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## Fiscal Policy and Economic Growth in Kenya: An Aggregated Econometric Analysis

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### **Abstract:**

*Sustainable economic growth is the drive of policy institutions, policy makers and the government in both developed and developing countries. The growth objectives underpinning the Vision 2030 requires the rate of growth of the Kenyan economy to rise by 10% each year with the intention of shifting Kenya from a low-income country to a middle-income country. Fiscal policy could stimulate economic growth by ensuring a sense of balance between taxation and expenditure consistent with sustainable growth. Contrary, proponents and opponents of government intervention in economic activity disagree on the effect of fiscal policy on economic growth. This makes the effect of fiscal policy on uncertain and debatable. This study therefore investigated the effect of fiscal policy on economic growth in Kenya using an aggregated analysis. The study employed correlation research design using autoregressive techniques based on annual data for the period 1991 to 2012. Data was obtained from World Bank development indicators. The findings indicate that tax has a significant positive effect on economic growth in Kenya while government expenditure has a significant negative effect on growth in Kenya. Bidirectional causality existed between economic growth and tax while unidirectional causality from growth to government expenditure was exhibited in Kenya. The study therefore recommends that the government of Kenya adopts a contractionary fiscal policy geared towards reducing government expenditure and increasing taxation to promote economic growth.*

**Keywords:** Fiscal policy, economic growth, aggregate analysis

## 1. Introduction

### 1.1. Background of the Study

Sustainable economic growth with relatively stable price level and substantial improvement of the welfare of the society has been the drive of policy institutions, policy makers and the government in both developed and developing countries (Mutuku & Elias, 2014). Governments apply various economic policies, in order to help their people through the efficient and optimum utilization of available resources, with the aim of producing goods and services that enable them as much as possible to satisfy the needs of their people (Al-Shatti, 2014). In this respect, the two main instruments of macroeconomic policy used by governments for the purposes of macroeconomic stabilization, economic growth and management are monetary and fiscal policies (Rena & Kefela, 2011).

Fiscal policy stimulates economic growth and development by ensuring a sense of balance between taxation and expenditure that is consistent with sustainable growth (Ocran, 2009). Advanced economies in particular have a long history of using taxes and government spending to smooth the business cycle (Abdon et al., 2014). Fiscal policy has also major impact on medium and long-term growth in developing economies where the private sector is relatively weak and underdeveloped. Government spending on infrastructure, such as roads, ports, and power plants, affects the firms and entire economy's productivity. Likewise, public spending on education fosters human capital, a vital ingredient to long-term growth (Abdon et al., 2014). Fiscal policy is therefore an important instrument for allocating resources to maintain a balance between the three key assets of the society: human capital, physical capital, and natural capital whereby the accumulation or depletion of these assets depends on the incentives created by tax policies and resources allocated through expenditure policies (López et al., 2010). Proponents of government intervention in economic activity according to Abdon et al. (2014) maintain that fiscal policy spurs long term growth by ensuring efficiency in resource allocation, regulation of markets, and stabilization of the economy. Opponents according to M'Amanja and Morrissey (2005) hold the view that government operations are inherently bureaucratic and inefficient and therefore stifle rather than promote growth and therefore to whether government's fiscal policy stimulates or stifles growth remains an empirical question. Thus, this study investigated the effect of fiscal policy on economic growth in Kenya.

### 1.2. Problem Statement

The effectiveness of fiscal policy in promoting growth remains uncertain and debatable given the mixed results on the effect of government expenditure and taxation on economic growth. More importantly, available studies focusing on Kenya like M'Amanja and Morrissey (2005) based on disaggregation fail to capture all components of government expenditure and taxation. This makes the overall effect of fiscal policy on economic growth in Kenya uncertain. The purpose of this study was to investigate the effect of fiscal policy on economic growth in Kenya using an aggregate analysis.

### 1.3. Specific Objectives

- To assess the composition of fiscal policy as a percentage of Gross Domestic Product (GDP) in Kenya
- To determine the overall effect of fiscal policy on economic growth in Kenya

### 1.4. Research Questions

- What is the composition of fiscal policy as a percentage of Gross Domestic Product (GDP) in Kenya?
- What is the effect of fiscal policy on economic growth in Kenya?

