

Fiscal Policy and Public Debt in Kenya

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Abstract: *Fiscal policy in Kenya has been unstable. Fiscal balance to GDP ratio worsened from a surplus of 0.2 percent to a deficit of 7.6 percent while debt to GDP ratio rose from 25.4 to 56.2 percent between 1963 and 2015. This was against deficit target of 4.8 and debt ratio of 41.4 percent in 2015. The continued build up of debt implies debt stabilization is not a priority and high debt may lead to adverse effects to the economy. The paper estimated the optimal fiscal balance to GDP ratio needed to stabilize debt levels and establish how the government reacts to changes in debt levels using fiscal reaction function in order to establish if the government was concerned with debt stabilization. The government requires an average fiscal deficit ratio of four percent between 2016 and 2030. Fiscal policy has not been responding adequately to changes in debt levels as the government pursued an expansionary fiscal policy. There is need for a fiscal law setting maximum fiscal deficit to GDP ratio and adherence to fiscal consolidation guidelines in order to determine the right response to changes in the debt levels to prevent the debt levels from taking an explosive path.*

Keywords: *Debt stabilization, fiscal balance, fiscal reaction function, fiscal consolidation, optimal debt*

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I. Introduction

Fiscal policy plays an important role in influencing economic performance and it entails deliberate measures by the government through taxes and expenditure to influence the direction the economy should take to attain a specific set of objectives (Musgrave & Musgrave, 1989). Fiscal policy in Kenya is aimed at ensuring stable macroeconomic environment, attaining sustainable growth and providing an environment conducive for innovation and investments. A good fiscal policy should create enough fiscal space for counter cyclical in the event the economy faces destabilizing shocks (Mutuku, 2015). Many countries face the challenge of insufficient domestic revenues to meet their desired expenditure needs which necessitates them to borrow to meet revenue shortfall leading to accumulation of public debt. Reasonable level of borrowing by a country is likely to enhance its economic growth through growth in productive capacity and accumulation of capital (Poirson, Ricci & Pattillo, 2004).

To achieve *Vision 2030* targets, Kenya embarked on implementation of ambitious infrastructural projects such as Lamu Port South Sudan-Ethiopia Transport project (LAPSSET), Standard Gauge Railway (SGR) and geothermal power generation which require large amount of funds beyond the government revenue collection capacity. To finance the deficit, the government decided to borrow to bridge the revenue and desired expenditure gap. Deficit financing is an ideal tool provided it is efficiently financed and productively utilized on programmes that will be self-sustaining (Were, 2001). Fiscal deficit shows the extent to which government revenue is unable to finance its expenditure and high deficit indicates heavy reliance on borrowing which exposes the economy to shocks resulting to high vulnerability in the economy (Republic of Kenya, 2003). The annual fiscal deficit arising from the increased expenditures that are not matched by increased revenues has led to an increase in the stock of debt in Kenya and the biggest risk that Kenya faces to external debt sustainability come from exchange rate shocks and less favorable terms on new public-sector loans (KIPPRA, 2013).

1.1 Trends in fiscal policy in Kenya

Vision 2030 recognizes the role of fiscal policy in achieving its objectives and has targeted to maintain a fiscal deficit of less than five (5) percent of GDP, consistent with the need to ensure public debt sustainability position (Republic of Kenya, 2008). Fig 1 shows the trend in fiscal balance to GDP in Kenya since independence.

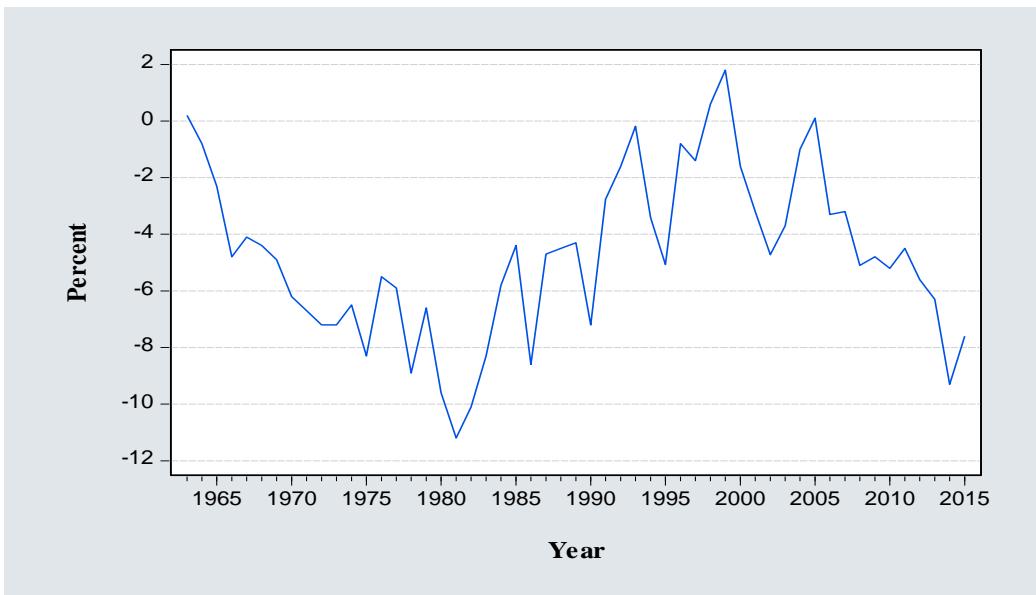
**Figure 1: Trends in Kenya's fiscal balance to GDP ratio**

Fig 1 shows that Kenya has experienced unstable fiscal policy with an average fiscal balance (deficit) to GDP ratio of 4.7 percent between 1963 and 2015. The instability in fiscal policy can be attributed to several shocks which sometimes required government intervention through fiscal policy. These shocks include the oil price shocks of 1973/74 and 1979/80 (Republic of Kenya, 1975 and 1981), droughts (Republic of Kenya, 1985 and 2001), Gulf crisis which led to increase in oil prices, fall in tourism earnings, exchange rate depreciation and high interest rates (Republic of Kenya, 1992), post-election violence of 2007/2008, the global financial and economic crisis of 2008 and the high international oil and food prices (Republic of Kenya, 2009). These shocks had adverse impacts on the economy by affecting government revenues and expenditures. The instability in the fiscal balance has contributed to the weak economic performance by accumulating high public debt and the associated high interest rates (Republic of Kenya, 2003).

