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Effectiveness of Fiscal Policy in Stimulating GDP Growth

(*Keberkesanan Dasar Fiskal dalam Merangsang Pertumbuhan KDNK*)

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ABSTRACT

This study examines the effectiveness of fiscal policy in stimulating the GDP growth. It further determines the most effective channel for growth stimulation. We use Structural Vector Autoregressive (SVAR) model on Kenyan quarterly time series data from 2006 to 2019 to track the response of GDP growth to fiscal policy. The findings reveal that, fiscal policy is effective for growth stimulation only when tax revenue and public debt are used. We find government expenditure is insignificant in influencing growth in Kenya while inflation rate having negative effects on growth. Relative to government expenditure and tax revenue, public debt was found to be the most effective fiscal policy item for growth stimulation. To realize increased growth in Kenya, this study recommends the use of an expansionary fiscal policy through tax revenue and public debt with proper control on inflation.

Keywords: GDP growth; fiscal policy; SVAR; Kenya

ABSTRAK

Kajian ini menguji keberkesanan dasar fiskal dalam merangsang pertumbuhan KDNK. Ia seterusnya menentukan saluran yang paling berkesan untuk rangsangan pertumbuhan. Kami menggunakan model Structural Vector Autoregressive (SVAR) pada data siri masa suku tahunan Kenya dari 2006 hingga 2019 untuk menjejak tindak balas pertumbuhan KDNK terhadap dasar fiskal. Penemuan mendedahkan bahawa, dasar fiskal berkesan untuk rangsangan pertumbuhan hanya apabila hasil cukai dan hutang awam digunakan. Kami mendapati perbelanjaan kerajaan adalah tidak penting dalam mempengaruhi pertumbuhan di Kenya manakala kadar inflasi mempunyai kesan negatif terhadap pertumbuhan. Berbanding dengan perbelanjaan kerajaan dan hasil cukai, hutang awam didapati sebagai perkara dasar fiskal yang paling berkesan untuk rangsangan pertumbuhan. Untuk merealisasikan peningkatan pertumbuhan di Kenya, kajian ini mengesyorkan penggunaan dasar fiskal mengembang melalui hasil cukai dan hutang awam dengan kawalan yang betul terhadap inflasi.

Kata kunci: Pertumbuhan KDNK; polisi fiscal; SVAR; Kenya
JEL Codes: B2, E3, E32, E61, E62, E63
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INTRODUCTION

Achieving increased GDP growth is a key priority for many governments in various countries particularly the developing ones (Ibrahim 2020). To enhance and strengthen their economy, such countries are constantly looking for increased growth (Bahaddi & Karim 2023). Therefore increased growth is the current measure on which a country is evaluated to determine its success and developments in the economy (Metelli & Natoli 2021). The urge to attain increased GDP growth emanates from the positive gains realized by the state economy that facilitates increased investments leading into job creation and an augmented purchasing power from the households (Ardanaz et al. 2020).

In Kenya, the task of attaining increased GDP growth remains key as the prevailing growth rates are below the aimed desired levels (Mutuku 2021). The Kenyan vision 2030 GDP pillar launched in the year 2003 aimed at achieving an annual growth rate of 10% by the start of year 2012 (Mukui et al. 2020). To date, this target has not been achieved as the current average growth rate in Kenya is 5% which is far below it. Figure 1 shows the trend of Kenya's real GDP growth rate from year 2006Q1 to year 2019Q4.

