EFFECT OF TAX AND DEBT FINANCED GOVERNMENT EXPENDITURE ON ECONOMIC GROWTH IN KENYA

Abstract:

This study aims at analyzing the effect of tax and debt-financed government expenditure on economic growth in Kenya using time series data from 1980-2014. Vector Error Correction Model (VECM) was used to analyze the data. The empirical findings showed that public investment expenditure financed by issuing debt has positive effect on economic growth. The results also indicated that financing government consumption expenditure using debt has negative effect on economic growth. With regards to tax revenue, the results indicated that tax financed public consumption spending affects economic growth negatively. Moreover, the results showed financing government investment expenditure using tax revenue promotes economic growth. Based on the findings, this study therefore recommends fiscal authorities in to use borrowing to finance investment expenditure as opposed financing consumption spending. Additionally, given the adverse effects of debt-accumulation on growth performance, policy makers should focus more on domestic revenue mobilization to finance government expenditures.

Key Words: Tax Revenue, Public Debt, Economic Growth, Vector Error Correction Model.

1. Introduction

A significant feature of development in the public sector since the first oil shock in 1973 is the growth of government debt to finance rising expenditure in both developed and developing countries. Because money growth and expansion of income taxation are limited to the legislative arm of the government, fiscal deficits have in most cases been financed by issuing bonds (Wang, 2009. There are various fiscal instruments that the government can use to achieve social stability and promote economic performance. However, the choice of a particular fiscal instrument would have different impact on a country's economic wealth and performance (Van and Sudhipongpracha, 2015). Public spending is one of the fiscal measures commonly used by governments to influence the economy. However, because of the fiscal constraint, financing government expenditures has become one of the major challenges facing the government today. It then turns out that the response on economic growth to a particular type of government spending will depend on the method of financing. Irwin and Easterly (2007) postulated that appropriate strategy of financing a country's expenditure differ across countries and it depends on revenue mobilization, the level and the composition of expenditures, fiscal institutions, and country-specific factors. Depending on the methods of financing and the magnitude of the existing debt and tax revenues, certain types of public spending would have diverse impact on economic growth.

Government spending can be financed through raising taxes, borrowing from the domestic or external market or increasing monetary growth (Kandil, 2006). The question that remains unanswered is whether the economic growth effect of public spending varies depending on how it is financed. Fiscal authorities may use money growth to avoid political unpopularity and perception of high taxes, concerns about the rising budget deficit and unsustainable public debt. As a result, the central bank will have to accommodate higher government spending by issuing or relaxing constraints on available credit thereby increasing the monetary base (Kandil, 2013). A growing government size may affect economic growth depending on whether a tax or debt-financed expansionary fiscal policy is pursued (Ghali, 2003). On the theoretical front, there are controversies surrounding the debate on the economic response of a tax and debt-financed government budget.

The Ricardian equivalence theorem, for example, postulates that government financing decision between tax revenue and bonds does not influence long-run growth but the quantity of government purchases does. According to the Ricardian hypothesis, agents may anticipate higher taxes to repay growing public debt and are therefore likely to save more in anticipation of higher tax liability. This may, in turn, lead to a decrease in private consumption which may act as a counterbalance of the positive gains realized from increased government spending on aggregate demand and therefore decrease fiscal multiplier. The traditional Keynesian theory argued that when government expenditures are increased permanently then financing such expenditures using taxes will permanently raise output and consumption. Moreover, income taxes are distortionary and create disincentives to work; saving and investment

while financing government spending using debt may crowd- out private investment (Wang, 2009; Agenor and Neanidis, 2011; Kneller *et al*., 1999). Higher government spending financed by issuing more debt is likely to affect economic growth through the adverse effect on private sector activity. Government budget constraint requires that if one magnitude is to be altered it must be equalized with corresponding changes elsewhere (Wahab, 2011).

According to Blankenau and Simpson (2004), financing public spending using distortionary taxes especially on capital and labor income could produce a negative effect on economic growth. At the beginning, increasing productive spending will improve growth as a result of the positive externalities from public investment which becomes greater than the negative disincentives from higher taxes. However, after some critical point, growth will decline because the negative effects emanating from higher taxes dominates and therefore the net effect of increases in public spending on economic growth becomes negative. This suggests that financing public spending using taxes is detrimental to growth. Conflicting views emerge with regard to financing government spending using debt.

Turnovsky and Chatterjee (2005) argued that an increase in government investment spending financed by public debt enhances a balanced growth rate. However, this hypothesis treats public debt as a flow rather than a stock and without incorporating the feedback effect of debt servicing. Nevertheless, if public debt is modeled as stock so as to accommodate feedback effects, then financing public investment using debt has the potential of promoting economic growth only under certain conditions. Additionally, borrowing to finance government expenditures may increase or lower growth depending on whether the steady-state level is high or low. Figure 1 and 2 shows the behavior of economic growth when financed using tax revenue and external debt in Kenya. Domestic debt was excluded because financing government spending using domestic borrowing involves resources going back to the economy compared to external borrowing which involves diverting domestic resources away from the economy.