1.2 Trends of Public Debt in Kenya

Debt to GDP ratio is a measure of a country's indebtedness and is used by investors to measure the ability of a country to make future payments on its debt, which affects the country's borrowing costs and government bond yields. A country's historical fiscal performance helps to inform the assessment of what constitutes an optimal public debt policy (Oviedo & Mendoza, 2004). The size and structure of the public debt in Kenya has increased and changed overtime necessitated by the need to source for affordable loans with less risks in order to finance development projects to meet the country's long term development goals. Analysis of the current composition of the public debt and its maturity structure is relevant to access the vulnerability of a country to a debt crisis (World Bank, 2007) and in turn determines the optimal public debt policy given the cost and risk of the public debt portfolio (Mupunga & Roux, 2015). Fig 2 shows the trend of Kenya's debt to GDP ratio since independence.

**Figure 2: Trends in Kenya's debt to GDP ratio**

The debt to GDP ratio averaged 28.1 percent between 1963 and 1970 with domestic and external debt averaging 7.2 percent and 21 percent of GDP respectively. During this period, the market conditions in Kenya did not allow for increase in internal debt and all new loans were obtained from external sources (Republic of Kenya, 1968). The average debt to GDP ratio rose to 28.3 percent between 1971 and 1980, with domestic and external debt averaging 13 percent and 15.3 percent of GDP respectively. This period was associated with the oil shocks and coffee boom. Between 1981 and 1990, the debt levels averaged 51.3 percent, with domestic and external debt averaging 15.5 percent and 35.8 percent of GDP respectively with the sharp increase partly attributed to political instability of 1982 and Structural Adjustment Programmes (SAPs) recommended by the World Bank and IMF since 1988.

The debt levels between 1991 and 2002 averaged 60.8 percent, a 10 percent point increase, with the external and domestic debt averaging 44.8 percent and 16.0 percent respectively. This period is associated with economic uncertainty due to the 1992 and 2002 multiparty elections, the Goldenberg scandal and suspension of foreign aid leading to foreign exchange crisis and the rapid depreciation of the Kenya Shilling against the major currencies resulting to an increase in nominal debt (Republic of Kenya, 1993). The period between 2003 and 2007 coincided with the implementation of Economic Recovery Strategy (ERS) for wealth creation which led to improvement of the country's debt position due to stable macroeconomic environment following low levels of inflation, limited public sector deficits, stable exchange rate and low interest rates (Republic of Kenya, 2008). During this period, the debt to GDP ratio averaged 49 percent of GDP with domestic and external debt averaging 21.3 percent and 27.7 percent of GDP respectively. The total debt to GDP ratio averaged 46 percent between 2008 and 2015 with domestic and external debt averaging 24.5 percent and 21.5 percent of GDP and 52.4 percent and 47.6 percent of total debt respectively. From 2008, the country's debt started rising again and it has been on an upward trend since then which can be attributed to the global financial crisis and the 2007/2008 post-election violence where the government had to spend more to resettle the displaced and the increased investment in infrastructure projects (Republic of Kenya, 2013).

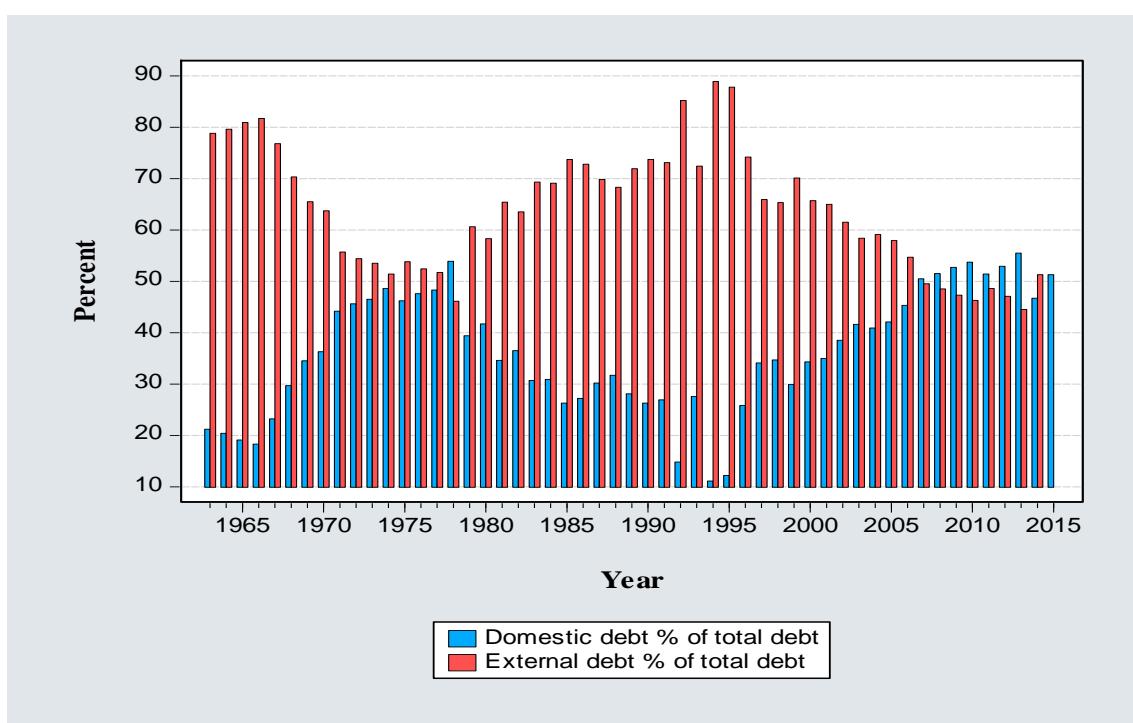


Figure 3: Composition of Kenya's public debt

Fig 3 shows the composition of public debt in Kenya since independence. External debt has constituted the largest proportion of public debt in Kenya but from 1994, the proportion of domestic debt started to increase. This trend continued until 2013 when the domestic debt was 55.5 percent of total debt. This was in line with the Medium-Term Debt Management Strategy (MTMDS) of 2010 recommendation of shifting the composition of debt towards long term domestic debt. This was aimed at minimizing both the cost and refinancing risks by lengthening the maturity profile of the domestic debt portfolio, promoting further development of the domestic debt market and the larger financial sector to minimize the degree of foreign exchange rate risk exposure associated with the external debt portfolio (Republic of Kenya, 2010).