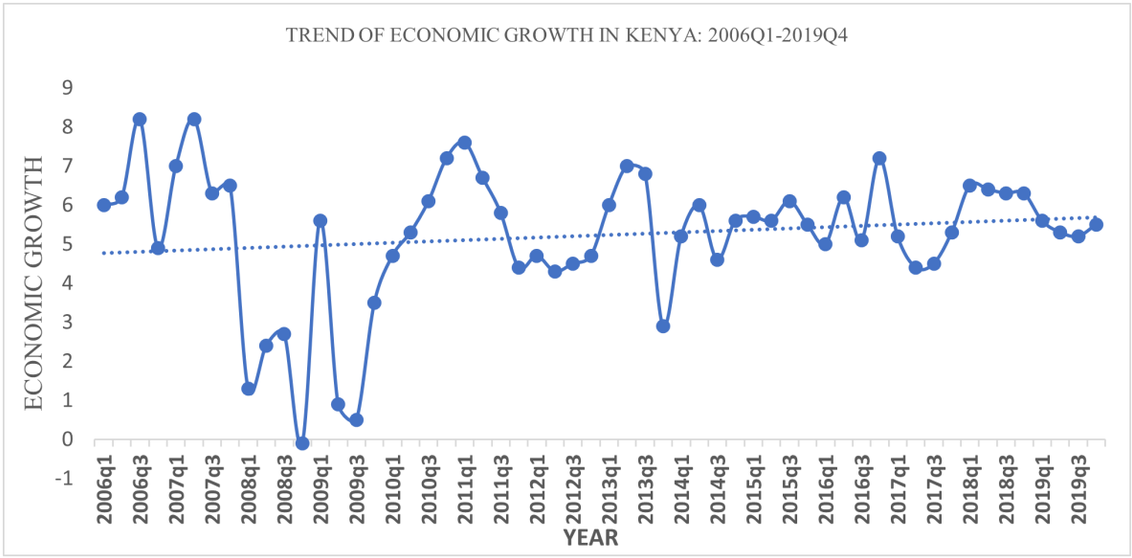

FIGURE 1. Trend of Kenya's GDP Growth rates (2006Q1- 2019Q4)

Considering the study period, Figure 1 shows the highest and the lowest GDP growth rates ever been experienced in Kenya were 8.2% and -0.1 % in the years 2007Q2 and 2008Q4 respectively. The highest growth rate was attributable to the Kenyan currency appreciation against the major currencies and the growth in the agricultural output that thrived throughout the year 2006 while the lowest growth rates of 2008Q4 were majorly attributable to the year 2007-2008 post-election violence that led to GDP activities disruptions and shutdown in Kenya. The mean growth rate is 5%, a rate which is far below the target level of 10%. As Figure1displays, growth oscillatory movements below the mean outweighs the growth oscillatory movements above the mean a case which imply that Kenya's GDP growth rate operates below its mean in most quarters of the year. This scenario is undesirable as no economy would like to operate below its normal trend as this can sire contractionary effects such decreased aggregate demand and supply in the economy. Further, it's worth noting that, GDP growth rates between 2006Q1 to 2014Q4 are relatively higher than growth rates beyond 2014Q1 to the end of the study period. This shows GDP growth rate in Kenya has been contracting over time. Clearly, this shows if the Kenyan government is to remain on the path that leads to the achievement of the set target of 10% annual growth rate, then a policy is needed to spur the GDP growth of Kenya.

The determining factors of GDP growth remains vital and the main accelerating factor for studies conducted in the area of macroeconomics (Durongkaveroj 2022) several developing countries have experienced a notable increase in income inequality along the path of economic development. Widening income inequality has been accompanied by growing demand for redistributive policy measures. The purpose of this paper is to examine the government spending and income inequality nexus in the context of structural transformation using an international panel data set covering 51 countries over the period 1990 to 2018 and an analytical framework that draws on Kuznets (1955. Nevertheless, these factors are partially identified. The fundamental question to be considered here is whether fiscal policy influences growth significantly or not. Largely, policymakers use either fiscal policy, monetary policy, or an optimal mix of both policies to stimulate growth (Ouraga 2020). Specifically, Keynesians recommend the utilization of a fiscal policy (varying government expenditures and taxes) for growth stimulation (Bista 2023). Kenya in particular has actively engaged fiscal policy to stabilize its economy whenever destabilization occurs. For example, following the year 2003 GDP recession with a GDP growth rate of 0.4%, as a stimulative strategy, the government opted for a debt equivalent to KES 54423.79 million in the year 2004, to be spent on infrastructural developments which were thought could increase aggregate demand in the economy through job creation (Olayiwola et al. 2022).Even though growth was seen in an expansion path by the end of year 2004, there is need to evaluate whether this effect was from fiscal interventionist policy or the monetarist policy which was imposed during the year by lowering the interest rates from 7% in 2003 to 6% in the year 2004.