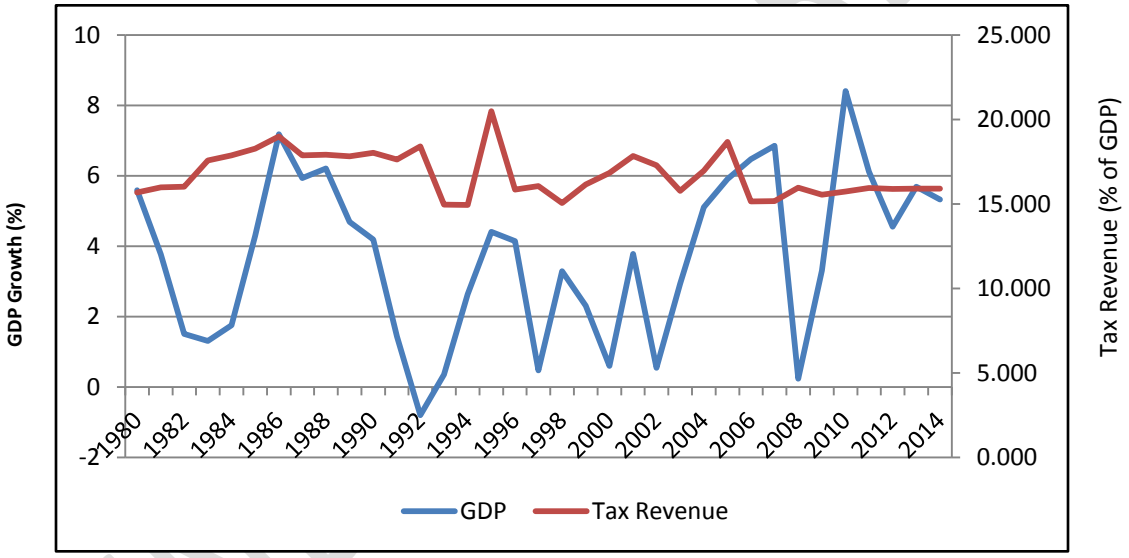

Figure 1.GDP and Tax Revenue (%); Source: Author's computation

Figure 1 shows the behaviour of GDP growth and tax revenue from 1980 to 2014. In summary, economic growth averaged 5.6% for the period under analysis while tax revenue averaged 15.9% over the same period. Figure 1 also indicates that an increase in tax revenue is accompanied by an increase in economy growth while as tax revenue declines economic growth also declines. This outcome could be attributed to the fact that financing domestic spending using own resources is beneficial to the economy. In the same vein, if domestic resources used to finance government spending declines as a result of debt payment then this will lead to further decline in economic growth. The relationship of external debt and economic growth is depicted in figure 2.

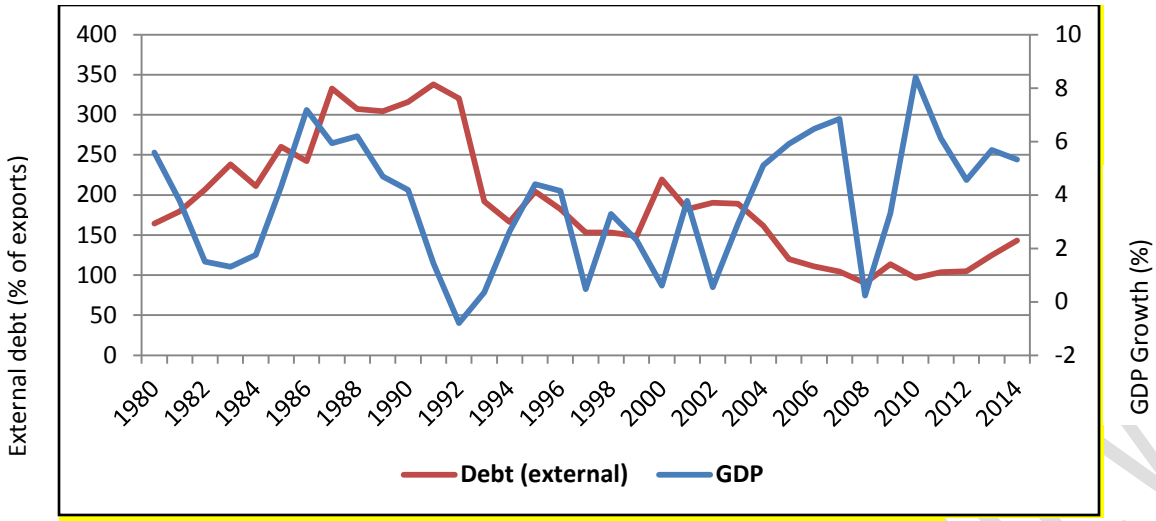

Figure 2: External debt and GDP growth (%): Source: Author's computation

Figure 2 shows that external debt as percentage of exports averaged 164.3% for the period under analysis. Figure2 clearly indicates there is decline in economic growth between periods 1980 to 1984 as external debt increases. The same scenario is depicted between 1990 to 1992. However, a decline in external debt is followed by an increase in economic growth. The outcome validates the economic theory that high debt level is detrimental to economic growth.

From the empirical point of view, this has however not been the case. Empirical literature focuses more attention on analyzing the response to economic growth due to changes in a subset of the budget while assuming that changes that occur elsewhere have no growth-effects. Consequently, it is assumed that changes in economic growth will be invariant irrespective of whether the increase was financed by increasing taxes or by using deficit financing (Adam and Bevan, 2001). Whereas considerable effort has been devoted to examining the effect of tax revenue and shifts between productive and unproductive expenditures, very little attention has been given to their economic effect depending on changes in method of financing such expenditures. It is therefore important to know how government spending can be allocated most efficiently and financed to bring about optimal growth, especially in the contest of declining tax revenue, large fiscal deficits, and growing debt stocks.