1.3Debt stabilization

Debt stabilization is an indicator of the effectiveness of the policies implemented by Government. A large and growing debt increases the risk of speculative attacks against a country's debt which can be viewed by investors as if the government is on the verge of a default leading to speculation in the economy (Sardoni, 2013). The analysis of Kenya's debt shows that the debt to GDP ratio was relatively stable between 1963 and 1977 after which the debt levels started to fluctuate. The debt levels in the country have always been higher than the projections in the MTDMS, indicating lack of adherence to fiscal guidelines. For example, MTDMS of 2013 and 2014 projected domestic debt at 25.4 percent and 24 percent of GDP while the external debt at 23.4 percent and 22.8 percent of GDP in 2014 and 2015 respectively. However, the actual domestic debt was 27.9 percent and 31 percent while the actual external debt stock contracted was 24.7 percent and 25.2 percent in 2014 and 2015 respectively.

The increase in public debt is still projected to continue with major capital projects especially in infrastructure and energy slated for implementation under the Vision 2030. The increasing debt levels have been characterized by the continuous upward revision of the country's debt limits. The Government reviewed the external debt borrowing limit from USD 8 billion to USD 1.2 billion in January 2013 which was later increased to USD 2.5 billion in November 2014. In order to stabilize the debt levels and subsequently put it on a declining path, the government needs to generate a sufficiently large fiscal surplus over an extended period of time. Stabilization of public debt depends on macroeconomic performance and the government's fiscal policy stance but with Kenya's rising fiscal deficit, it is difficult to prevent the debt levels from rising and prepare policies that will stabilize the debt levels.

1.4Statement of the Problem

The Vision 2030 recognized the role of fiscal policy in achieving high economic growth, low inflation, limited public sector deficits, stable exchange rates and low interest rates and has targeted to maintain a fiscal deficit of less than five (5) percent of GDP, consistent with the need to maintain Kenya's debt sustainability position. Kenya has experienced unstable fiscal policy depicted by the fluctuating fiscal balance which worsened from a surplus of 0.2 percent of GDP in 1963 to a deficit of 7.6 percent in 2015. The instability in fiscal balance can be attributed to several shocks such as the oil price shocks of 1973/74 and 1979/80, droughts, Gulf crisis which led to increase in oil prices, fall in tourism earnings, exchange rate depreciation and high interest rates, post-election violence of 2007/2008, the global financial and economic crisis of 2008 and the high international oil and food prices. The shocks had adverse effects on government revenues and expenditures while the instability in the fiscal balance contributed to the weak economic performance by accumulating high public debt and the associated high interest rates (Republic of Kenya, 2003). Debt stabilization is an indicator of the effectiveness of the policies implemented by government to achieve sustainable debt (Sardoni, 2013). Kenya's debt to GDP ratio rose from 25.4 to 56.2 percent between 1963 and 2015 against a target of 41.4 percent in 2015 implying debt stabilization has not been a priority to the government but the continued build-up of public debt may have negative implications in achievement of various national targets such as GDP growth of 10.6 percent and reducing debt to GDP ratio to 39.2 percent by 2017 (Republic of Kenya, 2013). With fluctuating fiscal balance, it will be difficult for the government to prepare policies that will stabilize the debt levels. Mutuku (2015) focused on testing for sustainability of fiscal policy to establish if Kenya government pursued appropriate policies to prevent excessive debt accumulation while Nandelenga (2010) determined the optimal debt levels necessary to achieve the 10 percent GDP growth rate. Less focus has been given to debt stabilization strategies in Kenya and therefore this paper seeks to fill the gap by estimating the levels of fiscal balance that the government should target in order to stabilize debt levels and estimate fiscal reactions to determine how the Kenyan government has reacted to changes in debt levels to establish if the government has been concerned with debt stabilization.

II. Selected empirical literature review

Bohn (1998) assessed how the governments reacted to accumulation of debt and the corrective measures taken to prevent the debt from growing by examining the response of the primary budget surplus to changes in the debt ratio using annual time series data from 1916 to 1995. The results show that primary surplus responded positively to changes in debt implying that fiscal policy was satisfying the intertemporal budget constraint and concluded that governments concerned with debt stabilization are expected to raise primary balance, by running surplus budget or lower fiscal deficit, in response to an increase in debt ratio and the positive correlation between debt to GDP and fiscal balance is sufficient condition to guarantee that the debt ratio will revert to some finite steady value. Celasun, Debrun and Ostry (2006) estimated a fiscal reaction function to determine fiscal behavior using data from 34 emerging market economies between 1990 and 2004. The results show that only the fiscal reaction functions in Argentina, Brazil, Mexico, South Africa and Turkey responded sufficiently to the public debt accumulation implying a sustainable debt path in the 5 countries.

Sirengo (2008) assessed the fiscal sustainability in Kenya using annual time series data from 1996 to 2004. The results showed that Kenya's fiscal policy was sustainable while the main determinants of debt accumulation (lagged primary surplus ratio, lagged difference of the debt ratio and lagged growth rate of real GDP) had a positive impact on the primary surplus ratio but current account balance to GDP ratio had a negative impact. The simulations carried out shows that the Kenyan economy is susceptible to adverse shocks which worsen the primary balance leading to the debt accumulation over the short and the medium terms. Izák (2009) estimated a fiscal reaction function to establish the response of primary balance to changes in debt levels and fluctuation in business cycles using cross sectional data for ten (10) post socialist countries of the European Union between 1995 and 2009 which was estimated using pooled OLS method. The results show that output gap of one (1) percentage point lowers the primary deficit by about 20-30 basis points and that a one (1) percent increase in lagged debt led to an increase in primary deficit in the following year by three (3) to six (6) basis points therefore the primary deficit is an increasing function of the debt to GDP ratio.

Nandelenga (2010) carried out a study to analyze sustainability of Kenya's debt and determine the optimal debt levels necessary to achieve the desired 10 percent GDP growth rate using monthly time series data on government expenditure, revenue, public debt and interest on public debt from 1985 to 2008. The study found that Kenya's public debt has been sustainable and that the debt to GDP ratio of 35.2 percent is optimal to achieve the desired 10 percent GDP growth. Mpatswe, Tapsoba and York (2011) estimated the cyclicalities of fiscal policies in the Central African Economic and Monetary Community (CEMAC) region using panel data from 1980 to 2008 to assess whether fiscal policies across these countries have been procyclical. The study estimated a fiscal reaction function with government expenditure, GDP per capita, Consumer Price Index, trade shares and terms of trade of the goods and services as the variables. The results established that the total public expenditure in these countries is strongly procyclical and that the institutional weaknesses and poor governance partly explain the procyclicality of the fiscal policies.