Similarly, upon the occurrence of the 2007-2008 post-election violence coupled with the 2008-2009 financial crisis which brought the GDP growth rate in Kenya to -0.1% by the fourth quarter of year 2008, the government injected a debt-financed GDP stimulus package of KES 22 billion in the first quarter of year 2009 (Yuan et al. 2022). This was directed at creating employment and funding rural-labor intensive projects for example, "*Kazi kwa vijana*". The package was expected to stimulate consumption levels, thereby generating the necessary demand to boost production in the economy (Voda et al. 2022). After implementation of this policy, Growth is seen increasing from 0.5% in 2009Q3 to 7.6% by the end of 2011Q1.

In 2020, in light of Covid-19 GDP costs, which reduced GDP growth in Kenya to -0.3%, KES 73.9 billion debt was issued to Kenya by the International Monetary Fund (IMF).Using the funds, the government injected KES 10 billion into the economy through the "*Kazi-Mtaani"* program which was aimed at stimulating growth through youth employment (Mutuku 2021). By the end of year 2021 growth is seen increasing from -0.3 % in 2020 to 7.5 %. Nevertheless, this expansion in growth can never originate from fiscal policy only since other microeconomic policies such as reduction of real interest rates from 9% to 7% to facilitate borrowing for investments were also used as monetary policy GDP recovery strategies (O. Al-kasasbeh 2023).

Profoundly, we notice from the stylized facts on GDP growth that a need to stimulate growth in Kenya is necessary as the current growth rate is far from the targeted levels and the GDP growth rates in Kenya are retarded if not negligible. Further the effectiveness of fiscal policy in Kenya is questionable as their influence on growth is not treated in isolation from other GDP recovery strategies which were used such as interest rates for monetary policy. In lieu of this, this study raises a question, is fiscal policy really effective in stimulating the GDP growth of Kenya? If by chance it is effective, which is the most effective fiscal policy item for growth stimulation amongst tax revenue, government expenditure and debt? This will be the subject of this study.

Therefore, this study aims to examine the effectiveness of fiscal policy in stimulating the GDP growth. It further determines the most effective channel for growth stimulation. It uses Structural Vector Autoregressive model on Kenyan quarterly time series data to track the response of GDP growth to fiscal policy. The results show that, fiscal policy is effective for growth stimulation only when tax revenue and public debt are used. It further found that while government expenditure is insignificant in influencing growth, inflation rate has negative effects on growth. Finally, public debt was found to be the most effective fiscal policy item for growth stimulation compared to government expenditure and tax revenue.

REVIEW OF RELATED EMPIRICAL LITERATURE

The concern on whether growth can be stimulated when a fiscal policy is implemented remains a critical subject under investigation by many studies. In regard to this, some studies shows a positive nexus exist between fiscal policy and GDP growth while others show a negative effect occur when growth is subjected to fiscal policy. In the opening, the work of Mengistu (2021) anchored around ARDL model to test whether recurrent government spending and tax revenues were feasible in stimulating growth in the Ethiopian economy. The study settled on asserting recurrent expenditures and tax had significant but negative effect on growth. Additionally, Farmer et al. (2022) utilized Vector Autoregressive (VAR) model to ascertain the effect of fiscal policy (debt financed government spending) on GDP growth in the developing countries. The study found that fiscal policy had negative effects on growth in countries which had small debt levels. Other studies showing fiscal policy influences growth negatively includes the work of Alami et al. (2022), Bista and Sankhi (2022), Metelli and Natoli (2021), Mrabet et al. (2023) and the work of Nuru and Gereziher (2022).

Studies that portray fiscal policy has positive effects on growth are equally available in the existing literature. For example, Kim et al. (2021), utilizes SVAR framework on China's fiscal variables (tax and government spending) to reveal that increasing government expenditure in china and lowering taxes will result into increased growth in the same country. In Low and Middle Income Countries (LMICS), Arvin et al. (2021), uses 2005 to 2018 tax revenue and government expenditure time series data on ARDL model to assert that expansionary fiscal policy leads to increased growth in the LMICS. Other studies revealing the existence of a positive link between fiscal policy and growth is to be found the works of: Makin and Layton (2021), Batool (2022), Oijagbe (2020), Mutuku (2021), Alshammary et al. (2020) and the study of Yang et al. (2022).

