Fiscal Policy Sustainability in Kenya

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Abstract

Fiscal policy sustainability is key for medium to long-term growth of any economy. Maintaining fiscal sustainability aids to create enough fiscal space to mitigate economic shocks. The fiscal space in Kenya has been constrained by rising government expenditures, widening the fiscal deficit further. As such, concerns have arisen on the sustainability of fiscal policy in Kenya, motivating this study. Using Johansen cointegration technique and the two-step Engle-Granger approach the study assessed the sustainability of fiscal policy in Kenya. Empirical findings indicate that fiscal policy in Kenya is weakly sustainable. However, the economy adjusts fast in instances of disequilibrium caused by various shocks. To ensure fiscal sustainability in the long run, the study recommends a reduction in the share of salaries and wages which is the largest component of recurrent expenditures. Similarly, retiring short-term and expensive commercial debt by increasing the share of concessional loans in financing fiscal deficit is key. A review of the relevance and costs of multiple exemptions including those on Value Added Tax (VAT) and other incentive schemes such as deductibles and investment allowances under corporate tax to reduce revenue forgone is paramount.

Keywords: Fiscal policy; fiscal sustainability; fiscal deficit; government expenditures; government revenues

JEL Classification Codes: E62, H50

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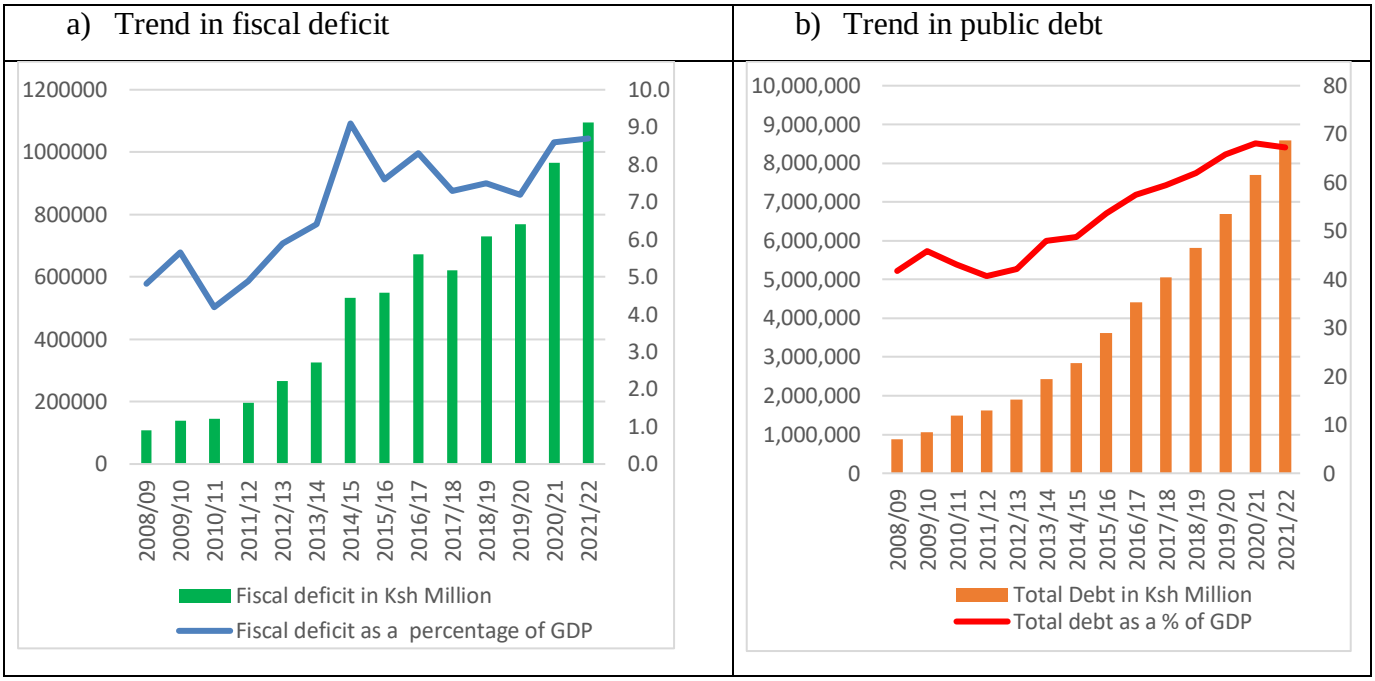
1. Introduction

Sustainable fiscal policy is imperative for a sustained economic development. It contributes to credible government policies that support macroeconomic and financial stability of a country. Therefore, maintaining prudent fiscal policy is vital to manage public spending and borrowing. According to Dwivedi (2005), fiscal policy refers to any government actions undertaken to influence the structures or levels of government revenues, expenditures and borrowing to realise specific objectives. Therefore, it is key in promoting economic growth, creating employment, reducing poverty levels as well as improving the external balance International Monetary Fund (IMF), (2015).

Taxation, government expenditure and public debt are the main instruments of fiscal policy. Tax revenue in Kenya is the main source of financing government expenditures. During FY 2021/22, the government realized a total of Ksh 2.19 billion from taxes against total expenditures amounting to Ksh 3.28 billion, accounting for 66.8 per cent of the total expenditures (National Treasury, 2022). Notably, the government expenditures have persistently been higher than revenues over the years causing a persistent increase in the fiscal deficit. As such, governments often use public debt (borrowing) as the third tool of fiscal policy to finance the fiscal deficit.