### 1.5. Scope of the Study

This study was based on annual time series data spanning 22 years from 1991 and 2012. Data was obtained from World Bank development indicators.

### 1.6. Significance of the Study

The study provides valuable insights to policy makers, academia, researchers and other stakeholders on the effect of fiscal on economic growth in Kenya. This forms useful material for the formulation of policy decisions relating to the pursuing of either expansionary or contractionary fiscal policies to enhance growth in Kenya.

## 2. Literature Review

### 2.1. Fiscal Policy in Kenya

Fiscal policy in Kenya has been conducted based on the Long-term National Development plans which have been acting as the guidance on investment and development. For instance, from 2003 the government adopted the economic recovery strategy which is currently the vision 2030 (Mutuku & Elias, 2014). Other initiatives which constitute fiscal policy have been implemented in Kenya for instance, The Medium-Term Expenditure Frame work (MTEF), Poverty reduction Strategy Paper and poverty Reduction Growth Facility (PRGF) (Mutuku & Elias, 2014). During the period 1964–1977, the government of Kenya was able to finance all its current expenditure and part of its development expenditure using recurrent revenue receipts, and hence incurred minimal fiscal deficits. This was made possible by a healthy flow of donor assistance in terms of grants and project/programme aid (Muriithi & Moyi, 2003). From the late 1970s, after a series of both internal and external shocks, the government experienced chronic fiscal deficits attributed to uncontrolled public expenditure and possibly an inelastic tax system. In relation to GDP, mean expenditure was 34.4% generating a resource gap of about 4.6% for the period 1986 to 1998. Kenya government adopted the Budget Rationalization Programme in 1987 for the purposes of regulating expenditure through strict fiscal controls (Muriithi & Moyi, 2003).

In the 1990s, Kenya undertook fiscal reforms which Muriithi and Moyi (2003) outlined as; Introduction of value added tax (VAT) in 1990 to replace sales tax which had been introduced in 1973, abolishing of export compensation and export duty in 1993. During 1993/94 fiscal year, the Government put into place policy instruments to redress economic problems encompassing a large budget deficit, soaring prices, excess liquidity and escalating inflation. Among the measures taken was imposition of tight control on expenditures. Further achievements during the 1993/94 fiscal year included reduced inflation rate to single digit level, stable general price levels and the strengthening of the shilling against major international currencies (GOK, 1995). The fiscal policy in Kenya according to Njuru (2012) was affected immensely by the Structural Adjustment Programmes (SAPs) initiated in the early 1980s which were to limit the role of the government to that of providing public utilities and maintaining law and order. Instead, market forces were to be relied upon to mobilize resources for economic growth and development with an aim of crowding-in private investment.

According to the economic recovery strategy 2003-2007, the Government was to continue tightening fiscal policy with the objective of reducing domestic debt by undertaking reforms on both tax revenue and public expenditure which include; Removing suspended import duties and all remaining discretionary duty exemptions in order to reduce the scope for tax evasion; Consolidating all tax collections through the Kenya Revenue Authority (KRA) by optimally using the PIN and VAT registration systems, expanding the tax base, particularly to target the informal sector, harmonizing Kenya's tax regime to bring it in line with those for other members of the East African Community and rationalizing personal income tax by raising tax threshold and reducing the number of tax brackets (Government of Kenya, 2003).

Sessional paper no. 10 of 2012 on Vision 2030 outlined that the Government was to ensure the bulk of expenditures are met from tax revenue and that overall expenditure is controlled to ensure that the overall government deficit is sustainable and does not lead to a crowding out of private sector investments (Republic of Kenya, 2012). Key elements of the fiscal strategy included the following: Maintaining a strong revenue effort with revenues targeted to rise from 20.7% of GDP to 22%, maintaining the overall fiscal deficit at less than 5% of GDP, containing growth of total expenditures, while creating fiscal space through expenditure rationalization to shift resources from non-priority to

priority areas, increasing the share of development expenditures in total outlays, building capacity for efficiency, effectiveness and accountability in budgetary (Republic of Kenya, 2012). Despite immense fiscal reforms, the overall budget deficit has been quite erratic from year to year and total expenditure has consistently exceeded revenues (Njuru, 2012).