Burger, Stuart, Jooste and Cuevas (2012) estimated fiscal reaction function for South Africa to assess how the government reacts to changes in its debt position using annual time series data from 1974 to 2008. The study found that South African government ran a sustainable fiscal policy by reducing the primary deficit or increasing the surplus in response to rising debt although the government tended to run fiscal balances in excess of those required to simply stabilize its debt. Mupunga and Roux (2014) carried out analysis of the theoretical and empirical foundations of public debt dynamics in Zimbabwe to estimate the necessary primary balance adjustments that will ensure sustainable public debt position and identify the key fiscal and macroeconomic variables that influence public debt dynamics in Zimbabwe using data from 1982 to 2012. The results show that Zimbabwe would require a large primary balance if the gap between interest rates and growth rates are low, specifically a primary surplus of 6.03 percent of GDP would be required to achieve an optimal debt portfolio of 20 percent by 2030 or 4.98 percent to reach a target of 50 percent, which is within the desired debt to GDP ratio of 60 percent by 2030.

Melou, Sumlinski and Geiregat (2014) estimated a fiscal reaction function to establish the relationship between public debt and real GDP growth, real interest rates, capital gains/losses on external debt using a pooled data of 33 countries that benefited from the Highly Indebted Poor Countries (HIPC) and the Multilateral Debt Relief Initiative (MDRI) from 2001 to 2011. The results revealed an inverse relationship between lagged debt and primary balance which implies that even in the times of debt relief accompanied by macroeconomic adjustment, the fiscal policy may not be a prudent measure because it accelerates the debt problem. Mutuku (2015) estimated Kenya's fiscal reaction function to determine whether the fiscal policy is on a sustainable path by establishing how it responds to business cycles and if the government pursued appropriate policies to prevent excessive debt accumulation using annual time series data from 1970 to 2013. The results established that the government's fiscal behavior is nonsystematic to the increasing debt and that the fiscal policy is cyclical in nature. This implies that stabilization objective is not a priority which is a threat to fiscal sustainability in the long run and that if no fiscal adjustment is taken.

III. Methodology

The study adopted Domar (1944) model under the Keynesian theory of public debt which advocates for governments to run budget deficits and that there is no need for the debt to GDP ratio to grow indefinitely. Equation 1 shows the inter temporal budget constraint:

$$D_t = G_t - T_t + (1 + i)D_{t-1} \quad (1)$$

where, D_t is outstanding debt in period t , G_t is Government expenditure in period t , T_t is Government tax revenue in period t , i is the nominal interest rate on government debt. Noting that $G_t - T_t = PB_t$, where PB_t is the fiscal balance in period t , then:

$$D_t = PB_t + (1 + i)D_{t-1} \quad (2)$$

Dividing equation 2 by the nominal GDP (Y_t), to express the variables as ratios of GDP:

$$\frac{D_t}{Y_t} = \frac{PB_t}{Y_t} + \frac{(1+i)D_{t-1}}{Y_{t-1}} \quad (3)$$

Multiplying the expression $\frac{(1+i)D_{t-1}}{Y_{t-1}}$ by $\frac{Y_{t-1}}{Y_{t-1}}$ and rearranging:

$$\frac{D_t}{Y_t} = \frac{PB_t}{Y_t} + (1+i) \frac{D_{t-1} Y_{t-1}}{Y_{t-1} Y_t} \quad (4)$$

Using lower case to denote ratios to GDP:

$$d_t = pb_t + (1+i) \frac{D_{t-1} Y_{t-1}}{Y_{t-1} Y_t} \quad (5)$$

Noting that $Y_t = Y_{t-1} + y_t Y_{t-1}$, $Y_t = (1+y_t)Y_{t-1}$ then $\frac{Y_{t-1}}{Y_t} = \frac{1}{(1+y_t)}$, implying that:

$$d_t = pb_t + \left(\frac{1+i}{1+y_t}\right) d_{t-1} \quad (6)$$

To get real values, nominal interest rate (i) and nominal GDP growth rates (y_t) are deflated by the inflation rate. Equation 6 can be expressed as:

$$d_t = pb_t + \left(\frac{1+r}{1+g}\right) d_{t-1} \quad (7)$$

Where r represents real interest rates while g is real rate of GDP growth. Equation 7 is the equation of motion of debt accumulation and it shows that the growth of debt depends on the fiscal balance to GDP ratio, real interest rates, the GDP growth rate and previous debt levels. If g is greater than r then $\left(\frac{1+r}{1+g}\right) < 1$ which implies that the total outstanding debt will reduce over time. Therefore, the sufficient condition for debt path not to be explosive is when $g > r$ or $\left(\frac{1+r}{1+g}\right) < 1$. The effect of inflation on public debt evolution is only through its effects on interest rates.

A stable debt implies that the debt value reduces or remains constant over time, that is, $d_t = d_{t-1}$. Subtracting d_{t-1} on both sides of equation 7 to get the expression of change in debt ratio:

$$d_t - d_{t-1} = pb_t + \left(\frac{1+r}{1+g}\right) d_{t-1} - d_{t-1} \quad (8)$$

$$\Delta d_t = pb_t + \left(\frac{r-g}{1+g}\right) d_{t-1} \quad (9)$$

Equation 9 gives the Domar stability condition which implies that debt to GDP ratio will be stable if the rate of GDP growth is greater than interest rates on debt. According to Horska (2011), $\left(\frac{1+r}{1+g}\right) = 1 + r - g$ and that for a stable debt $d_t - d_{t-1} = \Delta d_t = 0$, therefore equation 9 can also be expressed as:

$$d_t = pb_t + (1 + r - g)d_{t-1} \quad (10)$$

$$d_t - d_{t-1} = pb_t + (r - g)d_{t-1} \quad (11)$$

$$pb_t = (r - g)d_{t-1} \quad (12)$$

To stabilize the debt to GDP ratio, GDP growth rate multiplied by the lag of debt ratio (d_{t-i}) must be able to finance the debt service (rd_{t-i}) which implies that fiscal balance to GDP ratio is inversely related to real GDP growth (g). When g is higher than r ($g > r$) it implies that the country can run fiscal deficit without having the pressure to increase the debt levels but when g lower than r ($g < r$), the government will need to run a sufficiently large fiscal surplus to GDP ratio to the pressure to increase the debt levels.