The government expenditure in Kenya has been growing over the years as the government focus on bridging the infrastructural gap. Total government expenditure rose from Ksh 694.2 billion in FY 2008/09 to Ksh 3,028.18 billion in FY 2021/22. To finance the rising expenditures, the government has continuously put in place measures to boost revenues. This has seen the country's revenue increase from Ksh 498.9 billion to Ksh 2,199.81 billion over the same period. Despite the increase in government revenues, the growth in fiscal deficit persists. In FY 2008/09, the fiscal deficit in Kenya amounted to Ksh 107.83 an equivalent of 4.8 percent of Gross Domestic Product (GDP). As of FY 2021/22, the fiscal deficit had risen to Ksh 1,098.12 billion, which is 8.7 percent of GDP. The growth in expenditures have not only had immense effect on the country's fiscal deficit but has also had a great bearing on the country's public debt as indicated in figure 1.1 below. Specifically, total stock of public debt rose exponentially from Ksh 870.58 billion (41.8% of GDP) in FY 2008/09 to Ksh 8,588.28 billion (67.3% of GDP) in FY 2020/21. This has led to pertinent questions on the sustainability of fiscal policy in Kenya.

Figure 1.1: Trends in Kenya's fiscal deficit and public debt (Ksh Million and as a % of GDP)



Source of data: The National Treasury (Quarterly Economic Budget Review, various reports)

The instruments of fiscal policy may spur economic growth or be detrimental to the economy. Specifically, proactive fiscal policy is an important instrument available to governments to stimulate economic activity and growth. Nevertheless, persistent increase in government spending that is not matched with an increase in government revenue leads to a budget deficit that needs to be financed. Financing the deficit through issuance of domestic debt, can lead to increase in domestic interest rates, which may lead to crowding out of private spending (Dwivedi, 2005). Further, financing the deficit through external debt constraints the country's fiscal space as most of the government revenues are utilized to service the debts. Noting the implications of fiscal policy, it ought therefore to be implemented in a sustainable manner to take advantage of the opportunities it offers to promote growth, employment, equity as well as favorable external balance and minimize exposure to the pitfalls associated with the policy. This explains the significant attention by policy makers to issues of fiscal policy sustainability.

In Kenya, fiscal deficit has grown from 4.8 percent of GDP in FY 2008/09 to 8.7 percent in FY 2021/22. The persistent growth has not only led to increasing public debt but also resulted to the increase in country's risk of external debt distress from low to high in 2022 according to the debt sustainability framework by International Monetary Fund (2022). In addition to the widening fiscal deficit, the country has not met its fiscal deficit targets over the years. The actual fiscal deficit has continuously been higher than the desired target. This has raised major concerns on the sustainability of the fiscal policy in Kenya. The study, therefore, sought to establish the whether the current level of fiscal policy is sustainable or not. The study findings are instrumental in formulating the possible policies in relation to fiscal policy sustainability and that aid the government achieve its fiscal targets.

The study employed Johansen cointegration technique and the two-step Engle-Granger approach to assess the sustainability of fiscal policy in Kenya. Further, Impulse Response Functions were generated to ascertain the effect of one standard deviation on various macroeconomic indicators. The key findings showed that Kenya's fiscal policy is sustainable, though fast in adjustment in case of disequilibrium caused by shocks in the economy. Further, a standard deviation shock in fiscal policy was found to significantly depreciate the Kenyan Shilling, increase the consumer prices and decrease economic growth for at least the first one and half years. The results of the the Inverse Roots of AR characteristic polynomial test showed that the impulse responses were good as all the dots were within the circle as required.

The rest of the paper is structured as follows: the second section reviews literature on sustainability of fiscal policy, both theoretical and empirical. The third section discusses the estimation techniques and the data used in the study. Estimation results are presented in the fourth section and section five provides the conclusion and policy recommendations of the study.

2. Literature Review

Theoretical literature on fiscal sustainability is underpinned in three schools of thought; the Neo-classical, Keynesian and the Ricardian Equivalence theory. Whereas the Keynesian view propounds that expansionary fiscal policy constitutes a key policy prescription to grow the economy theorists persuaded by Ricardian equivalence assert that fiscal policy does not really matter except for smoothening the adjustment to expenditure or revenue shocks. While the Neo-classical and Ricardian schools focus on the long run, the Keynesian view emphasizes the short run effects of fiscal policy.

The Ricardian equivalence theory argues that financing of fiscal deficit through debt amounts only to postponement of taxes (Barro, 1989). Accordingly, the budget deficit in the present period can be considered as the present value of future taxation that is required to pay off the increment to debt resulting from the deficit. This implies that any expenditure by government must eventually be paid for, whether now or later, and the present value of spending must be equal to the present value of the total revenues. Therefore, the Ricardian equivalence theory argues that fiscal deficits are useful in smoothening the impact of revenue shocks or for meeting the requirements of nonsmoothed expenditures since tax financing may be spread over time (Barro, 1989).

Empirical studies on the sustainability of fiscal policy are becoming increasingly important.[1] However, only few studies have focused on Kenya (Nganga, Chevallier , & Ndiritu, 2018 and Mutuku, 2015). The studies reviewed mainly differ in econometric approaches. This study, therefore, categorizes the empirical literature into two, based on the econometric approach used by the authors.