## 2.2. Overview of Kenya's Economy

In the first decade of independence between 1964 and 1973 there was remarkable performance with the economy growing at an average of 6.7 percent which was as a result of emphasis on small holder agricultural farming and growing demand both domestically and within East Africa (Wanjiuku, 2013). Between 1973 and 1985, oil shocks of 1973/74 and 1979/80, mismanagement of proceeds from coffee boom of 1976/77 together with the effects of the oil shocks resulted to balance of payment problems which affected the economy negatively (Wanjiuku, 2013). In 1993, the government of Kenya began a major programme of economic reform and liberalization with the assistance of the World Bank and the International Monetary Fund (IMF), Kenya's real GDP growth rate averaged just over 4 percent a year (Kosimbei, 2009).

Arising from the implementation of sound fiscal and monetary policies supported by strong Structural reforms, Kenya's economy grew significantly from virtual stagnation in 2002 when it expanded by 0.6% to 6.1% in 2006 and 6.3% in the first quarter of 2007 (Republic of Kenya, 2012). The growth objectives underpinning the Vision 2030 require the rate of growth of the economy to rise to 10% which will shift Kenya from the rank of the low-income countries to well within the ranks of the middle-income countries. Achieving these growth targets requires: continued implementation of prudent fiscal, monetary and exchange rate policies; enhanced effort to raise the level of investments and savings, and accelerating structural reforms in order to increase the efficiency of both physical and human capital and raise total factor productivity (Republic of Kenya, 2012).

## 2.3. Empirical Literature

### 2.3.1. Fiscal Policy and Economic Growth

M'Amanja and Morrissey (2005); Ahmad and Wajid (2013); Olasunkanmi and Babatunde (2012) used time series techniques to investigate the relationship between various measures of fiscal policy on growth in Kenya, Pakistan and Nigeria. Categorising government expenditure into productive and unproductive and tax revenue into distortionary and non-distortionary, they found unproductive expenditure and non-distortionary tax revenue to be neutral to growth as predicted by economic theory. However, contrary to expectations, productive expenditure had strong adverse effect on growth whilst there was no evidence of distortionary effects on growth of distortionary taxes. These findings are contradicted by Babalola and Aminu (2012) who investigated the impact of fiscal policy on economic growth in Nigeria using the Engle-Granger Approach and Error correction models. The results indicated that productive expenditure positively impacted on economic growth during the period of coverage and a long-run relationship existed between them as confirmed by the cointegration test.

The results of the reviewed empirical studies are mixed, the findings can be classified as having; neutral, negative effect (e.g., M'Amanja & Morrissey 2005)) for productive government expenditure on economic growth, and positive effect (e.g., Ahmad & Wajid (2013); Olasunkanmi and Babatunde (2012) for productive expenditure on economic growth. Although the studies used a disaggregation approach, all components were not captured hence the need capture the overall effect of total government expenditure and total taxation on economic growth.

Al-Khasawneh and Aleqa (2012); Ocran (2009); Dada (2013) examined the relationship between fiscal policy and economic growth rates in Jordan, South Africa and Nigeria using quarterly data and based on VAR analysis. The results indicated that government expenditure and tax had a significant positive effect on economic growth.

Attinasi and Klemm (2014) looking at the impact of discretionary fiscal policy on economic growth for a sample of 18 EU countries over the period 1998-2011 using dynamic panel data techniques, found that fiscal consolidation can be a drag on economic growth in the short-term. In general, the results indicated that expenditure-based adjustment tends to be less harmful than revenue-based adjustment. Among expenditure cuts, reductions in government investment and consumption are found to be growth reducing. Among revenues, indirect tax increases are found to have a particularly strong negative impact. The methodological aspect of panel data set gives generalized perspective and has no place in explaining country specific characteristics.

