the non-linear results reported in Panel B of Table 1, the coefficient is mostly more than double the estimated values in the linear models. It ranges between 0.034–0.048 in this group of estimations. As in the linear equation results the fiscal reaction estimates of the fixed effects IV (0.047–0.048) are higher than those of the GMM and 2SLS (0.034–0.041). It is interesting to note the substantial improvements in statistical significance when a non-linear model is specified: the estimate is now significant at the 1% level across all the regressions. This is further discussed in Section 3.2 focusing on fiscal fatigue.

Turning to the non-debt determinants of fiscal effort included in Equation (2), the lagged dependent variable presents positive and strongly significant estimates regardless of the methods of estimation employed. Here the results of the linear and non-linear equations are similar. This supports the relevance of a dynamic specification. The evidence seems to suggest that fiscal policy has been persistent in SSA. This result is commonly reported among previous studies (see e.g., Checherita-Westphal & Žďárek, 2017; Everaert & Jansen, 2018). The estimated coefficient of the output gap is positive which would suggest that fiscal policy has been counter-cyclical during the study period. The results are, however, not significant across the two groups of estimations. Similar results are presented in previous studies such as those of Berti and others (2016) and Checherita-Westphal and Žďárek (2017). The coefficient of the government expenditure gap is negative and highly significant indicating that the primary balance responds inversely to temporary shocks to government spending. Thus, e.g., a shock that raises the government expenditure will tend to deteriorate the primary balance. This is also a commonly reported result in previous studies (see e.g., Adams et al., 2010; Mupunga & Ngundu, 2020). A positive coefficient on the current account is consistent with the twin deficit hypothesis, though the estimate tends to lack significance in most cases except in the non-linear FE-IV estimations in Panel B. Both the crisis dummy and the inflation rate present estimates, positive and negative respectively, that do not accord with the expectations. Both results are however insignificant.

Regarding the role of conflict which is tested by interacting the conflict dummy with gross debt ratio, the evidence tends to give considerable support to its importance in the model. The variable presents the expected negative and significant coefficient estimate which indicates the effect of conflict on the response of fiscal policy to gross government debt. This is an economically significant result which implies that the persistence of armed conflict tends to lead to increases in debt which negatively affect the fiscal effort in SSA countries. Given the fact that the overall sample is composed of conflict-affected and non-affected countries however, this result is re-examined in Section 3.1.

The significance of the coefficient estimate, though weak (at the 10% level) in most cases tends to increase to 5% level in some of the nonlinear regressions.

Both the linear and non-linear models perform quite well in the various diagnostic tests. The Sargan/Hansen tests of over-identifying restrictions confirm the validity of the instruments. Similarly, the Kleibergen-Paap tests for weak instruments present strong evidence suggesting that the model is identified in all cases. Moreover the models have good explanatory power as shown by the goodness of fit (R-squared ranges from 0.82–0.92) in both the linear and non-linear regressions.

3.1. Robustness checks

For robustness checks (Table 2) the entire sample is divided between conflict-affected and non-affected countries during the study period. The sub-sample of conflict-affect countries comprises 24 countries while the non-affected sub-sample comprises 17 countries (see Appendix A1). The estimations in Table 1 are repeated using these sub-samples, albeit this time, the conflict-debt interaction term is only included in the estimations that employ the conflict-affected sample. We report the results in Table 2.

The results in Panel A are from the sample of conflict-affected countries while Panel B presents results from the sample of no-conflict countries. The results are quite intuitive and interesting. On one hand the main results reported in Panel A tend to be similar to those of Table 1 in terms of magnitude, sign and statistical significance. Specifically the fiscal response variable is correctly signed and presents coefficients quite similar in magnitude (0.027–0.028) to the linear models in Panel A of Table 1. Although the variable presents a larger coefficient estimate in the fixed-effects regression (0.046) it however tends to resemble those of the nonlinear regressions of Table 1. It is quite satisfying to observe the improvement in statistical significance of the coefficient on the conflict×debt interaction term which is now significant at the 1% level in the fixed effects regression and at the 5% level in the others. On the other hand the estimates of the fiscal response variable presented in Panel B of Table 2 do not accord with the expectation neither are they significant in any of the regressions no matter which method of estimation is used. This suggests that conflict is a particularly important determinant of fiscal effort in countries that have been affected by conflict.