Studies under the first category estimated the time series properties; the stationarity and cointegration tests, of the fiscal dataset (Burret, Feld, & Köhler 2017, Oyeleke & Adebisi 2014, Lusinyan & Thornton 2009, Afoso 2005). Some of the authors under this category relied on these estimations to infer fiscal sustainability whereas others estimated cointegrating vector between

[1] Some of the reviewed studies include Nganga, Chevallier , & Ndiritu 2018, Oyeleke & Adebisi 2014, Stoian & Campeanu 2010, Lusinyan & Thornton 2009, Afoso 2005, Kalyoncu, 2005 among others.

government expenditures and revenues to ascertain the existence of a long run relationship. The idea behind this approach is to establish that a one percent increase in expenditures causes a one percent increase in revenues.

The studies reviewed under the first category include Burret, *et al* 2017, Oyeleke & Adebisi 2014, and Lusinyan & Thornton 2009. Burret *et al*, (2017) analyzed the sustainability of public finances in the 16 states (Laender) of the Federal Republic of Germany. Their results provided evidence against strict fiscal sustainability in a majority of German Laender, except for Bavaria. For Ghana, Oyeleke & Adebisi, (2014) examined the sustainability of fiscal policy for the period starting 1980 to 2010. Their findings indicated that the fiscal stance for Ghana was sustainable, although weak. In addition, the results revealed that incase of shocks in the economy, only 29 percent of disequilibrium between revenues and expenditures were restored yearly. Lusinyan and Thornton, (2009) examined the long-run fiscal sustainability in South Africa. The results showed that South African revenue and spending were integrated of order one and cointegrated when structural breaks for the years between 1985 and 2005 were considered. The estimated long-run equilibrium relation indicated the existence of a weak fiscal deficit sustainability. The authors further noted that an error correction method of analysis was a sufficient condition to establish fiscal sustainability.

The second category comprise of studies that estimate the Fiscal Reaction Function (FRF) of the fiscal dataset. Under this category, the regression of the FRF is used to deduce a causal relationship between the initial debt level and fiscal policy. The regression gives the responsiveness of fiscal primary balance to debt accumulation. According to Mutuku (2015), fiscal policy will be sustainable if the coefficient is positive and significant at conventional levels.

Studies that applied the second category of modelling include Nganga *et.al* 2018, Baharumshaha, Soon, & Lau 2017, Mutuku 2015, Potrafke & Reischmann 2015 and Kalyoncu 2005. Nganga *et al* (2018) sought to establish the nature of fiscal policy regime in Kenya and its sustainability taking into account periodic regime changes. Their results indicated that the regime-switching model was appropriate in explaining regime sustainability. Further, their investigation found that both sustainable and unsustainable regimes were dominant and lasted for an average of four years each. The study also established existence of pro-cyclical fiscal policy in Kenya. In assessing the sustainability of fiscal policy in Malaysia, Baharumshaha *et.al* (2017) found out that the country in the past had followed a sustainable fiscal policy path, with the exception of short-term periods of economic difficult. The authors established that the government ought to reduce the deficits to ensure their sustainability in the long run.

Similarly, Mutuku (2015) estimated a fiscal reaction function derived from an inter-temporal government budget constraint to ascertain the fiscal policy sustainability for Kenya. Applying multivariate analysis based on VAR and VECM model, the analysis indicated that the fiscal behavior was incoherent with intertemporal budget constraint. This implied that fiscal adjustment was necessary to curb debt accumulation in Kenya. In addition, the findings showed that election cycles expenditures threatened Kenya's long run fiscal sustainability. Potrafke and Reischmann (2015) estimated a Bohn-model for West German Laender during the period 1980-2010 in panel Ordinary Least Squares (OLS) regressions with two sided fixed effects. They found out that fiscal policy was sustainable when fiscal transfers are included.

Articles on fiscal sustainability focus on the behavior of expenditures, debt and tax revenues in a time series to investigate whether the behavior of these series is coherent with the inter-temporal budget balance. The results of the studies vary depending on the methodology used and sample period chosen. There is little empirical work done to assess fiscal sustainability in specific African countries, and more particular in Kenya. The two papers reviewed for Kenya have one main shortcoming. The studies do not analyze time series characteristics, which are meaningful to discuss given the relatively short time dimension. Therefore, this motivates the need to undertake this study, taking cognizant of the time series properties in order to inform policy making.

3 Methodology

3.1 Theoretical framework and data

The literature reviewed shows that various methods have been used to ascertain fiscal deficit sustainability in different parts of the world. The methods have yielded different conclusions based on type and size of economy, fiscal policy stance and government expenditure. This paper is based on Ricardian Equivalence theory and applies the cointegration method of estimation derived from the inter-temporal budget constraint approach to assess fiscal sustainability in Kenya.