### 2.3.2. Taxation and Economic Growth

Ferede and Dahlby (2012) examined the impact of the Canadian provincial governments' tax rates on economic growth using panel data covering the period 1977-2006. They found that a higher provincial statutory corporate income tax rate is associated with lower private investment and slower economic growth. The empirical estimates by impulse response analysis suggested that a 1 percentage point cut in the corporate tax rate is related to a 0.1-0.2 percentage point increase in the annual growth rate.

Ihenyen and Mieseigha (2014) examined taxation as an instrument of economic growth in Nigeria using annual time series data for the period 1980 - 2013 by Ordinary Least Square (OLS) technique. The empirical result suggested that the hypothesized link among corporate income tax, value added tax and economic growth indeed exist in the Nigerian context. Thus, the results showed that taxation was an instrument of economic growth in Nigeria.

### 2.3.3. Government Expenditure and Economic Growth

Chude and Chude (2013) investigated the effects of public expenditure in education on economic growth in Nigeria over a period from 1977 to 2012 in Nigeria by use of an Error Correction Model (ECM). The results indicate that Total Expenditure Education is highly and statistically significant and had positive relationship on economic growth in Nigeria in the long run. The result has an important implication in terms of policy and budget implementation in Nigerian. They concluded that economic growth is clearly impacted by factors both exogenous and endogenous to the public expenditure in Nigeria.

Babalola and Aminu (2011) investigated the impact of fiscal policy on economic growth in Nigeria. Annual data covering 1977–2009 were utilized for analysis using the Engle-Granger Approach and Error-correction models. The results indicated that productive expenditure positively impacted on economic growth during the period of coverage and a long-run relationship exists between them as confirmed by the cointegration test.

Nworji et al. (2012) examined the effect of public expenditure on economic in Nigeria for the period 1970 – 2009. The tool of analysis was the OLS multiple regression model specified on perceived causal relationship between government expenditure and economic growth. Results of the analysis showed that capital and recurrent expenditure on economic services had insignificant negative effect on economic growth during the study period. Also, capital expenditure on transfers had insignificant positive effect on growth.

Alexiou (2009) established the relationship between economic growth and government spending by applying using panel data methodologies applied to seven transition economies in the South Eastern Europe (SEE). The results indicated that four out of the five variables used in the estimation i.e. government spending on capital formation, development assistance, private investment and trade-openness all had positive and significant effect on economic growth. Population growth in contrast, is found to be statistically insignificant.

Okoro (2013) using time series data of 32years for the period (1980-2011), investigated the impact of government spending on the Nigerian economic growth. Employing the ordinary least square multiple regression analysis to estimate the model specified, Granger Causality test, Johansen Co-integration Test and Error Correction Mechanism, the result showed that there existed a long-run equilibrium relationship between government spending and economic growth in Nigeria. The short-run dynamics adjusts to the long run equilibrium at the rate of 60% per annum.

Given the above review of empirical studies, it was evident that the effect of fiscal policy on economic growth is controversial given the mixed results. This therefore makes the effect of fiscal policy on economic growth uncertain and debatable. Thus, the study investigated the effect of fiscal policy on economic growth in Kenya to bridge the uncertainty knowledge gap.

## 3. Research Methodology

### 3.1. Research Design

The study adopted a correlation research design based on time series data. The study analyzed the effect of fiscal policy on economic growth in Kenya using Vector Autoregressive techniques of cointegration, error correction mechanism and Granger Causality test.

### 3.2. Theoretical Framework

This study's theoretical framework was underpinned on the endogenous growth model. The theory, advocates the stimulation of level and growth rate of per capita output by use of fiscal policies such as government spending (M'Amanja & Morrissey, 2005). More specifically, models on the effect of fiscal policy on economic growth are built on the basis of Barro (1990) framework (Babalola & Aminu, 2011). According to Barro (1990) as examined by M'Amanja and Morrissey (2005) a Cobb-Douglas-type production function is used to examine the effect of fiscal policy on economic growth. The study therefore specified the relationship between fiscal policy and economic growth as;

$$Y = f(G, T, \varepsilon) \quad (3.1)$$

$$Y = AG^{\alpha}T^{\beta}e^{\varepsilon} \quad (3.2)$$

$$\ln Y = \ln A + \alpha \ln G + \beta \ln T^{\beta} + \varepsilon \quad (3.3)$$

Where: Y- economic growth, G- government expenditure, T- tax, A- factor productivity,  $\alpha, \beta$  – elasticity coefficients and  $\varepsilon$  - error term.