Moreover, of concern is the macroeconomic effect of government spending, the channels through which these effects are transmitted, and how these effects vary depending on the method of financing the expenditures. Answering this question is not only interesting to policymakers in designing strategies but also help in reconciling conflicting predictions about the effects of government expenditure. Despite these crucial insights and the strong desire in the academia to analyze the effect of public spending, there is little empirical research which has tried to determine changes in the economic growth brought about by the various methods of financing government budget. In particular, this dearth evidence reflects the fact that much of the empirical research in this area has not taken into account the effect of tax and debt-financed government spending, which are the most popular sources of financing government budget. This study, therefore, examines this issue in Kenya which finances its budget mainly using tax revenue and debt, both external and domestic debt. Specifically, the study seeks to empirically analyze how public spending funded by taxes and borrowing affect economic growth.

2. Theoretical Literature Review

Economic theory asserts that tax-financed increases in unproductive spending lead to a reduction in economic growth rate even though it can improve the welfare of the individual if it directly enters in the utility function. On the other hand, a rise in grants could be growth enhancing if they are used to reduce taxes so as to reduce public debt or to increase productive spending. However, the economic growth effect of grants will be neutral if used to finance

non-productive expenditures. Moreover, high levels of public debt will lower the growth effect of taxation and productive expenditures. However, there is a consensus that using income taxation and seigniorage to finance government expenditures are distortionary though with divided opinions concerning their relative merits. Palivos and Yip (1995) argued that financing public spending using income taxes is more harmful to economic growth than when the same is financed using seigniorage.

To further expound the theoretical literature on the growth effect of debt and tax-financed government expenditures, the study explored the Greiner and Semmler (2000) analysis on the response to economic growth arising from different sources of financing government expenditure. The authors postulated that it is not mandatory for the government to run a balanced budget instead it can use both bond and tax-financing as long as the debt remains sustainable. Building on endogenous growth framework, the economy comprises of interactions between among the households, firms, and the government. The households are assumed to be identical supplying labor, (*L)* to the firms, and derive utility from private consumption, *C(t)* whereby the utility function is given by*:*

$$U(C) = \int_0^{\infty} e^{-p} \left(\frac{C^{1-\sigma}-1}{1-\sigma}\right) dt$$

The producers in this economy produce two types of goods: the final good sold in the private market and the human capital. The government budget is divided into physical investment and social investment. Output *Y* is produced by identical competitive profit-maximizing firms where each firm's production is given by:

$$Y = AK^{1-\alpha-\beta}(\mu H)^{\alpha}(\nu K_G)^{\beta}.$$

A, represents productivity characteristics and K_G represents the supply of public capital. μ and ν range between zero and one and they represent the stock of knowledge from the workers and public capital stock used to produce market goods. $\alpha \; and \; \beta$ are the output elasticities. The government can use various financing options and is not constrained from implementing a balanced budget each period. However, the government certainly has to pay all the debt by the end of each period such that:

$$lim_{n\to\infty} B(t) \exp\left(-\int_0^t (1-\tau_k)\, r(s) ds\right) = 0,$$holds.

This implies there is no ponzi game and therefore the discounted debt asymptotically approaches zero. The government is assumed to collect revenue from income and consumption taxes and it can issue one period bond. The government spends its resources on public consumption, C_p, capital investment I_p and debt servicing *rB*. Over time, debt accumulation is represented by:

$\dot{B} = rB + C_p + I_p - T$ where *T* denotes total tax revenues. Government consumption expenditure does not affect productivity but a given share of tax revenue has to be devoted to financing such expenditures. Hence $C_p = a_1 T$ where a_1 lie between zero and one. Productive expenditure yields return in the future and are financed through borrowing but the government must first use current tax revenue to finance purchases and payment of interest such that $C_p + rB = b_1 T$ where b_1 lies between zero and one. This is in line with the fiscal rule that government should borrow to finance investment only and not for spending. The proportion of the remaining tax revenue allocated to investment would be $I_p = b_2(1-b_1)T$ where b_2>1 implies debt financing. Therefore, the variation of fiscal policy parameter b_2 captures the effect of debt financing on economic growth. Increasing b_2 beyond certain levels is assumed to have a negative effect on economic growth.

Other theoretical assertions include De Gregorio (1993) who postulated that financing public spending using seigniorage is more important in promoting economic growth than tax financing as long as returns on bonds are responsive to changes in inflation. Simpson and Blankenau (2004) argued that the long-run growth effect of an economy is affected when government expenditures are financed using distortionary taxes on capital and labor income. When expenditures are low increasing productive spending leads to higher growth because investment in the public sector will produce positive externalities greater than the negative disincentive effects from higher tax rates. However, when the expenditures reach the optimal level the effect of higher taxes will be negative and therefore harmful to economic growth (Rebelo, 1990; Chen and Lee, 2005).

Turnovsky and Chatterjee (1995) pointed out that productive spending compliments the production process and therefore enhance economic growth by increasing productivity of private factors of production. On the other hand, unproductive public spending has no direct effect on production but have to be financed thereby draining resources from the economy. The optimal government spending involves the allocation of expenditures from unproductive to productive expenditures. However, productive government spending does not have the same effect on economic growth and therefore this grouping provides little information about allocating the most growth-enhancing expenditures.