The concept of fiscal sustainability starts with formulation of the government budget constraint[2] that is applied to derive the present value borrowing constraint. The government budget constraint gives the relationship between government revenue and expenditure which comprises of the total spending on goods and services by the government, various transfer payments and interest paid on debts (Jibao, Schoeman, & Naraidoo, 2012). The government expenditures are assumed to be financed by taxes and debt issued at an interest rate, r, for simplicity. In financing the deficit using debt, it follows that the debt consumed in period *t* is issued in period *t-1*. Therefore, at period t, the budget constraint is given as follows:

$$E_t + (1 + r_t)D_{t-1} = R_t + D_t \qquad (1)$$

Where E is government expenditure in nominal terms excluding interest payments, r is the rate of interest, R is government revenue and D is the stock of debt. Iterating equation (1) further yields the following government's inter-temporal budget constraint:

$$E_t + R_t = \sum_{j=0}^{\infty} \prod_{i=1}^{\infty} (1 + r_t)^{-j+1} \left(R_{t+j} - E_{t+j}\right) + \lim_{j \to 0} \prod_{i=1}^{\infty} (1 + r_{t+1}) D_{t+j} \qquad (2)$$

Where $(1 + r)^{-j+1}$ is the discounting factor while R_{t+j} - E_{t+j} is the difference between government revenue and expenditure. Equation 2 gives the present value budget constraint (PVBC) which holds that solvency is achieved when the present value of primary surplus[3] is equivalent to the initial debt stock (D_t). Building on the foregoing, and following Hamilton & Flavin (1986), the model assumes that the interest rate is stationary with unconditional mean, r_t, and the growth rates of supply of debt, on average, are equal to or lower than the average interest

[2] The model was introduced by Blanchard, Chouraqui, Hagemann, & Sartor, (1990) and later advanced by Jibao, *et al*, (2012) and Oyeleke, (2014)

[3] Primary Surplus = R_t - E_t

rate. The above assumptions yield the transversality condition (equation 3) which states that the debt stock, when discounted to present value terms, equals to zero:

$$\lim_{j\to 0}(1 + r_{t+1})\, D_{t+j} = 0 \tag{3}$$

Given equation 3, equation 2 can therefore be re-written as follows;

$$E_t + R_t = \sum_{j=0}^{\infty}(1 + r)^{-j+1}\,(\Delta R_{t+j}\Delta E_t + rD_{t+j} \tag{4}$$

Equation 4 is the inter-temporal government budget constraint. The constraint must be stationary if government revenue, expenditure and the stock of debt are all integrated of order 1. This follows, therefore, that $R_t$and E_t are likely to be cointegrated if both are integrated of order 1. Based on this, an error-correction mechanism pushing government finances towards the levels required by the intertemporal budget constraint will exist.

To test the hypothesis of fiscal policy sustainability, equation (4) can be rewritten as follows:

$$E_t = \alpha + R_t + lim\frac{D_{t+j}}{(1+r)^{j+i}} + \varepsilon_t \tag{5}$$

Equation 5 prohibits the government from infinite borrowing given that the limit term is zero[4]. As a result, equation 5 may be expressed as:

$$R_t = \alpha + \beta E_t + \varepsilon_t \tag{6}$$

where R_t, and E_t are as defined before, α is a constant parameter, β is the expenditure coefficient and ε_t is the error term of the model.

The fiscal policy is said to be sustainable if R and E are cointegrated. Following Oyeleke & Adebisi (2014), Jibao *et al* (2012), and Kalyoncu (2005), as β tends towards zero, the fiscal policy is weakly sustainable and as it tends towards one, it portrays a strong form of sustainability. Therefore, the necessary and sufficient conditions[5] of fiscal policy sustainability are satisfied when $0 < \beta < 1$.

The study applied two-step Engle-Granger approach to achieve the second objective. First, the OLS technique was used to estimate equation 6 to attain the long run model. Secondly, the short run analysis between government revenues and expenditures was estimated using the error correction model (ECM). According to Lusinyan & Thornton (2009), the existence of cointegration between revenues and expenditures may imply the presence of corresponding error correction representation. It is worth noting that the change in government revenues not only depend on changes in government expenditure and its past values but also on the extent of

[4] From equation 3

[5] Quintos, (1995) and Ahmed & Rodgers, (1995) extensively discussed the necessary conditions for fiscal sustainability in relation to the order of integration and this was later elaborated in (Afoso, 2005).

disequilibrium between both variables in instances of economic shocks. First differencing the variables in equation 6 gives;

$$\Delta R_t = \alpha + \beta \Delta E_t + \varepsilon_t \quad (7)$$

Therefore, using equation 7, the study specified the error-correction model as follows;

$$\Delta R_t = \alpha + \sum_{i=1}^{n} \partial \Delta R_{t-i} + \sum_{i=0}^{n} \beta \Delta E_{t-i} + \delta \, ECT_{t-1} + \varepsilon_t \quad (8)$$

Where ΔR_t is the first difference of government revenue, ΔE_t is the first difference of the government expenditures and ECT_{t-1} is the error correction term generated from the residuals in equation 6 and δ is the coefficient of ECT that represents the speed of adjustment to equilibrium in case of shocks in the economy. The model also includes the lags of both dependent and independent variables.

3.2 Specification and Estimation procedure

The empirical estimation involves testing for stationarity of the variables, cointegration and estimating the cointegrating relation. The study applies the Phillips-Perron (1988) test to test for stationarity of the variables. Phillips-Perron is based on the null hypothesis that the series has unit root (non-stationary). Phillips-Perron test was preferred based on the weakness of low power[6] in the presence of structural breaks associated with the Augmented Dickey-Fuller (ADF) test. The test is therefore superior to ADF given that it takes into account the presence of structural breaks and they have higher power against very persistent alternatives.