Moreover, studies showing fiscal policy has zero effects on growth are not lacking in literature. For example, Abu and Tarawalie (2020), used an ARDL model to determine the efficiency of fiscal policy in triggering growth in Sierra Leone. The study found that fiscal policy had a weak relation with GDP growth. Nuru and Gereziher (2020), employed a nonlinear ARDL model to capture both the short run and long run effects of fiscal policy on the South African economy. The findings revealed that increased government expenditures had negligible effects on output growth on the South Africa economy. Adeleke and Sule (2020) used the multivariate Granger Causality approach to investigate the existence of any causation between fiscal policy items (government expenditures and tax revenue) and the GDP growth of Sub- Saharan African countries. In all the twenty-three countries chosen, no designable causality was realized between GDP growth and the fiscal items. Another study portraying fiscal policy has zero effects on growth is the work of Khalid and Marwan, (2013) which utilized Markov- switching regression model to infer the fiscal policy of Singapore has no effects on economic growth.

Studies with mixed findings on which fiscal policy instrument (tax, government spending and public debt) is effective are also traceable in current literature. Using a time series data on tax, government spending and public debt spanning from 1980 to 2019 of the G7 countries, Gurdal et al. (2021) realizes that the influence of fiscal policy on G7 countries growth is positive and effective only when tax is applied as the main instrument for the policy. Their work advocates the use of taxation in all the G7 countries to achieve increased growth. On the contrary, in Southern Europe, using fixed effects and the dynamic

linear regression model, Gllogjani et al. (2021) assessed the growth effects of public debts and taxes and found that public debt influenced growth significantly while tax did not. Tiamiyu et al.(2021) chooses government spending, tax revenue and fiscal deficit for growth stimulation in countries listed in ECOWAS. The study concludes that only government spending is significant for growth stimulation in all the countries. A comparison of these studies suggests that no generalization can be made on which fiscal policy instrument between taxes, government spending and public debt is good for growth stimulation.

RESEARCH GAP

The question on whether fiscal policy is effective in stimulating growth still remains controversial and partially answered by the existing literature. From the reviewed literature, some studies suggest fiscal policy has negative effect on growth while others suggest it has positive effects. This clearly implies no generalization has been made on whether the effect of fiscal policy on growth is positive or negative. Further, some studies suggest that fiscal policy has no effect on growth at all a case which requires re-examination to ascertain if that is so even in other countries. Additionally, reviewed studies show mixed results on which fiscal policy instrument between tax, government expenditure and public debt is effective for growth stimulation. Profoundly, no single study has tried to evaluate the most effective fiscal policy instrument for growth stimulation in Kenya. Therefore this study would like to add to the existing literature by assessing whether fiscal policy is effective for growth stimulation in Kenya and if the policy is found effective, the paper is motivated to determine the most effective fiscal policy instrument for growth stimulation in Kenya.

METHODOLOGY

This section presents data source description and the analysis used theoretical framework and the empirical model that was used in this study.

DATA SOURCE, DESCRIPTION AND MEASUREMENT

The type of data employed in this study was time series covering the first quarter of year 2006 to the fourth quarter of the year 2019. Data for fiscal policy variables (tax revenue, public debt and government expenditure) was extracted from the Kenya National Bureau of Statistics (KNBS) while data on the response variable GDP growth and the internal effect variable inflation was obtained from the Central Bank of Kenya (CBK). A summary of data definition, source and measurement is displayed in Table 1.

TABLE 1. Data definition, source and measurement

Variable	Source	Definition	Unit of measurement
Gross domestic product	CBK	Kenya's total monetary value of goods and services produced in a given quarter of the year	Kenyan shilling in millions (Kes, millions)
Tax revenue	KNBS	Kenya' total revenue earned through taxation in a given quarter of the year	Kenyan shilling in millions (Kes , millions)
Government expenditure	KNBS	This is the total government spending comprising of recurrent and development expenses in a given quarter of the year	Kenyan shilling in millions (Kes , millions)
Public debt	KNBS	Total external and internal debt secured by the government in a given quarter of the year	Kenyan shilling in millions (Kes , millions)
Inflation	CBK	The percentage change in the general prices of Kenya's products in a given quarter of the year	Percentage (%)