### 3.3. Data Analysis

The study conducted stationarity tests based on ADF test, Johansen cointegration for long run analysis, Error correction mechanism for short run dynamics analysis and Granger causality for directional causality. The analysis was conducted using Eviews 7.1.

## 4. Results and Discussion

### 4.1. Descriptive Statistics

The Descriptive Statistics are presented in Table 1

Statistic	G	T	Y
Mean	2.22E+11	2.36E+11	1.47E+12
Median	1.70E+11	1.79E+11	1.03E+12
Maximum	5.91E+11	6.77E+11	4.26E+12
Minimum	3.76E+10	3.95E+10	2.24E+11
Std. Dev.	1.63E+11	1.82E+11	1.16E+12
Skewness	0.827801	1.032987	1.040131
Kurtosis	2.602636	3.066365	2.998930
Jarque-Bera	2.657337	3.916597	3.966870
Probability	0.264830	0.141098	0.137596
Observations	22	22	22

Table 1: Descriptive Statistics  
Authors (2017)

Table 1 test results on descriptive statistics indicated that the null hypothesis of normal distribution for all the variables of economic growth, taxes and government expenditure in Kenya was not rejected at 5% level of significance given that the JB-statistics had p-values greater than 0.05. The first objective of this study was to assess the composition of fiscal policy as a percentage of Gross Domestic Product (GDP) in Kenya. On average government final consumption expenditure as a ratio of GDP stood at 15%. Tax revenue as a ratio of GDP on average stood at 16 %. Since final government consumption expenditure excluded government military expenditures which according to the world development indicators is approximately 3% of GDP. It was therefore concluded that the inclusion of this expenditure will automatically raise ratio of government expenditure to GDP in Kenya. This implied that, in Kenya government expenditure always exceeds tax revenue an indication that the government of Kenya has been operating a deficit budget over years. Thus, tax revenue in Kenya remains insufficient to finance government budget prompting the country to seek other means of budget financing a justification for the rising public debt to meet the ambitious infrastructural development projects.

#### 4.2. Correlation Analysis

Variable	LNY	LNT	LNG
LNY	1.000000		
LNT	0.995468*	1.000000	
	(0.0000)	-----	
LNG	-0.795994*	0.693633*	1.000000
	(0.0000)	(0.0000)	-----

Table 2: Correlation Matrix

Note. \*Indicates Significance at 5% Level of Significance (Authors, 2017)

Table 2 test results indicated that there was a strong significant positive association between tax and economic growth and a strong negative association between government expenditure and economic growth in Kenya at 5% level of significance. This implied that an increase in government expenditure and taxation are likely to decrease and increase growth in Kenya respectively. The findings were consistent with M'Amanja and Morrissey (2005); Ocran (2009); Al-Khasawneh and Aleqa (2012) and Dada (2013).

### 4.3. Stationarity Test

Variable			ADF – Coeff	ADF P-value	Inference
ln Y	Level	Intercept	-0.026786	0.6599	-
		None	0.003685	0.9972	-
		I & T	-0.322841	0.3823	-
	1 <sup>st</sup> diff	Intercept	-0.758064*	0.0275	I(1)
		None	0.149492	0.2328	-
		I & T	-0.786814*	0.0426	I(1)
ln T	Level	Intercept	-0.025622	0.7704	-
		None	-1.005210	1.0000	-
		I & T	-0.345245	0.4893	-
	1 <sup>st</sup> diff	Intercept	-0.913436*	0.0075	I(1)
		None	-0.342063*	0.0399	I(1)
		I & T	-1.173286*	0.0461	I(1)
ln G	Level	Intercept	-0.030824	0.5953	-
		None	-0.005055	1.0000	-
		I & T	-0.248690	0.6682	-
	1 <sup>st</sup> diff	Intercept	-0.880121*	0.0107	I(1)
		None	-0.247586*	0.0386	I(1)
		I & T	-0.947590*	0.0275	I(1)

Table 3: Unit Root Test

Note. I (1) Indicate Integrated of Order One. Authors (2017)

The Augmented Dickey-Fuller (ADF) test results in Table 3 showed that the null hypothesis of non-stationarity at 5% level of significance was rejected for all the variables of economic growth, tax and government expenditure. This implied that the variables were stationary and indeed they were integrated of order one.