In testing for cointegration, the study employs the Johansen (1991) cointegration test. The test involves testing the rank of r and π using the likelihood ratio test. The approach uses two tests, the maximum eigenvalue test (Max test) and trace test to ascertain the cointegrating vectors. On one hand, the Max test tests the null hypothesis that there are r cointegrating vectors against the alternative of r +1 vectors. On the other hand, the trace test tests the null hypotheses, $r = r_o$ against the alternative, $r \geq r_{o+1}$ such that the first r eigenvalues are non-zero. Trace test has been found to be superior to Max test based on its robust to skewness and excess kurtosis. Furthermore, the trace test can be adjusted for degrees of freedom, which can be of importance in small samples (Johansen & Juselius, 1990). The cointegration test was preferred over two-step procedure of Engel and Granger because it can estimate more than two cointegrating equations. A linear coefficient restriction test was also undertaken to ascertain whether the coefficient of the independent variable in the long-run cointegration model is statistically different from one.

Based on the analysis, Kenya's fiscal policy is sustainable if and only if the intertemporal government budget constraint holds in the present value terms. This implies that the current debt stock should be offset by the sum of the expected future discounted budget surpluses. Any violation to this constraint indicates that the current fiscal policy is not sustainable and thus corrective measures undertaken to correct it.

[6] The ADF have very low power against I(0) alternatives that are close to being I(1). That is, it cannot perfectly distinguish highly persistent stationary processes from nonstationary processes.

3.3 Data type and source

The data on the total national government revenues and expenditures was used to estimate the model. Total national revenues comprise of both tax and non-tax revenues whereas national expenditures comprise of total recurrent and development expenditures as classified by the National Treasury. The variables were measured in Kenya shillings (millions), nominal values. The dataset is from the first quarter of 2007 to the second quarter of 2022 obtained from various issues of the Quarterly Economic Budget Review published by the National Treasury.

4 Empirical results and discussion

4.1 Findings for stationarity analysis

Prior to estimation, the time series properties were examined to avoid estimation bias. The Phillips-Perron test results, in table 4.1, indicate that consumer price index and exchange rate only were stationary at levels. Debt/GDP ratio, government expenditure, government revenue and output gap indicated the presence of unit root at levels but stationary at first difference. This implies that they are integrated of order one, I(1).

Table 4.1: Unit root tests

	Phillips-Peron test		Conclusion
	Level	First Difference	
Consumer Price Index	-4.0463**	-6.9378	I(0)
Debt/GDP ratio	0.6381	-7.7296*	I(I)
Exchange rate	-3.3295**	-7.1108	I(0)
Expenditure	-1.7930	-13.1681*	I(I)
Revenue	-1.6036	-11.2061*	I(I)
Output gap	-1.4650	-3.5333*	I(I)
GDP	-2.6461	-10.3726*	I(I)

*The asterisk,**, * denote 5% and 1%, significance level respectively*
Source: Author's own computation using Eviews software

4.2 Diagnostic test results

The study conducted the post estimation diagnostic tests to ensure that none of the classical linear regression assumptions are violated. This is essential since it ensures that the estimator is unbiased, consistent and efficient. To achieve this, the study employed the Breusch-Godfrey Serial Correlation LM test to test for serial correlation. The results presented in table A1 in the Appendix indicate the none rejection of the null hypothesis[7], given the P-value corresponding to the observed R-squared is greater than 5 percent. This implies that the residuals are not serially correlated hence the estimator will be best, linear and unbiased. The Breusch-Pagan-Godfrey test was applied to test for Heteroskedasticity. The results, presented in table A2 in the Appendix, indicate that the null hypothesis of constant variance could not be rejected and hence the model has no heteroskedasticity problem. To test for the stability of the variables, the CUSUM test presented in figure A3 in the Appendix, was applied. The figure shows that the model is stable given that the calculated CUSUM statistics lies within the given range and hence the failure to reject the null

[7] The null hypothesis for serial correlation is that residuals are not serially correlated against the alternative that residuals are serially correlated.

hypothesis of model stability. In general, the diagnostic test results indicate that the assumptions were satisfied. Thus, the results are consistent and can be interpreted.

4.3 Cointegration test results

The stationarity tests showed that government revenue and government expenditures were integrated of order one. Therefore, it was necessary to test for cointegration to establish whether they have a long run relationship. The study employed Johansen cointegration test given that the approach allows for testing of restricted versions of cointegrating vectors and the speed of adjustment parameters. In addition, the approach can estimate several cointegration relations among the variables (Enders, 2004). The trace (λtrace) test and the maximum eigenvalue (λmax) test, reported in table 4.2a, were used to ascertain the number of cointegrating vectors. The results indicate the presence of one cointegrating equation at 5 percent level of significance. This implies that revenues and expenditures have a long run relationship and therefore are on a sustainable path. However, the existence of a long run relationship between revenues and expenditures is a necessary but not a sufficient condition for fiscal policy sustainability.

Table 4.2a: Unrestricted cointegration rank test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.4468	36.1391	15.4947	0.0000
At most 1	0.0003	0.0201	3.8415	0.8873
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.4468	36.1190	14.2646	0.0000
At most 1	0.0003	0.0200	3.8415	0.8873

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's own computation from study data using Eviews software

In addition to the existence of cointegrating relationship between revenues and expenditures, the coefficient should lie between zero and one in absolute value for fiscal policy to be sustainable. The study applied the concept of normalized cointegrating coefficient and Wald statistic coefficient restriction test as discussed by Quintos, (1995) to ascertain the strength of sustainability. The results indicate that the estimated cointegrating coefficient (β) in absolute is 0.53, which is closer to zero than one as shown in table 4.2b This implies that the fiscal policy has a weak form of sustainability over the period under consideration. The results compare with the findings of Nganga *et.al* 2018; Burret *et.al* 2017; Oyeleke & Adebisi 2014 and Kalyoncu 2005.