THEORETICAL FRAMEWORK

This study employed the endogenous growth theory. The endogenous growth theory postulates that fiscal policy is capable of affecting the growth rate of GDP output both in the short run and in the long run. The mechanism through which this occurs is traceable in the works of Barro Galic et al. (2022) and Al-kasasbeh (2022) . Galic et al. (2022), employed a modified Cobb- Douglas production function which used state provided goods and services (*p)* as a factor of production in the model to capture the influence of government spending and distortionary taxes on output. In per capita terms, the modified Cobb-Douglas production function was structured as follows:

$$y = Åk^{1-\alpha}p^{\alpha} \quad (2.1)$$

Where y, Å, k, p and α represents output, productivity factor, per capita private capital, state provided services and the coefficient of input elasticity correspondingly. Supposing that the state funds its budget by imposing a proportionate tax rate (Γ) and lump – sum taxes (L) on the produced output (y). The government budget constraint can be formulated as follows:

$$mp + C_g = L + \Gamma my \quad (2.2)$$

From Equation (2.2), m and C_g captures the number of productive producers in the economy and government expenditures on consumptions correspondingly. It is assumed theoretically, when a proportionate tax is imposed on output, the incentive to invest by private agents is affected accordingly but the lump sum taxes do not influence the investors incentive to invest. Following this notion and subject to the government utility function, Galic et al. (2022) extracted the long run growth rate model (n) as follows:

$$n = \Psi(1-\Gamma)(1-\alpha)Å^{1/(1-\alpha)}(p/y)^{1/(1-\alpha)} - e \quad (2.3)$$

In equation (2.3), Ψ and e captures the parameters of the utility function. From equation (2.3), it is observed that output growth rate decreases with increases in tax rate (Γ) and increases with increases in productive government expenditures (p). Additionally, lump sum taxes (L) and government consumption expenditures (C_g) are not observed in the model implying that both have zero effects on output growth rate and therefore can be dropped from the model. The specification in equation (2.2) assumes a balanced budget, a case which is not true especially in developing economies like Kenya. We revise the model adopted by Al-kasasbeh (2022) to fit reality by considering the government budget does not balance in each period. Putting this into consideration, equation (2.2) adjusts as follows:

$$mp + C_g + w = L + \Gamma my \quad (2.4)$$

Where represents the budget deficit or surplus and its expected effect on growth is zero if Ricardian equivalence holds and non-zero otherwise. Additionally, since (p) is productive, its expected sign is positive and since (Γ) is distortionary its expected sign is negative. Informed by neutral effects on growth from equation (2.3), C_g and L are dropped from the model.

Following Al-kasasbeh (2022), we formulate a growth model consisting of both fiscal and non-fiscal variables as follows:

$$y_t = \beta + \sum_{i=1}^{q}\delta_i V_{it} + \sum_{j=1}^{l}\lambda_j \eta_{jt} + \omega_{it} \quad (2.5)$$

From equation (2.5), (V) and (η) are vectors of fiscal and non -fiscal variables while (ω) is a vector of white noise disturbances. From theory if the government operates on a balanced budget, then $\sum_{i=1}^{q} V_{it} = 0$. To avoid this, we drop one variable in V_{it} which was assumed to have neutral effect on growth, say (V_q). To aid in dropping the neutral variable, we restructure equation (2.5) as follows:

$$y_t = \beta + \sum_{i=1}^{q}\delta_i V_{it} + \delta_q V_{qt} + \sum_{j=1}^{l}\lambda_j \eta_{jt} + \omega_{it} \quad (2.6)$$

Therefore omitting (V_q) from equation (2.6) we have:

$$y_t = \beta + \sum_{i=1}^{q-1}(\delta_i - \delta_q)V_{it} + \sum_{j=1}^{l}\lambda_j \eta_{jt} + \omega_{it} \quad (2.7)$$

Equation (2.7), is now an estimatable growth model which captures the effect of fiscal variables and non- fiscal variables on output growth. In this equation, ($\delta - \delta_q$) caries the effect of a unit increases in any of the fiscal variable on GDP growth while (λ_j) carries the effects of a unit increase in any of the non -fiscal variable on output growth.