Elmendorf and Mankiew (1999) argued that the interest rate is a crucial avenue through which debt-financed government spending affects growth. A rise in long-term interest rate dampens potential output growth. Consequently, an increase in demand by the government to finance its expenditures will push up yields from sovereign debt which induces an increase in the flow of funds from the private sector to the public sector (Şen and Kaya, 2014).

Feldstein (1985) analyzed two cases aimed at comparing the relative merits of debt financing and financing using distortionary taxes on labor income. The analysis first compared two methods of financing a temporary increase in government expenditure while the second analysis considers the optimal method of financing a permanent increase in government expenditure from the point of maximizing utility. The analysis showed when government spending is increased it must be financed by increasing taxes while the optimal choice between tax finance and debt finance was really a choice about the timing of these taxes.

3. Empirical Literature Review

Using panel data from 1975 to 2008, Ghani and ul Husnain (2010) investigated the expenditure-growth nexus with the aim of examining whether the relationship is influenced by the source of finance. The sources of financing that were considered at the same time are the tax, debt, and seigniorage. The results showed that public spending financed using debt slowed economic growth. The findings also revealed that financing public spending using seigniorage negatively affects economic growth. Further, the study established that financing public expenditure using tax has a negative effect on economic growth. Even though the three methods had a negative effect, much of it was associated with expenditures financed by means of seigniorage compared to debt and tax financing.

Rioja and Christie (2011) developed and calibrated the dynamic macroeconomic model for Latin American economies to explore the extent to which economic growth is affected by expenditure composition and methods of financing. The authors sought to analyze the response to economic growth as a result of financing public investment using taxes or borrowing from 1990-2008. The results showed that if tax rates are low, increasing them so as to generate more revenue to finance public investment promotes economic growth. However, in a situation of tax rates being high, then restructuring public spending rather than financing using taxes will enhance economic growth. Moreover, financing additional investment using debt does not promote economic growth irrespective of the fiscal conditions.

Using data from the European Union (EU) countries for over forty years, Rother and Checherita (2010) investigated the effect of government debt on economic growth. Results indicated that debt had a non-linear effect on growth with a debt-GDP ratio of about 90-100 % being harmful to economic growth. The empirical evidence further indicated that changing the ratios of public debt and budget deficit-to-GDP annually had a negative effect on GDP.

Ghali (2003) analyzed the Cointegration relationship among government spending, budget financing and economic growth for Tunisian economy using Vector error correction model. The findings were analyzed depending on whether debt financed or tax-financed fiscal policy was followed. The findings established that government reliance on debt financing adversely affects economic growth while tax-financed government spending enhances economic growth.

Villieu and Minea (2009) analyzed the effect of government borrowing to finance public investments using endogenous growth framework. Their aim was to determine how fiscal deficit affect long-run growth and welfare. The results showed that fiscal deficit slows down the balanced-growth path in the long-run. By modeling debt as

stock and taking into account the feedback effect from debt servicing, the empirical findings for Greiner and Semmler (2000) revealed that financing public investment using debt is negatively associated with economic growth.

Ndjokou (2013) examined the interaction between fiscal policy and economic growth in nine West Africa CFA franc Zone countries using panel data. Specifically, the study sought to analyze the influence of public expenditures and revenues in addition to the budget composition of these economies on growth. The findings showed that government expenditures had a negative effect on economic growth while increasing revenues was associated with higher GDP growth. Further, the findings indicated that the composition of the budget had a greater influence on economic growth whereby indirect taxes had significant positive effect on growth while taxes on labor income had a significant negative effect on growth.

Abiad *et al.* (2015*)* investigated the macroeconomic effect of public investment financed by using taxes and debt in advanced economies. The authors used public investment forecast errors to simulate the causal effect of government investment in a sample of 17 OECD countries from 1985 to 2015. The findings indicated that public investment financed using debt raises output in the short run and in the long run. However, financing public investment using tax revenue was found to be detrimental to economic growth.

4. Methodology

The theoretical model of this study is based on a modified Diamond (1965) simple Overlapping- Generation (OLG) model which is formulated by incorporating seigniorage, taxes and public debt. The choice of the framework is motivated by the suitability of the OLG model in analyzing policy issues involving different treatment of young and old generation such as public debt and taxation policies. In addition, in OLG modeling, people born at a later period do not have control over decisions made in an earlier period. The model is then embedded in an endogenous growth model of government growth due to Barro and Sala-i-Martin (1992). To rule out the possibility of tax shifting, the study assumes the government levies a flat tax rate on output. Government spending can either be used for productive spending or directly enter into the consumers' utility with no effect on output. In this, study the government has an unbalanced budget which is financed either by taxes, seigniorage and public debt. The model is dynamic comprising of households, firms, and government interactions.

The households

In this model, individuals live for two periods as opposed to having a fixed number of infinitely-lived households. That is, there is a population turn-over where new generation is continually being born, and the old generation is continually dying. The individuals supply one unit of labor inelastically during the first period and consume in both periods. Population growth, which in essence is the labor force, grows at the constant rate n. There are no intergenerational transfers and the utility which is logarithmic and additive in nature is of the form:

$u = blnc_1 + (1-b)lnc_2$ ..... (4.1)

where c_1 and c_2 are consumption during the first and second period while b is a preference parameter.