Table 4.2b: Normalized cointegrating coefficients

	Coefficient	Std error	P>|z|
Revenues	1.0000		
Expenditures	-0.5267	0.0221	0.0000

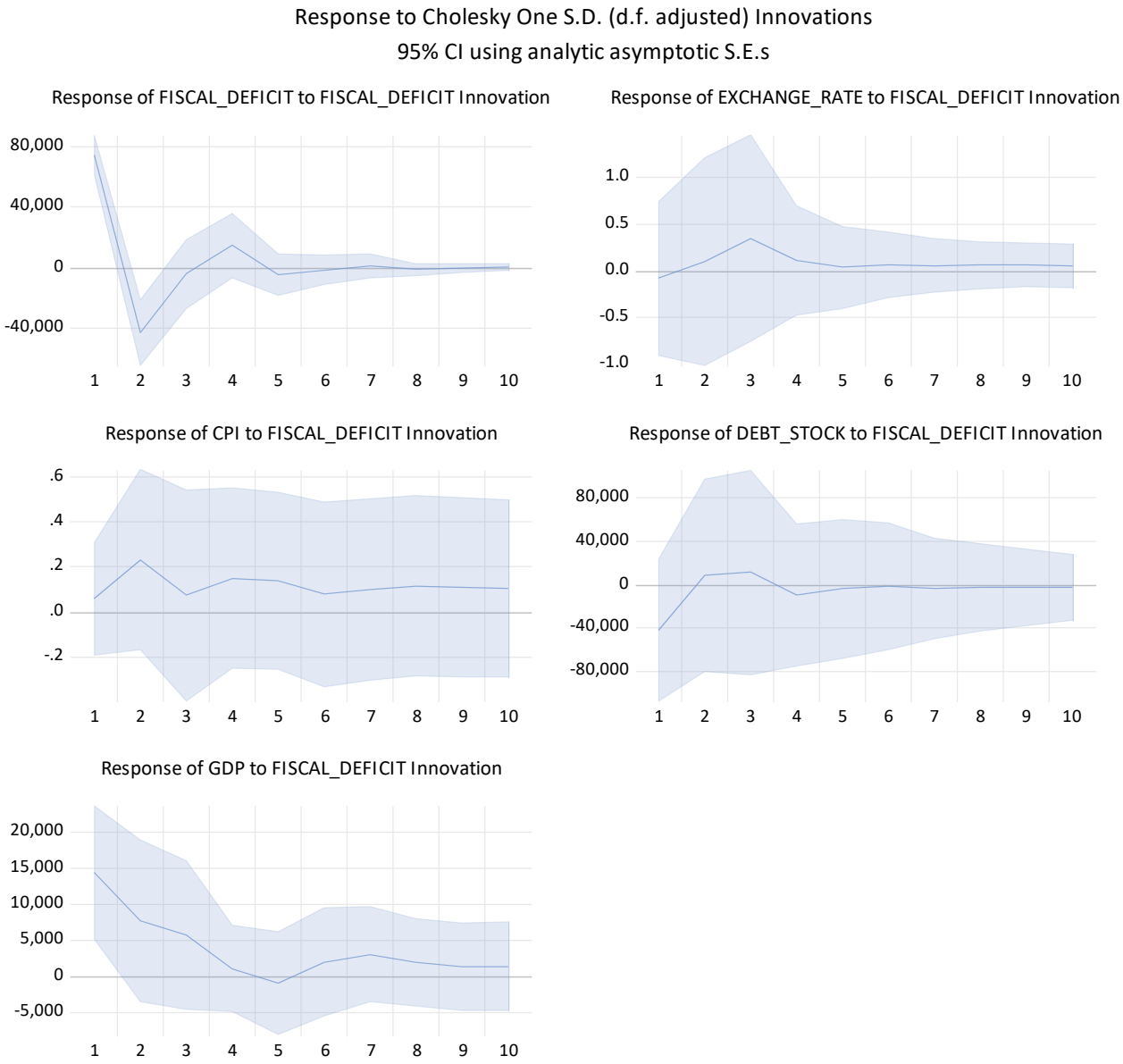
Source: Author's own computation from study data using Eviews software

4.4 Granger causality test results and Impulse response functions

The results for Granger causality test for the variables are presented in table A3. The findings expenditures influence revenues and vice versa. Despite the existence of causality, the relationship does not control for other explanatory variables, which is a key limitation of the Granger causality test. Therefore, the study estimated the long run and short run relationship between revenues and expenditures using the two-step Engle-Granger approach.