Regarding the other included regressors the results in Panel A (using the conflict-affected countries sample) are also more similar to those of Table 1 than the results in Panel B using the no-conflict countries). There are, however, a few changes. Output gap is now negative, suggesting that fiscal policy is procyclical when focusing only on conflict-affected countries. Similarly the coefficient on the current account balance now fails to accord with the twin deficits theory. As in Table 1 these results are not significant. Overall the results

Table 2. Robustness checks using sub-samples of conflict and non-conflict countries

Variables	Panel A: conflict countries sample			Panel B: non-conflict countries sample		
	FE-IV	GMM	2SLS	FE-IV	GMM	2SLS
pb(t–1)	0.887***	0.853***	0.865***	0.707***	0.794***	0.794***
	(0.334)	(0.077)	(0.078)	(0.058)	(0.142)	(0.143)
yg	–0.008	–0.006	–0.005	0.008***	0.009	0.009
	(0.009)	(0.008)	(0.008)	(0.003)	(0.008)	(0.009)
cab	–0.093	–0.049	–0.057	0.022	0.072	0.068
	(0.187)	(0.0499)	(0.0542)	(0.155)	(0.151)	(0.227)
gd(t–1)	0.045***	0.027***	0.028***	–0.318	–0.150	–0.149
	(0.016)	(0.009)	(0.009)	(0.328)	(0.147)	(0.151)
gdsq(t–1)	–0.000***	–0.000***	–0.000***	0.002	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)
g · g	–0.839***	–0.747***	–0.771***	–1.464***	–1.616***	–1.616***
	(0.131)	(0.099)	(0.104)	(0.016)	(0.098)	(0.098)
gfc	0.034	–0.048	0.034	–1.662	–0.169	–0.180
	(0.447)	(0.499)	(0.498)	(1.477)	(0.767)	(0.921)
inf	–0.0006	0.0006	0.0005	0.023	0.009	0.010
	(0.001)	(0.001)	(0.001)	(0.051)	(0.033)	(0.051)

con · gd		−0.690	−0.709		−0.745	−0.765
		(0.580)	(0.582)		(1.088)	(1.467)
year	−0.012***	−0.009**	−0.009**			
	(0.003)	(0.003)	(0.003)			
relief	−3.233*	−1.238*	−1.391**	8.397	3.058	3.045
	(1.661)	(0.661)	(0.665)	(7.915)	(3.328)	(3.383)
Constant	0.78	0.79	0.78	0.92	0.93	0.93
	yes	yes	yes	yes	yes	yes
R-squared	0.655	2.027	1.739	1.067	0.000	0.001
FE	[0.717]	[0.363]	[0.187]	[0.586]	[0.983]	[0.972]
S/H test	23.65	28.395	26.717	7.420	7.420	7.499
S/H test [*p*-value]	[0.000]	[0.000]	[0.000]	[0.059]	[0.025]	[0.025]
K-P	567	567	567	405	405	405
K-P test [*p*-value]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
Observations	972	972	972	972	972	972

Note: *, **, *** denote significance at 10%, 5% and 1% respectively. In parenthesis are standard errors—clustered in the fixed effects regressions and robust in the GMM and 2SLS regressions; *p*-values in squared bracket. S/H test denotes the Sargan / Hansen tests of over-identifying restrictions. Its null hypothesis is that instruments are valid; K-P denotes the Kleibergen-Paap LM test for weakness of instruments. Its null hypothesis is that instruments are weak. FE denotes time fixed effects.

Source: Own work.

of Panel B have not performed quite well in terms of meeting the fundamental expectations of a fiscal reaction function. On the other hand the results of Table 2 have generally done well in the diagnostic tests which give support to the validity of the instruments and to the explanatory power of the regressions.

3.2. Fiscal fatigue

An important aspect of the results of Table 1 concerns the issue of fiscal fatigue. This issue is examined using a non-linear (quadratic) specification. Thus each of the regressions in Panel B of Table 1 includes a squared term of the lagged government gross debt ratio. Whereas each of the regressions in Table 2 also includes a squared term of the lagged debt the results of Panel B are not significant. Therefore the focus of the discussion is on the results of Panel B of Table 1 and Panel A of Table 2. The results show, overall, that fiscal fatigue is present in the FRF of SSA countries given the positive sign on gross debt and the negative sign on its squared term in virtually all the regressions. This implies that there are fiscal adjustments being made in response to the rising levels of debt but that this happens only up to a threshold beyond which the response turns to negative. The threshold tends to vary a bit with the method of estimation employed and ranges from 253%–278%. Given the widely contemplated issue of cross-country heterogeneity in FRFs, it is considered that although fiscal fatigue is present (as the present evidence suggests) the threshold may tend to vary from one country to another depending on the unique factors that determine each country's fiscal response. Moreover it has been argued that the evidence of fiscal fatigue may be biased when heterogeneous slopes are modelled as homogeneous (Everaert & Jansen, 2018). In support, several different threshold estimates have been reported in previous studies (Medeiros, 2012; Ghosh & Kim et al., 2013; Ghosh, Ostry, & Qureshi, 2013; Everaert & Jansen, 2018). For this reason the evidence regarding the turning point of the fiscal response variable is taken with caution.

Conclusion and policy recommendations

This study examines the determinants of the primary fiscal balance within the established framework of the fiscal reaction functions. It focuses exclusively on the case of SSA countries due to the growing debt in the sub-region both in the aftermath of debt relief and since the outset of the global financial crisis.