Production

The representative firm's production is of the Cobb-Douglas form:

$y_i = A^{\alpha+\beta} l_i^{1-\alpha} k_i^{\alpha} \left(\frac{K}{L}\right)^{\beta} \left(\frac{G_p}{L}\right)^{1-\alpha-\beta}$ ..... (4.2)

where i is the index of the firm and it has constant returns to scale in the factors used for producing the output. A represents productivity characteristics while G_p represents the supply of public capital, $\alpha \; and \; \beta$ are the output elasticities. In this analysis, it is assumed that there is no depreciation of public capital. Therefore, imposing a flat tax rate τ in a competitive market and differentiating equation (4.2) with respect to k gives the returns r to capital investment which is given by:

$r = (1-\tau)\frac{\partial_i}{\partial_k} = \alpha A^{\alpha+\beta} \left(\frac{k_i}{l_i}\right)^{\alpha-1} \left(\frac{K}{L}\right)^{\beta} \left(\frac{G_p}{L}\right)^{1-\alpha-\beta}$ ..... (4.3)

Where τ denotes flat tax rate on a firm's output. Letting $\gamma_p = {}^{G_p}/_{L}$, the economy's aggregate production is then given by:

$$Y = A^{\alpha+\beta}K^{\alpha+\beta}G_p^{1-\alpha-\beta} = AK\gamma_p^{(1-\alpha-\beta)/(\alpha+\beta)} \quad \text{(4.4)}$$

The return of the representative firm in equation (4.3) will then be given by:

$$r = (1-\tau)\alpha A\gamma_p^{(1-\alpha-\beta)/(\alpha+\beta)} \quad \text{(4.5)}$$

The government

All activities of the government are measured relative to $GDP(Y)$ and that the government finance both productive and unproductive expenditures. As noted earlier, the government levies a flat tax rate on output τ and also receives grants as a proportion of income denoted by a_e. The government issues public debt where the outstanding domestic debt stock at the start of period t is D_{dt} which is repaid in the future while new debt in the second period amounts to D_{dt+1}. Public debt attracts interest rate in period t, denoted by r_{dt}, which is equivalent to the net of a tax return to capital. In the end, total public debt will be given by ${D_{dt+1}}/{Y_t} = \Delta_{dt+1}$, while at the beginning of the period the ratio of public debt to income is:

$$\frac{D_{dt}}{Y_t} = \frac{D_{dt}}{Y_{t-1}}\frac{Y_{t-1}}{Y_t} = \frac{\Delta_{dt}}{(1+g_t)} \quad \text{(4.6)}$$

Equation (4.6) holds whether the government finances public spending either by using domestic or external debt. In addition, the government could also finance expenditure from seigniorage amounting to ${\Sigma_t}/{Y_t} = \sigma_t$. This implies that the conventional government deficit when grants and interest payments are deducted is given by:

$$\delta_t Y_t = \Sigma_t + (D_{dt+1} - D_{dt}) + (D_{et+1} - D_{et}) \quad \text{(4.7)}$$

where D_{dt} is domestic debt while D_{et} is external debt. The government budget constraint relative to GDP is:

$$\tau_t = \gamma_{pt} + \gamma_{ut} - a_{et} + r_{dt}\Delta_{dt} + r_{et}\Delta_{et} - \delta_t \quad \text{(4.8)}$$

where γ_{pt} and γ_{ut} represents the share of productive and unproductive expenditures in *GDP*.
Alternatively, substituting the components of the budget deficit into equation (4.7) becomes:

$$\tau_t = \gamma_{pt} + \gamma_{ut} - a_{et} + \left[\frac{(1+r_{dt})}{(1+g_t)}\Delta_{dt} - \Delta_{dt+1}\right] + \left[\frac{(1+r_{et})}{1+g_t}\Delta_{et} - \Delta_{et+1}\right] \quad \text{(4.9)}$$

Capital formation of the representative firm in period t is financed using savings of the individuals who were young in period $t-1$. Importantly, a proportion of the total savings is used to repay domestic government bond, D_{dt} and D_{et} while net savings are invested in capital goods and working capital. Inflation generated from seigniorage affects a firm's profits hence the demand for investible resources. In this regard, inflation reduces demand for real money balances and also drives the wedge between investment funds as well as installed capital. Therefore, the amount of working capital created in period t is given by:

$${K_t}/{I_t} = \phi(\pi_t) = \phi \quad \text{(4.9)}$$

From equation (4.1), the aggregate growth rate of savings in period t will be given by:

$$S_t = (1-b)W_t = (1-b)(1-\alpha)(1-\tau_t)Y_t \quad \text{(4.10)}$$

This implies that from equation (4.9), total capital stock in period $t+1$ will be

$$K_{t+1} = \phi_{t+1} = \phi_{t+1}(S_t - D_{dt+1}) \quad \text{(4.11)}$$

Therefore, the growth rate of output between period $t\ and\ t+1$ will be

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 = \frac{AK_{t+1}\gamma_{pt+1}^{\frac{1-\alpha-\beta}{\alpha+\beta}}}{Y_t} \quad \text{(4.12)}$$