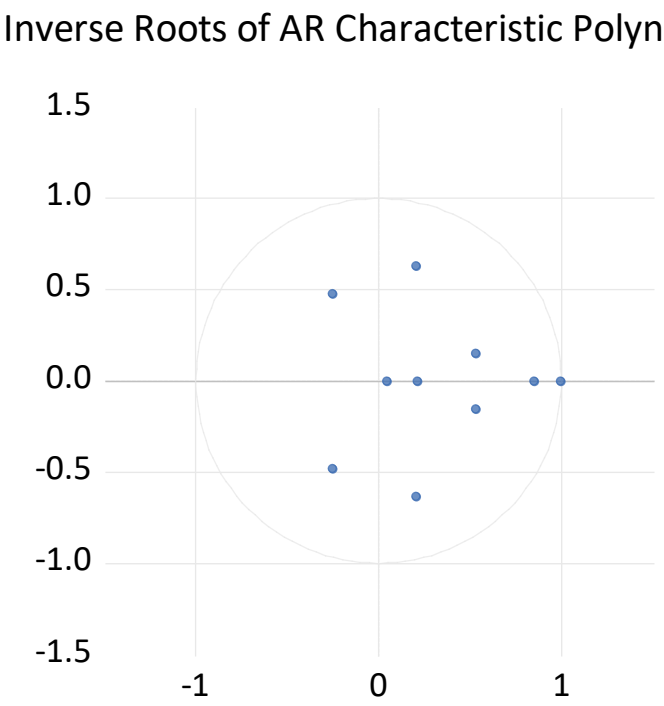
The study tested the impulse response of macroeconomic variables as a result of changes in country's fiscal positions. To ascertain whether the validity of the impulse responses, the study undertook the Inverse Roots of AR characteristic polynomial test. The results presented in figure 4.2 show that the impulse responses are good and may be interpreted as all the dots lie inside the circle as required. The findings on impulse response presented in figure 4.1 indicates that a one standard deviation in fiscal deficit significantly depreciates the Kenyan currency for a period of three and half years before stabilizing after the fourth year. Similarly, a fiscal shock on consumer prices increased for the first one and half years and decreased thereafter, stabilizing after the fifth year. Notably, economic growth significantly decreased in the first four years due to a fiscal shock. However, the effects decay after the fifth year. The findings indicate the various effects of changes in fiscal policy on macroeconomic indicators.

Figure 4.1: Impulse response functions



Source: Author's own computation from study data using E-views software

Figure 4.2: Inverse Roots of AR Characteristic Polynomial



Source: Author's own computation from study data using E-views software

4.5 Long run and short run analysis

The existence of the cointegrating vector necessitates the estimation of the error correction model to capture the short run dynamics. Prior to the estimation of the long run and short run analysis, the optimal lag length was selected based on the results of the information criteria including Akaike information criterion (AIC) Schwarz information criterion (SC), Hannan-Quinn information (HQ) criterion, Final prediction error (FPE) and Sequential modified LR test statistic. As indicated in table A4 in the Appendix, the optimal lag is 2 as majority of the information criteria selects it.

The long run analysis presented in table A5 in the Appendix shows that the long run coefficient of government expenditure is positive and statistically significant at one percent level of significance. This suggests that one percent increase in government expenditure leads to an increase in government revenues by 0.29 percent. It implies that as the government increases expenditures, government revenues increase.

The short run analysis, error correction model (ECM) specified in equation 8, was estimated to achieve the second objective on the rate of adjustment between government revenues and expenditures. The results presented in table 4.3 indicate that all the variables are statistically significant at one percent level of significance. The error correction term, which is the variable of interest, has the conventional negative sign and is statistically significant at one percent level of significance. The results are in line with the findings of Oyeleke & Adebisi 2014 and Jibao *et.al* 2012. The estimated coefficient of -0.78 imply that incase of shocks in the economy, 78 percent of the disequilibrium between government expenditures and revenues generated were restored

quarterly. Based on this result, it can be concluded that Kenya's fiscal policy is weakly sustainable though fast in adjustment in case of disequilibrium.

Table 4.3: ECM short-run estimation results

Dependent Variable: D(LNREV)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT (-1)	-0.781	0.147	-5.299	0.0000
D(LREVN(-1))	-0.242	0.099	-2.442	0.0178
D(LEXPEN)	0.403	0.049	8.281	0.0000
D(LEXPEN(-1))	-0.302	0.085	-3.543	0.0008
D(LEXPEN(-2))	-0.163	0.053	-3.050	0.0035
C	0.006	0.016	0.402	0.6902
R-squared	0.79	Durbin-Watson stat		2.25
F-statistic	52.95	Prob(F-statistic)		0.0000

Source: Author's own computation from study data using E-views software

5 Conclusion and policy recommendation

The study aimed at assessing the sustainability of the fiscal policy in Kenya, using the intertemporal budget constraint approach. The government budget constraint was used to derive the analytical formulations necessary for empirical testing. The model derived estimated the cointegration equation between government revenues and expenditures. Evidence based on this study show that Kenya's fiscal policy is sustainable within the period analyzed. However, the absolute value of the estimated coefficient of interest is significantly below one, implying that the fiscal position may not be sustainable in the long run. Therefore, the country faces a challenge of having government expenditures growing at a higher rate as compared to the growth rate of government revenue.

In order to avert the situation, it is imperative for the government, through the National Treasury and Kenya Revenue Authority (KRA) to adopt a fiscal consolidation plan that emphasizes reduction in spending[8], and expansion of the tax base. Reduction in the current government spending may be achieved the review of recurrent spending given that it accounts for almost three-quarters of the total government spending. To achieve this, the National Treasury could focus on scaling down expenditures on salaries and wages as they account for the largest shares of recurrent expenditures.