To carry out a dynamic estimate, forecast and avoid specification error, equation 12 was modified to incorporate lags of the dependent variable as an independent variable. The modified equation is represented as:

$$pb_t = (r - g)d_{t-i} + pb_{t-1} \quad (13)$$

The paper estimated equation (13) to get the level of fiscal balance to GDP ratio necessary to stabilize the debt levels in the country in time t with respect to real rates of interest, real rate of GDP growth and debt to GDP ratio.

The paper further estimated the fiscal reaction function to determine how the government reacted to changes in debt levels with an aim of establishing if the fiscal authorities are motivated by debt stabilization motives. A fiscal reaction function is a rule that helps governments to forecast and react to some macroeconomic changes (Nguyen, 2013). It shows how the fiscal balance to GDP ratio responds to a set of macroeconomic variables and its analysis is aimed at establishing if the fiscal authorities are motivated by debt stabilization motives. When the authorities have a Ricardian behaviour and are concerned with having a stable debt, a feedback from the level of debt ratio to government revenue and spending is expected (Cherif & Hasanov, 2012). Burger et al. (2012) used an extended fiscal policy reaction function model with the first lags of fiscal balance and output gap to analyze fiscal sustainability and fiscal policy reaction function for South Africa expressed as:

$$\left(\frac{B}{Y}\right)_t^{\text{Act}} = \alpha^* \left(\frac{D}{Y}\right)_{t-1}^{\text{Act}} + \epsilon_t \quad (14)$$

Where $\left(\frac{B}{Y}\right)_t^{\text{Act}}$ is the actual primary balance to GDP ratio in period t, $\left(\frac{D}{Y}\right)_{t-1}^{\text{Act}}$ is the first lag of debt to GDP ratio, α^* is on average equivalent to $\frac{r-g}{1+g}$ and ϵ_t is an IID error term shock to the fiscal balance. In order to provide for inertia in government debt, a lag of the ratio of primary balance to GDP and the output gap were added to equation 14 as control variables to allow for the possibility that the government may pursue short run demand stabilization. The equation was specified as:

$$\left(\frac{B}{Y}\right)_t^{\text{Act}} = a_1 + a_2 \left(\frac{B}{Y}\right)_{t-1}^{\text{Act}} + a_3 \left(\frac{D}{Y}\right)_{t-1}^{\text{Act}} + a_4 ygap + \epsilon_t \quad (15)$$

This paper modified equation 15 by expressing the variables in lower case (ratios to GDP) except output gap and considered other determinants of public debt relevant to Kenya which include previous period's ratio of debt to GDP, current account balance to GDP ratio, and the output gap to get equation 16 expressed as:

$$pb_t = a_0 + a_1 pb_{t-i} + a_2 d_{t-i} + a_3 ygap_{t-i} + a_4 cacgdp_{t-i} + \epsilon_t \quad (16)$$

where pb_t is the ratio of fiscal balance to GDP, pb_{t-i} is the ratio of fiscal balance to GDP, d_{t-i} is the ratio of previous periods debt to GDP ratio, $ygap_{t-i}$ is the previous period's output gap which controls for cyclical fluctuations, $cacgdp_{t-i}$ is the current account balance as a ratio of GDP in the previous period.

3.1 Definition and Measurement of Variables

Current account balance as a ratio of GDP (CACGDP): sum of trade balance, net income from abroad and net current transfers and measured as the balance of the current account (deficit or surplus) as a ratio of GDP.

Fiscal balance to GDP ratio (pb): excess of government expenditure over revenue in a given period expressed as a ratio of GDP.

Debt to GDP ratio (d): The rate of a country's indebtedness which compares the country's outstanding public debt and her GDP in each year

Output gap (ygap): the difference between actual output and potential output of an economy in a given year.

Real GDP growth rate (g): the rate of change of a country's Gross Domestic Product (GDP) from one year to another after adjusting for inflation

Real Interest Rates (RIR): interest rates adjusted for the effects of inflation to reflect the real cost of funds and measured as the difference between nominal interest rates on funds borrowed domestically and the annual average inflation rate.

3.2 Data type and source

Annual time series data from 1963 to 2015 was used for analysis. The data consisted of annual observations of current account balance to GDP ratio, fiscal balance to GDP ratio, public debt to GDP ratio, output gap, real GDP growth and real interest rates. The data was obtained from Statistical abstracts, Economic surveys published by Kenya National Bureau of Statistics, Central Bank of Kenya, Annual debt reports published by the National Treasury's, Kenya Institute of Public Policy Research and Analysis (KIPPRA) reports, International Monetary Fund financial statistics, African Development Bank and World Bank's African Databases.

3.3 Estimation technique and time series properties of data

The time series data used in this paper was subjected to various diagnostic tests to test for stationarity, Cointegration, autocorrelation, heteroscedasticity, normality and structural breaks. Equation 13 was estimated using OLS method and in order to get the forecast of the dependent variables from 2016 to 2030, it was necessary to provide the values of the independent variables for this period. Auto Regressive Moving Average (ARIMA) approach was used to make predictions of the values of each of these independent variables. There are insufficient macroeconomic theories linking the variables used in equation 16 and therefore not possible to directly estimate this equation using the OLS technique which prompted the use of Vector Auto Correlation (VAR) method because it is a theory-free method used for the estimation of economic relationships (Kosimbei, Wawire and Mburu, 2010).

Kwiatkowski–Phillips–Schmidt–Shin (KPSS) method was used to test for stationarity instead of Augmented Dickey–Fuller (ADF) method because the ADF test has very low power against I (0) alternatives that are close to being I (1). The unit root tests established that the variables were of different order of integration and used the Auto Regressive Distributed Lag (ARDL) bound test procedure to test for the presence of short run and long run relationships among the variables. The paper carried out bound tests using Pesaran and Shin (1999) approach which uses Wald or F-statistic to test for the joint significance of lagged variables in an

unrestricted Error Correction (ECM) regression. If the computed Wald or F-statistic falls below the Pesaran critical lower bound value, the null hypothesis of no long-run relationship (no Cointegration) is accepted but if the computed Wald or F-statistic falls above the Pesaran critical upper bound value, the null hypothesis of no long-run relationship (there is Cointegration) is rejected. However, when the computed F-statistic falls between the lower and upper bound, then the results were inconclusive and knowledge of the order of integration of the variables will be needed before conclusive inferences are made.

IV. Study Results

4.1 Time series properties

The results of the KPSS test show that current account balance to GDP ratio, output gap, fiscal balance to GDP ratio and real interest rates were stationary at levels at 5 percent significant level but debt to GDP ratio and real GDP growth rate were non-stationary at levels. The non-stationary variables at levels became stationary after first difference. The results are shown in Tables 1 and 2.