### 4.4. Cointegration

The Johansen cointegration analysis results based on the trace and maximum eigenvalue tests are presented in Table 4

Unrestricted Cointegration Rank Test				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.681298	32.69554	29.79707	0.0226
At most 1	0.342918	9.825559	15.49471	0.2944
At most 2	0.068846	1.426615	3.841466	0.2323
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.681298	22.86998	21.13162	0.0282
At most 1	0.342918	8.398944	14.26460	0.3396
At most 2	0.068846	1.426615	3.841466	0.2323
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				

Table 4: Johansen Cointegration Test Results  
Authors (2017)

The Johansen cointegration analysis results indicated the existence of one cointegration equation. This implied that the variables of economic growth, tax and government expenditure in Kenya have a long run relationship. The normalized cointegration coefficients are presented in Table 5.

LNY	LNT	LNG
1.000000	-1.680212	0.657120
	(0.24048)	(0.23816)
	[-6.98679]	[2.75916]

Table 5: Normalized Cointegration Coefficients

Note. \* () and [] Indicate Standard Error and T-Statistics Respectively (Authors, 2017)

The results indicated that the relationship between economic growth with tax and government expenditure in Kenya can be represented as;

$$\ln Y + \underset{[2.7592]}{0.66} \ln G - \underset{[-6.9868]}{1.68} \ln T = 0 \quad (1)$$

$$\ln Y = \underset{[-6.9868]}{1.68} \ln T - \underset{[2.7592]}{0.66} \ln G \quad (2)$$

The second objective of this study was to establish the effect of fiscal policy on economic growth in Kenya. Model (2) with t – statistics in parenthesis on interpretation implies that tax has a significant positive long run effect on economic growth at 5% level of significance i.e. a percentage increase in tax causes an increase in economic growth in Kenya by 1.68%. This was consistent with the findings of Ocran (2009); Al- Khasawneh and Aleqa (2012) and Dada (2013). On the other hand, government expenditure has a significant negative long run relationship with economic growth in Kenya at 5% level of significance i.e. a percentage increase in government expenditure causes economic growth in Kenya to decrease by 0.66%. This was consistent with the findings of M'Amanja and Morrissey (2005).

#### 4.5. Error Correction Mechanism

The Error correction results are presented in Table 6.

Error Correction	D(LNY)	D(LNT)	D(LNG)
CointEq1	-0.136076	0.917138	-0.268141
	(0.17557)	(0.20005)	(0.21500)
	[-0.77504]	[ 4.58446]	[-1.24718]
D (LNY (-1))	0.379718	0.132692	0.332798
	(0.23989)	(0.27334)	(0.29376)
	[ 1.58287]	[ 0.48544]	[ 1.13288]
D (LNT (-1))	0.426103	0.962177	0.156544
	(0.22180)	(0.25273)	(0.27161)
	[ 1.92107]	[ 3.80709]	[ 0.57635]
D (LNG (-1))	-0.223632	-0.232931	-0.012786
	(0.24697)	(0.28141)	(0.30243)
	[-0.90551]	[-0.82774]	[-0.04228]
R-squared	0.583813	0.627361	0.397701
Adj. R-squared	0.472829	0.527990	0.237088
F-statistic	5.260363	6.313348	2.476141
Akaike IC	-2.537585	-2.276509	-2.132420

Table 6: Vector Error Correction Results

Authors (2017)

The results indicated that tax and government expenditure had no effect on economic growth in Kenya. The negative sign of error correction term though insignificant, validated the existence of long run relationship between economic growth with tax and government expenditure in Kenya. The value of 0.58 for the coefficient of determination implied that 58% of variation in economic growth was explained by changes in government expenditure and tax (fiscal policy) in Kenya. The model was significant at 5% level of significance given an F-statistic of 5.260363.