Evidence from the study suggests that SSA countries have carried out fiscal adjustments in response to the escalating levels of debt. Further to this, the study presents a rather compelling evidence of fiscal fatigue which affirms the belief that fiscal responsiveness may not go on indefinitely. Conflict tends to play an important role in explaining fiscal effort in SSA. Given the indirect im-

pact that conflict may have on the main explanatory variable—gross government debt—it is modelled non-linearly using the interaction (conflict · debt). This is then used to explain the impact of conflict on the fiscal response. The results show that conflict has a negative and significant impact on fiscal response in SSA during the study period. Evidence further shows that conflict is a particularly important determinant of fiscal effort in countries that have experienced conflict between 1990–2019.

This study provides an interesting consideration for fiscal policy in SSA countries. The conflict problem in many SSA countries is one the most pervasive socio-political problems in these countries. Although quite a lot has already been said about the deleterious effects of violent conflict on economic variables this study presents additional evidence that helps to explain the intervening impact of conflict on fiscal response in SSA. Based on the evidence it is important to consider that although SSA governments have made attempts at carrying out fiscal consolidation to address their debt problems, persistent violent conflict remains a limiting factor that must be addressed. In particular the quest to expand the revenue base in this group of countries should of necessity be pursued along with that of finding ways to address the conflict problem. Fiscal policy may not achieve sustainability in the long-term otherwise.

The economic implications of armed conflict and terrorism continue to be an important area of research given the persistent of violence and conflict in many parts of the globe. While previous studies have focused more on the growth effects more recent studies have placed increasing emphasis on the fiscal effects. Among SSA countries this is a less-explored area which can be examined outside the framework of FRFs in future.

Appendix

Table A1. Summary of variables and their sources

Variable	Description	A priori	Source
pb	primary fiscal balance (% of GDP)	dep. variable	WEO
pb(t–1)	one year lag of primary fiscal balance (% of GDP)	(+)	HPDD[11]
gd(t–1)	one year lag of government gross debt (% of GDP)	(+)	HPDD[12]
yg	output gap (cyclical indicator)	(+)	WDI[13]
g · g	government expenditure gap	(–)	WEO
inf	consumer price index	(+)	WDI
cab	current account balance (% of GDP)	(+)	WEO
gfc	global financial crisis dummy	(–)	–
relief	debt relief dummy	(+)	World Bank
conflict	conflict dummy		UCDP/PRIO
con · gd	interaction term of conflict and government debt	(–)	–

Note: WDI stands for World Development Indicators; UCDP/PRIO represents the Upsala Conflict Data Program and the Peace Research Institute, Oslo; HPDD stands for the Historical Public Debt Database by Abbas, Belhocine, El-Ganainy and Horton (2010). WEO denotes the IMF World Economic Outlook Database.

Source: Own work.

[11] Latest figures are obtained from the World Economic Outlook (IMF) from 2017–2019.
[12] Latest figures are obtained from the World Economic Outlook (IMF) from 2017–2019.
[13] Output gap is obtained using Real GDP values from WDI.

Table A2. List of countries

Angola*	Ghana	Swaziland
Benin	Guinea*	Tanzania
Botswana	Guinea Bissau*	Togo
Burkina Faso	Kenya*	Uganda*
Burundi*	Lesotho*	Zambia
Cabo Verde	Liberia*	
Cameroon*	Madagascar	
Central African Rep*	Malawi	
Chad*	Mali*	
Comoros*	Mauritius	
Congo DR*	Mozambique*	
Congo Rep*	Namibia	
Cote d'Ivoire*	Niger*	
Equatorial Guinea	Nigeria*	
Eritrea*	Rwanda*	
Ethiopia*	Senegal*	
Gabon	Sierra Leone*	
Gambia The	South Africa	

Note: * denotes that a country has been affected by conflict during the 1990–2019 period. These sum up to 24 conflict-affected countries as against 17 remaining non-conflict countries.

Source: Own work.

Table A3. Descriptive statistics

	Unbalanced dataset (1990–2019)				
	mean	**standard deviation**	**min**	**max**	**observation**
pb	–2.612	25.48	–549.8	31.31	1076
pb(t–1)	–2.668	25.96	–549.8	31.31	1,035
gd(t–1)	75.57	62.07	0.474	523.4	1,150
yg	–0.000	0.033	–0.321	0.268	1218
g · g	–4.938	10.372	–124.557	40.863	900
inf	–0.618	0.608	–1.826	1.217	900
cab	–4.938	10.372	–124.557	40.863	1,217
gfc	0.267	0.442	0	1	1230
relief	0.707	0.455	0	1	1230
conflict	0.213	0.409	0	1	1,230
con · gd	17.929	48.542	0	523.382	1,191

Source: Own work.

Table A4. Cross-section dependence test results

	No year dummies		Year dummies included	
Test	**statistic**	***p*-value**	**statistic**	***p*-value**
Hypothesis: countries are cross-section independent				
Friedman	45.488	0.254	46.793	0.214
Frees test	3.103		4.033	
Frees' Q distribution				
	0.283	10%	0.283	10%
	0.383	5%	0.383	5%
	0.581	1%	0.581	1%

Note: ***, **, * denote significance at 1%, 5% and 10% respectively.

Source: Own work.

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Aims and Scope

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