Hence, substituting equations (4.10) and (4.11) into (4.12) we obtain the equation for the growth rate of output as:

$$g_{t+1} = A\phi_{t+1}[(1-b)(1-\alpha)(1-\tau_t) - \Delta_{dt+1}]\gamma_{pt+1}^{(1-\alpha-\beta)/(\alpha+\beta)} \quad \text{(4.13)}$$

Equation (4.13) shows that growth rate of the economy between period t and $t+1$ is depended on the tax rate, the stock of public debt, the rate of inflation as well as government productive spending in period $t+1$. For convenience, the government budget constraint is repeated as

$$\tau_t = \gamma_{pt} + \gamma_{ut} - a_{et} + \left[\frac{(1+r_{dt})}{(1+g_t)}\Delta_{dt} - \Delta_{dt+1}\right] + \left[\frac{(1+r_{et})}{1+g_t}\Delta_{et} - \Delta_{et+1}\right] \quad \text{(4.14)}$$

Equations (4.13) and (4.14) provide the basis for empirical analysis to determine the effect of tax and debt-financed government spending on economic growth.

4.1 Empirical Model Specification

The empirical model is specified as:

$$Y_t = \beta_0 + \sum_{i=1}^{n}\beta_1 X_t + \sum_{j=1}^{m}\beta_2 W_t + \varepsilon_t \quad \text{(4.15)}$$

Where Y_t denotes GDP growth at time *t*, X_t represents other non-fiscal variables. Non-fiscal variables include public investment, official development assistance, and exchange rate. W_t is the the government budget constraint while ε_t is the error term. We ignore seigniorage financing and focus on tax and debt financed government expenditure. Thus the budget constraint is written as:

$$GOV_{exp} = TR_t + D_t \quad \text{(4.16)}$$

Where GOV_{exp} is total government expenditure net of transfers, and interest payment on outstanding debt, TR_t is tax-financing excluding grants while D_t represents debt financing. Since the budget constraint is an identity, including all the three variables of the budget constraint in the regression equation (4.16) will lead to the problem of multicollinearity. The problem is avoided by omitting one of the variables from the regression equation during estimation. The omitted variable is the implicit method of financing since it can be altered without restrictions. Following the methodology proposed by Ahmed and Miller (2000), excluding debt financing (D_t) from (4.16) the regression equation becomes:

$$Y_t = \beta_0 + \sum_{i=1}^{n}\beta_1 X_t + \beta_2 GOV_{exp} + \beta_3 TR_t + \varepsilon_t \quad \text{(4.17)}$$

Similarly, excluding tax-financing (TR_t) from equation (4.16) the regression equation becomes:

$$Y_t = \beta_0 + \sum_{i=1}^{n}\beta_1 X_t + \beta_2 GOV_{exp} + \beta_3 D_t + \varepsilon_t \quad \text{(4.18)}$$

The implication of equation (4.17) is that the excluded variable (D_t) is the indirect source of financing. Hence, the estimated coefficient (β_2) will measure how economic growth responds as a result of expenditures that are financed using debt assuming that tax revenues or other source of financing do not change. Likewise, exclusion of TR_t from equation (4.18) becomes the implicit source of financing and therefore the coefficient attached to the government expenditure will measure the effect to economic growth when public spending is financed using tax revenue since the other sources of financing are assumed not to change. Using the variables for this study, the estimated equations are transformed into linear forms as:

$$Y = \beta_0 + b_1 PI + b_2 PC + \ b_3 ODA + b_4 EXRATE + b_5 TR + \varepsilon_t \quad \text{(4.20)}$$

$$Y = \beta_0 + b_1 PI + b_2 PC + \ b_3 ODA + b_4 EXRATE + b_5 D + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (4.21)$$

Where, *PI* = public investment, *PC* = public consumption *ODA* = official development assistance, *EXRATE* = exchange rate, *TR* = tax revenue, *D* = stock of external debt.

4.3 Data types, description and measurement of the Variables

Time series data was used from 1980 to 2014. The variables used are:
GDP is the annual percentage change in economic growth rate. Total government expenditure is the ratio of total government spending in GDP. Public investment is measured as percentage of gross fixed capital formation in GDP. Public consumption expenditure is the total government purchases that do not generate future capital flows and is measured as percentage in GDP. Public debt which is measured as percentage of GDP comprises both external and domestic debt owed to creditors by the national government. External debt is measured as percentage of exports on goods, services and primary income while domestic debt is measured in Kenya shillings (KES). Tax revenue comprises government revenue generated from income taxes, corporate taxes, and consumption taxes measured as a percentage in GDP. Other Non-fiscal variables used are net official development assistance (ODA) received measured as percentage of gross national income. Finally, exchange rate is measured as yearly average of KES to United States dollar. The data was obtained from World Bank data base.