#### 4.6. Error Correction Mechanism Diagnostic Tests

##### 4.6.1. Normality

Component	Jarque-Bera	Df	Prob.
1	0.598545	2	0.7414
2	1.528862	2	0.4656
3	0.926290	2	0.6293
Joint	3.053697	6	0.8021

Table 7: Normality Test Results

Authors (2017)

The test results in Table 7 indicated that the null hypothesis of normal distribution for residual was accepted at 5% level of significance given that the joint probability value was greater than 0.05. This implied that the residuals were normally distributed.

#### 4.6.2. Heteroscedasticity

The Heteroscedasticity test results are shown in table 8.

<b>VEC Residual Heteroskedasticity Tests: No Cross Terms (Only Levels and Squares)</b>		
Joint test		
Chi-sq	df	Prob.
37.01207	48	0.8752

Table 8: Heteroscedasticity test results  
Authors (2017)

The results indicated that the null hypothesis of no heteroscedasticity was not rejected at 5% level of significance given that the p-value was greater than 0.05. This implied the residuals had a constant variance.

#### 4.6.3. Serial correlation

The Serial correlation test results are presented in Table 9

<b>VEC Residual Serial Correlation LM Tests</b>		
Null Hypothesis: no serial correlation at lag order h		
Lags	LM-Stat	Prob
1	9.806829	0.3663

Table 9: Serial Correlation Test Results  
Authors (2017)

The results indicated that the null hypothesis of no serial correlation was not rejected at 5% level of significance given that the p-value was greater than 0.05. This implied the residuals were not correlated.

#### 4.6.4. Multicollinearity

The study established whether the independent variables of tax and government expenditure were highly correlated by use of pair wise correlation. Table 2 results on correlation analysis indicated that the correlation coefficient between government expenditure and tax was 0.693633. This value is less than 0.8 which according to Gujarati (2004) implies the variables are not highly correlated thus no multicollinearity problem.

#### 4.6.5 Stability

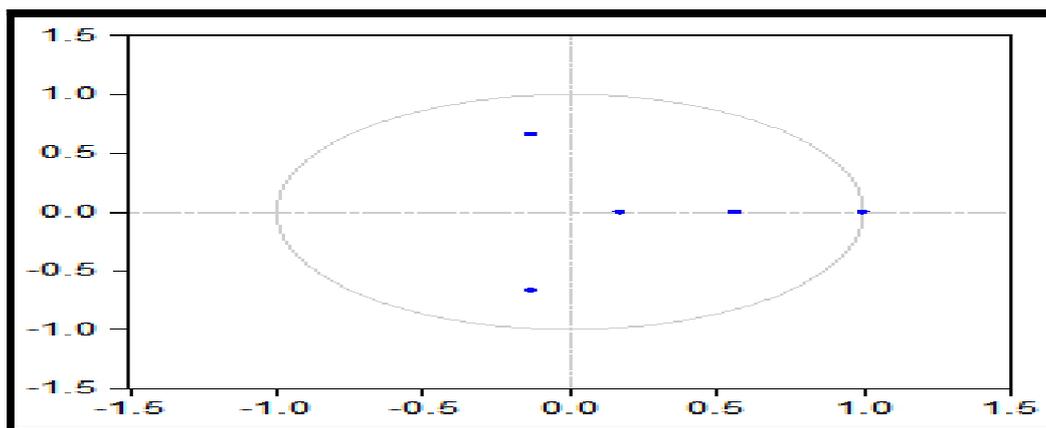


Figure 1: Inverse Roots (Author, 2017)

The study established the stability of the VAR model by use of inverse roots of characteristic polynomial. Figure 1 showed that none of the inverse roots was outside the circle and indication that the VAR model was stable.