Public debt transaction also accounted for the largest share of total government spending. Therefore, there is need for the National Treasury to adopt a plan that focus on retiring short-term and expensive commercial debt to reduce interest rate obligation. This could be achieved by increasing the share of concessional loans as opposed to non-concessional loans in financing fiscal deficit.

[8] For instance cuts in social transfers, government wages and other recurrent expenditures. Empirical work in Kenya is necessary to establish whether social spending and transfers are areas of key interest to focus on in terms of spending cuts to realize a successful fiscal consolidation as Guichard *et al. (*2007) found.

In increasing the tax revenue and expanding the tax base, the Kenya Revenue Authority and the National Treasury could consider tax policies and administrative measures that focus on rationalizing, awarding and monitoring corporate income tax exemptions to safeguard the corporate tax base and ensure that the exemptions granted achieve the targeted purpose. A deliberate move is needed to review the relevance and costs of multiple exemptions including those on Value Added Tax (VAT) and other incentive schemes such as deductibles and investment allowances under corporate tax to reduce revenue forgone.

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Appendix

Table A1: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.961	Prob. F(2,35)	0.3924
Obs*R-squared	2.186	Prob.Chi-Square(2)	0.3351

Source: Author's own computation from study data

Table A2: Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	0.263	Prob. F(4,37)	0.8997
Obs*R-squared	1.162	Prob. Chi-Square(4)	0.8843

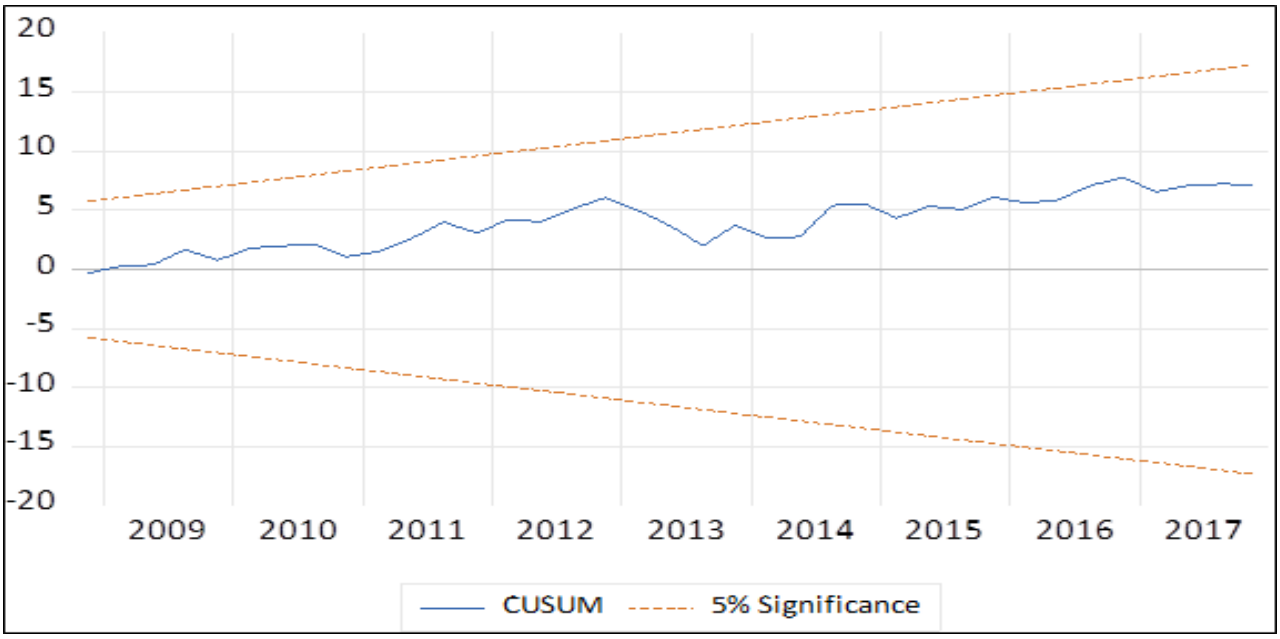
Source: Author's own computation from study data using E-views software

Table A3: Granger Causality Test results

Pairwise Granger Causality Tests
Date: 04/20/23 Time: 14:41
Sample: 1 64
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LEXPENDITURE does not Granger Cause LREVENUE	62	3.94045	0.0250
LREVENUE does not Granger Cause LEXPENDITURE		19.6117	3.E-07

Figure A3: CUSUM test



Source: Author's own computation from study data using E-views software

Table A4: Lag selection criteria

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-11.535	NA	0.006	0.644	0.727	0.675
1	17.582	54.073	0.002	-0.551	-0.303	-0.461
2	46.468	50.895*	0.001*	-1.737*	-1.323*	-1.585*

Source: Author's own computation from study data using E-views software

Table A5: Long run analysis

Dependent variable LNRE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREVN(-1)	-0.022647	0.132915	-0.170386	0.8653
LREVN(-2)	0.242062	0.115393	2.097714	0.0406
LEXPEN	0.403210	0.056172	7.178124	0.0000
LEXPEN(-1)	0.017095	0.081795	0.208996	0.8352
LEXPEN(-2)	0.138464	0.071785	1.928867	0.0590
C	0.477556	0.351216	1.359723	0.1796
R-Squared	0.962480	Durbin-Watson stat	2.1521	
F-statistic	23.8718	Prob(F-statistic)	0.0000	

Source: Author's own computation from study data using E-views software