Table 1: KPSS Unit root test results at level

Variable	Form of test	t- statistic	CV at 5 %	Conclusion
Current Account balance to GDP (CACGDP)	Intercept	0.4151	0.4630	Stationary
	Trend & Intercept	0.0999	0.1460	
Debt to GDP ratio (d)	Intercept	0.5170	0.4630	Non-stationary
	Trend & Intercept	0.1836	0.1460	
Output Gap (ygap)	Intercept	0.0604	0.4630	Stationary
	Trend & Intercept	0.0693	0.1460	
Fiscal Balance to GDP ratio (pb)	Intercept	0.2350	0.4630	Stationary
	Trend & Intercept	0.1309	0.1460	
Real GDP Growth (g)	Intercept	0.2642	0.4630	Non-Stationary
	Trend & Intercept	0.1588	0.1460	
Real Interest Rates (RIR)	Intercept	0.3292	0.4630	Stationary
	Trend & Intercept	0.0904	0.1460	

Source: Authors' calculations (2018)

Table 2: KPSS Unit root test results at first difference

Variable	Form of test	t- statistic	CV at 5 %	Conclusion
Debt to GDP (d)	Intercept	0.0715	0.4630	Stationary
	Trend & Intercept	0.0531	0.1460	
Real GDP Growth (g)	Intercept	0.1495	0.4630	Stationary
	Trend & Intercept	0.1048	0.1460	

Source: Authors' calculations (2018)

The paper carried out diagnostic tests, before establishing the short and long run relationships, to establish if the ARDL model is statistically significant. The estimation results are presented in Table 3. The model used Akaike's Information Criterion automatic lag selection criteria and estimated a model with optimal lags 1,3, 0, 0, 1,1. The fitted model had a R-squared and Adjusted R-squared of 74 per cent and 66 per cent respectively. The estimated F statistic of model is 9.613 with a probability of 0.0000 implying the joint significance of all independent variables in the model.

Table 3: ARDL General model

Dependent Variable: PB				
Sample (adjusted): 1966 2015				
Included observations: 50 after adjustments				
Dynamic regressors (4 lags, automatic): DEBT G RIR CACGDP YGAP				
Selected Model: ARDL(1, 3, 0, 0, 1, 1)				
Variable	Coefficient	Std. Error	t-statistic	Prob.*
First lag of fiscal balance to GDP	0.407582	0.110839	3.677243	0.0007
Debt to GDP ratio	0.005494	0.045098	0.121823	0.9037
First lag of Debt to GDP	-0.048812	0.057940	-0.842469	0.4048

Second lag of Debt to GDP	0.064139	0.056395	1.137314	0.2625
Third lag of Debt to GDP	0.066033	0.042303	1.560962	0.1268
Real GDP growth rate	-0.168454	0.128446	-1.311477	0.1976
Real Interest Rate	-0.045148	0.050715	-0.890236	0.3789
Current account balance to GDP	-0.026691	0.061717	-0.432471	0.6678
First lag of Current account balance to GDP	0.189502	0.064723	2.927903	0.0057
Output gap	-0.056979	0.067357	-0.845922	0.4029
First lag of output gap	-0.139846	0.064131	-2.180633	0.0355
C	-5.571159	1.801427	-3.092636	0.0037
R-squared	0.737214	Mean dependent var		-4.955200
Adjusted R-squared	0.661144	Akaike info criterion		4.075687
F-statistic	9.691293	Schwarz criterion		4.534572
Prob(F-statistic)	0.000000	Durbin-Watson stat		2.173716

Source: Authors' calculations (2018)

The Breusch-Godfrey correlation LM and heteroscedasticity test tested null hypothesis of no residual serial correlation and no heteroscedasticity with the residuals being normally distributed as shown in Table 4.

Table 4: Summary of tests on ARDL model

Test	Statistic	Result
Residual Normality	JB statistic 0.423 P value 0.81	Accept null hypothesis: residuals are normally distributed
Breusch-Godfrey serial correlation LM	Obs* R squared 2.91 P value 0.23	Accept null hypothesis that there is no serial correlation
Breusch-Pagan-Godfrey heteroscedasticity	Obs* R squared 16.86 P value 0.75	Accept null hypothesis that there is no heteroscedasticity

Source: Authors' calculations (2018)

The bound test resulted to an F statistic value of 5.486 which is greater than the upper bound value of 4.68 at one per cent significance level as shown in table 5.

Table 5: ARDL Bound test

Sample: 1966 2015		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	5.486534	5
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Authors' calculations (2018)

The paper rejected the null hypothesis and concluding that there exists a long run relationship among the model variables and that the use of Error Correction Model (ECM) version of ARDL could be employed to establish the short run effects and interpret the speed of adjustments given by the coefficient of the Error Correction Term (ECT). To establish the short run relationships, the paper estimated the ARDL cointegrating and long run form in Table 6. The coefficients in the model shows short run and long relationship while ECT represents the speed of adjustment towards equilibrium and it shows the amount of disequilibrium in the model that is corrected in each year. The results of estimating the short run model gives short run marginal effects among the variables, that is, the short run changes in the dependent variable due to changes in the previous independent variables.

Table 6: ARDL Cointegrating Short and Long Run Form

Short-run effects on fiscal balance to GDP ratio			
Dependent Variable	Fiscal Balance to GDP		
Regressors	Coefficients	t-Statistic	P value
Δ Debt to GDP ratio	-0.0054*	2.321823	0.0904
Δ Debt to GDP ratio lagged once	-0.0641***	3.0270	0.0085
Δ Debt to GDP ratio lagged twice	-0.0660	-1.5609	0.1268
Δ Real GDP growth	0.1685***	-3.0899	0.0075
Δ Real Interest Rates	-0.0451**	2.7356	0.0342
Δ Current Account to GDP ratio	-0.0267	-0.5106	0.6171
Δ Output gap	0.0183*	0.2674	0.0793
Error Correction Term (ECT)	-0.5924***	-5.3449	0.0000
Long-run effects on fiscal balance to GDP ratio			
Debt to GDP ratio	0.1466***	3.2780	0.0022
Real GDP growth	-0.2844***	3.0270	0.0085
Real interest rate	-0.0762	-0.8815	0.3836
Current Account to GDP ratio	0.2748***	2.724130	0.0097
Output gap	-0.3322**	-2.1872	0.0350
C	-9.4041***	-3.6083	0.0009