#### 4.7. Impulse Response

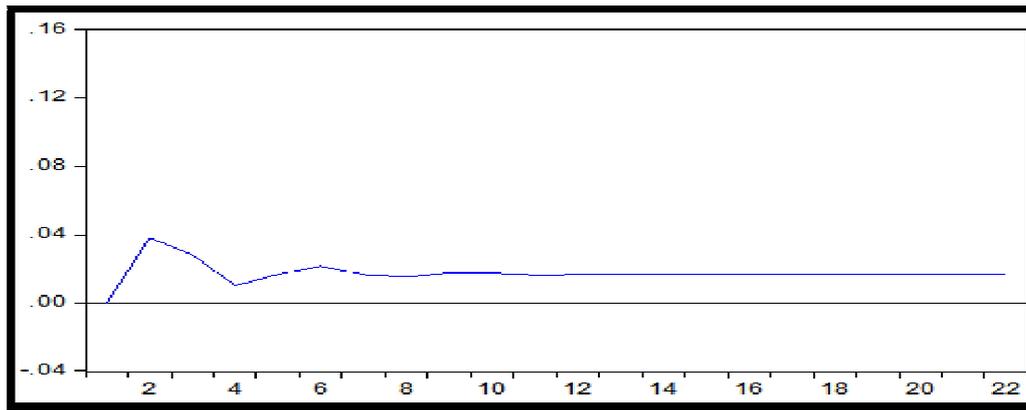


Figure 2: Response of Growth to Tax, (Authors, 2017)

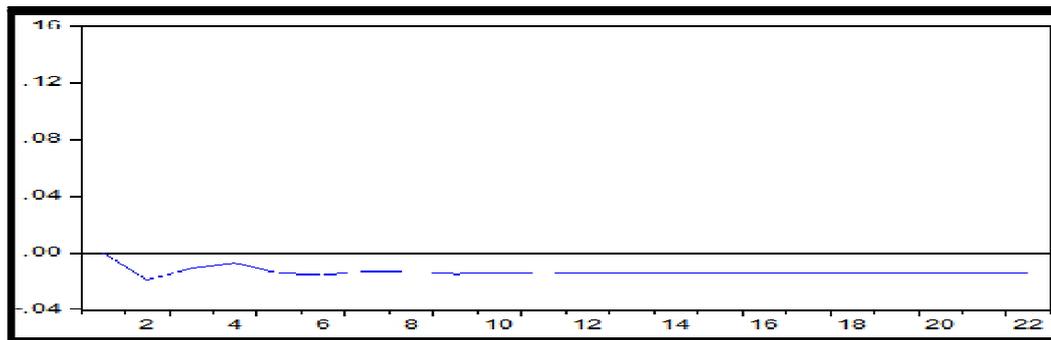


Figure 3: Response of Growth to Government Expenditure, (Authors, 2017)

The study conducted impulse response analysis to establish the effect of a one-unit standard shock of tax and government expenditure on economic growth in Kenya. Figures 2 and 3 indicated that tax had a positive effect on growth while government expenditure had a negative effect on economic growth in Kenya for the entire study period. These findings corroborate the cointegration findings and are consistent with M'Amanja and Morrissey (2005); Ocran (2009); Al-Khasawneh and Aleqa (2012) and Dada (2013).

#### 4.8. Causality

Using the Pair wise Granger causality test results to test bidirectional causality are shown in Table 10.

Null Hypothesis:	Obs	F-Statistic	Prob.
LNT does not Granger Cause LNY	21	5.96492*	0.0251
LNY does not Granger Cause LNT		6.31295*	0.0217
LNG does not Granger Cause LNY	21	0.68636	0.4183
LNY does not Granger Cause LNG		4.87958*	0.0404

Table 10: Pair Wise Granger Causality Test Results  
Authors (2017)

The results indicated that there was bidirectional causality between economic growth and taxation in Kenya while there was a unidirectional causality running from economic growth to government expenditure.

## 5. Conclusions and Recommendations

### 5.1. Conclusions

The study concluded that;

- Government expenditure has a significant negative long run effect on economic growth in Kenya.
- Tax revenue has a significant positive long run effect on economic growth in Kenya.

### 5.2. Recommendations

The study therefore recommended that the government of Kenya needs to adopt a fiscal policy that is contractionary in nature. This will lead to a decrease in government expenditure and an increase in tax to promote economic growth.

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