4.4 Estimation Procedure

This study used error correction (ECM) model to investigate how public spending financed using taxes and debt affect economic growth. However, before equations (4.10) and (4.11) were estimated, the variables were checked for time-series properties to ascertain the validity of the data. Phillip-Perron (PP) and Dickey-Fuller generalized least squares (DF-GLS) were used to test whether the variables have unit root. The equation for PP test is given as:

$$\Delta y_t = \beta' D_t + \pi y_{t-1} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (4.12)$$

Elliott (1999) proposed an efficient test that involves modifying the Dickey-Fuller statistics using generalized least squares (GLS). Accordingly, the modified DF-GLS test ha good predicting powers which dominate the ordinary Dickey-Fuller test. Since the PP and DF-GLS did not reject unit root in several explanatory variables, maximum likelihood ratio was used to establish the number of cointegrating vectors. The trace test is given by:

$$\lambda_{trace}(r_0) = -T \sum_{j=r_0}^{k} \log\left(1 - \hat{\lambda}_j\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (4.13)$$

Where the null hypothesis $H_0: r \leq r_0$ is checked against the alternative $H_1: r_0 < r \leq k$. The maximum eigenvalue test is given as:

$$\lambda_{max}(r_0) = -T \sum_{j=r_0}^{k} \log\left(1 - \hat{\lambda}_{r0+1}\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (4.14)$$

Where r_{0+1} represent the largest eigenvalue.

Because of cointegrating relations, then estimating cointegrating vectors using ordinary least squares (OLS) would be super-consistent but inefficient hence the choice of ECM as the estimating method. Error correction model is suitable for estimating the short-run and long-run dynamics of economic growth arising from different sources of financing government expenditure.

5. EMPIRICAL RESULTS AND DISCUSSION

5.1 Unit Root Test

The variables were tested for unit roots as shown in table 1.

Table 1: PP and DF-GLS Results for Unit Root

Variable	Level (5%)		First difference (5%)		Decision
	PP	DF-GLS	PP	DF-GLS	
Economic Growth (GDP)	-3.468**	-3.538**	-6.719	-5.615	*I(0)*
Public Investment Exp (PI)	-1.993	-2.548	-5.942	-5.537	*I(1)*
Public Consumption Exp (PC)	-1.953	-2.893	-4.990	-4.240	*I(1)*
Public external debt (ED)	-1.443	-2.074	-6.020	-4.083	*I(1)*
Tax revenue (TR)	-4.462**	-3.981**	-10.820	-7.473	*I(0)*
Official Dev. Assistance (ODA)	-2.083	-2.042	-5.928	-4.356	*I(1)*
Exchange Rate (EXR)	-0.940	-1.824	-5.431	-4.138	*I(1)*
Exports	-2.061	-2.095	-5.235	-3.861	*I(1)*

*Source: Research stata; ** denotes significance at 5% level.*

Table 1 indicates that GDP and tax revenue are stationary in levels and in the first difference. However, public investment expenditure, public consumption expenditure, external debt stock, official development assistance, and exchange rate are non-stationary in levels but become stationary after differencing. Further, the results indicates that variables GDP and tax revenue are I(0) hence do not share a common trend while the remaining variables are I(1) implying they are cointegrated and have a long-run relationship.

5.2 Cointergration

Having detected the presence of cointegration in most of the variables, the number of cointegrating relations in the equation was tested using maximum likelihood. The results are given in table 2.

Table 2 Cointegration Results

Variables	gdp taxrevenue dpublicinvestment dpublicconsumption ddebtexternal doda dexchangerate dexports				
	Lag length included = 2				
Max. Rank	**Eigenvalue**	**Likelihood ratio**	**Trace statistics**	**5% critical value**	**Null hypothesis**
0	-	-572.83651	164.2653	124.24	$H_0: r = 0$
1	0.82483	-544.96491	108.5221	94.15	$H_{0:} \leq 1$
2	0.63770	-542.36315	76.0331	68.52	$H_{0:} \leq 2$
3	0.55435	-515.78879	50.1698	47.21	$H_{0:} \leq 3$
4	0.51478	-504.21839	27.0290*	29.68	$H_{0:} \leq 4$
5	0.33696	-497.64372	13.8797	15.41	$H_{0:} \leq 5$
6	0.23411	-493.37616	5.3446	3.76	$H_{0:} \leq 6$
7	0.14208	-490.48577	0.0261	3.76	$H_{0:} \leq 7$

*Source: Research data. H0: No cointegration. * indicates the number of cointegrating eqution*s

Table 2 showed rejection of the null hypothesis confirming the variables have long-run relationship. As shown in table 2, the null hypothesis of no cointegration (*r=1*) when tested against the alternative of two cointegrating vector (*r=2*) was rejected at 5 percent level. This is true because trace statistics value 108.5221 is way above the critical value 94.15. The results further revealed that there are at least four cointegrating equations as indicated by the asterisk and the likelihood ratio.

53: Vector Error Correction (VECM)

Having confirmed the Cointegration relationship this study used VECM to analyze the dynamic effect of tax and debt-financed government spending on economic growth. The regression analysis was done in two different scenarios but in the same estimation equation aimed at determining the effect of tax-financed as well as debt-financed public investment, and public consumption spending. The results are presented in table 3 and 4.