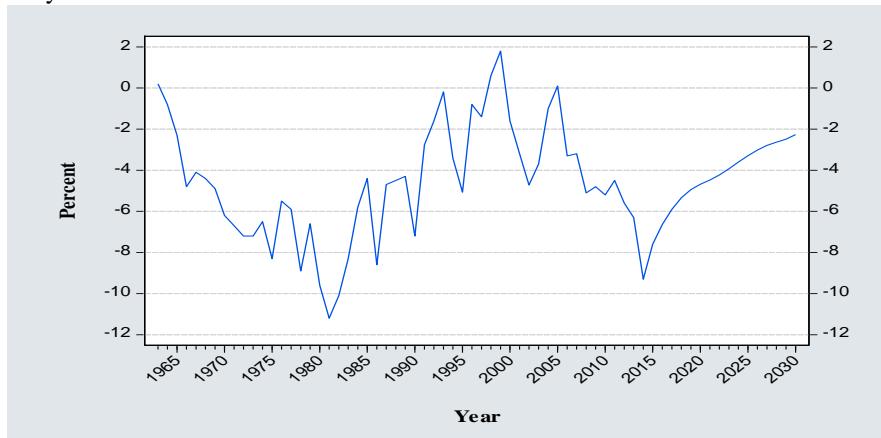
Source: Authors' calculations (2018)

Notes: [***], [**] and * denote significant at levels 1%, 5% and 10% respectively. Δ denotes the first difference operator

Table 6 shows that the coefficients of debt to GDP ratio are negative and statistically significant at different levels implying that a unit increase in debt to GDP ratio led to a decrease in fiscal balance (high fiscal deficit) in the short run and the magnitude of the effect decreased as the lags increased. Similarly, the coefficient of real interest rates is negative and statistically significant at five percent level. The coefficients of real GDP growth rate and output gap are positive and statistically significant at one and ten percent level respectively. The ECT coefficient was -0.59 and significant at one percent level implying presence of long-run association among the variables and that the disequilibrium in the fiscal balance to GDP ratio was adjusted to its long-run level at a rate of 59 per cent. The coefficient of debt to GDP ratio is negative and significant at one percent implying that a unit increase in debt to GDP ratio led to a decrease in fiscal balance to GDP ratio (high fiscal deficit) in the long run. The coefficients of real GDP growth rate and current account balance to GDP ratio are positive and significant at one percent while the coefficient of output gap is positive and significant at five percent. This implies that an increase in GDP growth rates, current account balance and output gap led to high fiscal balance (low fiscal deficit or surplus) in the long run.

4.2 Optimal level of fiscal balance to GDP ratio necessary to stabilize debt to GDP ratio

To implement an out-of-sample forecasting of the independent variable using a dynamic model, the values of the independent regressors had to be provided for the forecast period which used an ARIMA approach to forecast the values of each of the independent variables from 2016 to 2030. The model then used the forecasted series of the independent variables to estimate and forecast the dependent variable (fiscal balance to GDP ratio). Fig 4 plots the projected path of the fiscal balance to GDP ratio required to stabilize the debt levels in the country.

**Figure 4: Forecasted fiscal balance to GDP ratio necessary to stabilize debt levels**

The results in fig 4 show that, in order to stabilize the debt levels, the government needs to run an average fiscal balance to GDP ratio (deficit) of four (4) percent between 2016 and 2030 with a deliberate target to reduce the deficit from 6.6 percent in 2016 to 2.3 percent in 2030. The desire to grow the economy has seen the fiscal deficit increase overtime as the government borrowing increased. While debt plays critical role in growing the economy and ultimately increasing the welfare of its citizens, high debt levels may lead to slowdown in economic activity. The study results are in line with the objectives of the Budget Policy Statement of 2017 which envisages reduction of fiscal deficit from 9.2 percent in 2014/15 to 4.9 percent in 2019/20 fiscal year with an average fiscal balance of 8.1 percent implying that the government's intention to reduce fiscal deficit over the period. However, the Budget Policy Statement targets a higher fiscal balance to GDP ratio than the study estimates which will make it difficult to stabilize the debt levels. The results conform with the findings of the study by Mupunga and Roux (2014) who established that Zimbabwe would require a primary surplus of 6.03 percent of GDP to achieve an optimal debt portfolio of 20 percent by 2030 or 4.98 percent to reach a target of 50 percent, which is within the desired debt to GDP ratio of 60 percent by 2030. Burger et al. (2012) found that South African government ran a sustainable fiscal policy by reducing the primary deficit or increasing the surplus in response to rising debt although the government tended to run fiscal balances in excess of those required to simply stabilize its debt.

4.3 The Government's fiscal reaction to changes in public debt levels

The paper estimated a VAR model and generated the impulse responses to analyze the fiscal reaction of the government to changes in the stock of debt with an aim of establishing if the fiscal authorities are concerned with debt stabilization. Various VAR diagnostic tests were carried out as summarised in Table 7.

Table 7: Summary of VAR diagnostic statistics

VAR test	Statistic	Result
Stability condition	Roots of polynomials are within the unit cycle with highest root being 0.776158	The VAR model is stable
Residual serial correlation LM test	LM test statistic 18.99794 P value at lag 1 is 0.4589	Accept null hypothesis that there is no serial correlation
Residual Heteroscedasticity Test	Joint Chi-Square =184.9481 P value=0.0613	Accept null hypothesis that there is no heteroscedasticity
Residual Normality Test	Jarque-Bera (Joint) statistic 206.0894P value= 0.00	Reject null hypothesis that residuals are not multivariate normal
Chow break point test	F-statistic 1.146894, p value 0.3579	Accept null hypothesis that there are no structural breaks

Source: Authors' calculations (2018)

Any government interested in debt stabilization should ensure that any increase in debt levels is accompanied by a reduction in budget deficit or run a budget surplus. The impulse response analysis traced the effects of one standard deviation positive shock to the innovation on current and future values of all the endogenous variables of the system over a period of 15 years. The impulse response of a shock on debt to GDP ratio to fiscal balance is shown in fig 5.