Table 3: Results for Debt- Financed Public Spending

Dependent Variable: GDP growth				
Variable	**Coefficient**	**Std.error**	**t-statistics**	**p>t**
ΔPublic Investment	0.8067374	0.2467384	3.27	0.001***
ΔPublic consumption	-0.6133531	0.3390148	-1.81	0.070*
ΔTax Revenue	0.1307167	0.3190903	0.41	0.682
ΔOfficial Dev. Assistance	-0.0356528	0.0465807	-0.77	0.444
ΔExchange Rate	0.0635212	0.0964817	0.66	0.510
ΔExports	-0.2727192	0.1371459	-1.99	0.047**
$EC_1(-1)$	-0.1348863	0.0803225	-1.68	0.093*
Constant	0.164583	0.3728609	0.44	0.659

*Source: Research data; ***, **,* denotes significance at 1%, 5% and 10% respectively*
R-squared = 0.4553; Log likelihood = -448.393, Det (Sigma_ml) = 3496.175

Table 4: Results for Tax-Financed Public Spending

Dependent Variable: GDP growth				
Variable	**Coefficient**	**Std.error**	**t-statistics**	**p>t**
ΔPublic Investment Exp.	0 .672983	0.241943	2.78	0.005***
ΔPublic Consumption Exp.	-0.6575731	0.3349096	-1.96	0.050*
ΔPublic debt	0.0150114	0.0106311	1.41	0.158
ΔOfficial Dev. Assistance	-0.0433184	0.0402472	-1.08	0.282
ΔExchange rate	0.0131118	0.1003003	0.13	0.896
ΔExports	-0.1267678	0.177638	-0.71	0.475
$EC_1(-1)$	-0.1617178	0.0817277	-1.98	0.048**
Constant	0.1538066	0.366225	0.42	0.675

*Source: Research data; ***, **,* denotes significance at 1%, 5% and 10% respectively R-squared = 0.4745;* Log likelihood = -552.2846, Det (Sigma_ml) = 2309741

The regression results presented in table 3 and 4 indicated that official development assistance (ODA) had a negative but insignificant effect on economic growth. Thus, development assistance channeled to subsidize domestic capital formation has no significant effect on economic growth for the period under analysis. The exchange rate is also positive but insignificant. The results further showed that an increase in tax rate or external debt stock, holding government spending constant, has no significant effect on economic growth. The empirical findings also indicated that a country's exports have negative effect on economic growth. The outcome could be attributed to imports being higher than exports thereby resulting in negative trade balance which consequently has a bearing on economic growth.

Besides, the result indicated clearly the method of financing public spending has an important implication on economic growth. It is evident that issuing debt to finance public investment positively affects GDP growth. This outcome is similar to the empirical finding of Turnovsky (1995) who argued that financing public investment by issuing debt increases growth rate. However, the finding is contrary to Semmler (2000) who found that using debt to finance public investment has a negative effect on economic growth. The results also indicated that public consumption spending financed using debt negatively affects GDP growth. This affirms theoretical assertion that public borrowing should be directed towards financing productive investment and not for public consumption

expenditures. On the use of domestic resources to finance public spending, the results showed that tax-financed public consumption spending is associated with a negative effect on GDP. Financing public investment using tax revenue exerts positive effect on GDP growth. The findings are in line with Barro (1990); Cashin (1995) and Simpson (2004) who showed that financing government expenditure through taxes on labor and capital have positive impact on growth. Although the empirical evidence showed that investment spending exerts a positive effect financed using both debt and taxes, the two can be ranked comparatively in terms of their effect. The ranking takes into account the magnitude of the coefficient attached to public investment spending in different specifications. In this regard, debt-financed public investment contributes more to economic growth than when the investment is financed through taxes. In addition, debt-financed public consumption spending hurts economic growth less than tax finance as indicated by the coefficient attached to public consumption expenditure. The positive effect on economic growth arising from tax-financed public spending implies that it is possible for the government to reduce the fiscal deficit by improving the efficiency of the tax system and therefore increase tax revenue to finance its expenditure. Similarly, the negative effect of debt-financed public consumption spending implies the need for the government to reduce external borrowing because a further increase in debt stock is detrimental to economic growth.

6. Conclusion and Policy Implications

The study sought to investigate economic growth effect arising from different methods of financing government spending using cointegration and Vector Error Correction techniques. As opposed to prior studies, the current study considered simultaneously tax and debt financing to determine their effect on GDP growth. The study established that the source of financing public spending influences economic growth in Kenya. The estimates from the cointegration regression analysis showed that public consumption and investment spending had positive relationships with economic growth. Further, the regression results indicated both debt and tax-financed public investment spending promote economic growth. Financing public consumption spending using debt or tax revenue has a negative effect on GDP growth rate. The results confirmed the hypothesis that increasing public investment spending would effectively boost economic growth compared to government consumption. In addition, empirical findings established that although the two sources of financing public investment are associated with positive impact, the contribution of tax-financed investment to economic growth was less compared to investment financed using debt. On the other explanatory variables, the empirical finding showed that the effect of official development assistance and exchange rate have no significant effect on GDP growth. However, the coefficient for exports was negative and significant. This implied that contrary to theoretical predictions the country's domestic exports did not play any significant role in accelerating economic growth for the period under analysis.

Based on the findings, it is recommended that fiscal authorities in Kenya adopt a strategy of financing public investment using debt as opposed to using tax revenues. Given the negative effect of debt-financed public consumption, this study also recommends debt to be used in financing public investment instead of government consumption. Although tax-financed government consumption had a negative effect on growth and given the adverse effects of debt-accumulation on growth performance, policymakers should focus more on domestic revenue mobilization to finance government expenditures. Broadening tax base to bring on board informal sector, efficient tax system, minimizing tax evasion and tax avoidance are some of the ways through which the government can generate more revenue. Further, there is a need for policymakers to pursue fiscal discipline including prudent debt management, efficient use of domestic revenue, and endeavor in the reallocation of scarce resources in order to boost economic growth

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