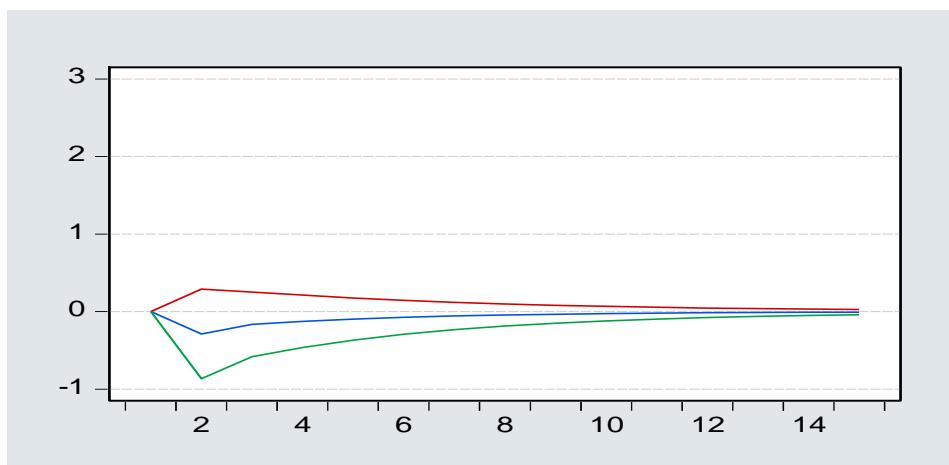


Figure 5: Effect of a shock on debt to GDP ratio to fiscal balance to GDP ratio

Fig 5 shows that a one standard deviation shock on debt to GDP ratio resulted to a drop in fiscal balance (high fiscal deficit) in the first two (2) periods followed by a stable time path, which took the fiscal balance to GDP ratio 12 years to return to its pre-shock equilibrium position. The result implies that the government has been running higher fiscal deficits in response to an increase in the levels of public debt, therefore the fiscal policy has not been responsive to changes in debt levels which is likely to undermine the Government's target to attain fiscal sustainably and ensure public debt sustainability by avoiding debt explosion. The study results differed with the findings of the studies by Bohn (1998), Celasun et al. (2006), Sirengo (2008) and Burger et al. (2012) which established a positive response of primary balances to increase in the levels of public debt. However, the study results conformed with findings by Melou et al. (2014) who established a negative relationship between debt to GDP ratio and primary balance on the estimated fiscal reaction function implying that the fiscal policy was not a prudent measure because it accelerates the debt problem.

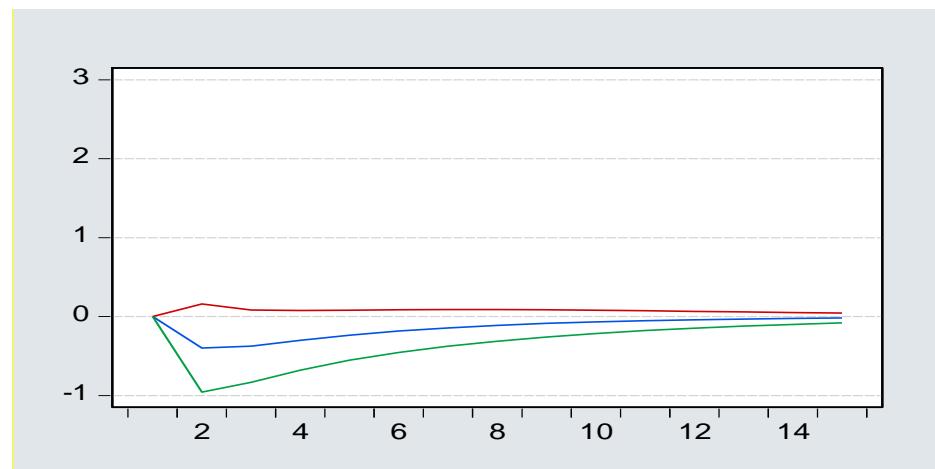


Figure 6: Effects of a shock to output gap on fiscal balance to GDP ratio

Fig 6 shows the response of fiscal balance to GDP ratio to a shock on output gap and it implies that one standard deviation shock on output gap resulted to a drop in fiscal balance (high fiscal deficit) in the first two (2) periods after which the shock started to increase the fiscal balance to GDP ratio. The shock took the fiscal balance to GDP ratio 14 years to return to its pre-shock equilibrium position. The behavior of the output gap reveals that a unit increase in output gap (high actual GDP growth) resulted to a reduction in fiscal balance to GDP ratio (High fiscal deficit). This means that the fiscal policy has been expansionary in times of high economic growth denoting a pro cyclical fiscal policy which does not counter increase in debt levels. The government reacted to an increase in actual GDP growth by running a high fiscal deficit. The results conform with the findings by Izák (2009) but differed with the findings of the studies by Mpatwse et al. (2011) who found the evidence of fiscal policy pro cyclical in their studies. Mutuku, (2015) established that the reaction of the fiscal authorities was nonsystematic to the increasing debt which is a threat to fiscal sustainability in the long run and that the fiscal policy is cyclical implying that stabilization objective is not considered while conducting the fiscal policy.

V. Conclusions

This paper has revealed that Kenya has experienced unstable fiscal policy depicted by high and a rising fiscal balance and debt levels which have always surpassed the set targets and that debt stabilization has not been a priority to the government. If the government wishes to stabilize its debt levels, it needs to target to reduce fiscal deficit to GDP ratio to an average of 4 percent between 2016 and 2030. The fiscal policy has not been responding adequately to increase in debt levels which may undermine the Government's efforts to attain fiscal debt sustainability. The behavior of the output gap further revealed that the fiscal policy has been expansionary in times of high economic growth implying a pro cyclical fiscal policy which does not counter increase in debt levels. The paper recommends that the National Assembly should legislate a fiscal law to set the maximum ceiling of fiscal deficit to GDP ratio beyond which the National Treasury cannot exceed in any given time which should be in line with the long term debt strategy to check the public debt to GDP ratio from taking an explosive path. It further recommends that the National Treasury should ensure adherence to fiscal consolidation guidelines. This is informed by the inverse relationship between the behavior of fiscal balance to GDP ratio in response to changes in public debt levels. The paper, however, did not consider the stock flow adjustments as a variable when estimating the fiscal reaction function to determine the response of fiscal authorities to changes in debt to GDP ratio. Stock flow adjustment is the difference between the changes in the

levels of outstanding debt and the annual fiscal deficit/surplus during the period. Negative stock flow adjustments mean that the government debt increases less than the annual deficit (or decreases faster than implied by the surplus). A positive stock-flow adjustment means that government debt increases more than the annual deficit (or decreases less than implied by the surplus). The analysis of stock-flow adjustment is important because the government can use it as a fiscal performance tool to monitor the development of debt in the country.

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