EMPIRICAL MODEL

To achieve the objective of this study, we utilized a Structural Vector Autoregressive Model (SVAR). The model utilized five variables in their natural log forms. The included variables were: GDP growth (GDP), public debt (DEBT), government expenditure (EXP) tax revenue (TAX) and inflation rate (INF). The first three variables after GDP growth represented fiscal policy while inflation rate is non -fiscal and served as an internal effect affecting the Kenyan economy. SVAR model was chosen in this study since it was considered proficient in foreseeing how a target variable in the model could react when subjected to certain policy inventions through the generated impulse response functions (IRFs). Following Chugunov et al. (2021), a baseline SVAR model showing the relationship between existing variables and the past structural shock can be formulated as follows:

$$C_O M_t = C(L)M_{t-1} + A\varepsilon_t \quad (2.8)$$

Where M_t is K× 1 vector of fiscal and non - fiscal variables, $C(L)$ shows a matrix of the lagged polynomial variance-covariance matrix of the impulse-response functions of the shocks emanating from $M_t . L$ Serves as a lagging operator and ε_t exemplifies $M \times 1$ vector of disturbances which are white noise. C_O Carries instantaneous responses between the variables in the model while (A) incorporates the structural parameters of the model. Since equation (2.8) contains unobserved shocks, their identification is not specified. To identify them, we multiply equation (2.8) by the inverse of C_O to yield equation (2.9).

$$M_t = C_0^{-1}C(L)M_{t-1} + C_0^{-1}A\varepsilon_t = B(L)M_{t-1} + \mu_t \quad (2.9)$$

Where $B(L)$ is the link between variables in the system and their lags. μ_t Carries a vector of shocks defined to have contemporaneous effect on each other but follow normal distribution without any serial correlations. Equation (2.9) is now estimatable and traces how the reduced-form innovations μ_t are related to the structural-form innovations ε_t. This relation can be formalized and structured as follows:

$$\mu_t = C_0^{-1} A\varepsilon_t \text{ Or } C_0^{-1}\mu_t = A\varepsilon_t \quad (2.10)$$

Considering the study variables included in the model: GDP growth (*GDP*), public debt (*DEBT*), government expenditure (*EXP*), tax revenues (*TAX*) and Inflation rate (*INF*), we set a SVAR model in equation (2.10) in matrix representation as follows.

$$\begin{bmatrix} \varepsilon_t^{EXP} \\ \varepsilon_t^{GDP} \\ \varepsilon_t^{TAX} \\ \varepsilon_t^{DEBT} \\ \varepsilon_t^{INF} \end{bmatrix} = A \begin{bmatrix} \mu_t^{EXP} \\ \mu_t^{GDP} \\ \mu_t^{TAX} \\ \varepsilon_t^{DEBT} \\ \varepsilon_t^{INF} \end{bmatrix} \quad (2.11)$$

In Equation (2.11), ε_t^{EXP},, ε_t^{GDP} ,ε_t^{TAX}, ε_t^{DEBT} and ε_t^{INF} exemplified structural shocks while $\mu_t^{EXP}, \mu_t^{GDP}, \mu_t^{TAX}$, μ_t^{DEBT}, and μ_t^{INF} depicted the reduced shocks of the SVAR model. The instant response of GDP growth to the variables in the system is shown by the left hand-side of Equation (2.11) while non -contemporaneous response of the same relation is captured by the right-hand side of the same equation.

SHOCK IDENTIFICATION

Anchoring on the available literature, four methods can be utilized to identify the orthogonal components of the disturbance term through assignment of restrictions on the resultant impulse response functions. The first approach is the use of dummy variables to capture certain periods, second is the application of sign-restrictions traced, third is policy formulation and application of information related to fiscal policy changes on GDP activities by the use of decision and lastly is the use of recursive ordering to perform choleski decomposition on the variance covariance matrix containing the structural components (Inchauspe 2021).The last method is one utilized in this study. The primary condition for this approach is that the variables in the model should be ordered from the most exogenous to the least exogenous.

In this study, we order government expenditure as first assuming that it is predetermined and therefore no immediate response to shocks from other variables is expected. The intuition behind this assumption is that the government budget always predetermines the expected government expenditure and is less likely to react to business cycles within a quarter. This implies that government expenditure is affected by its own shocks only and therefore other shocks in the system were restricted to remain zero. GDP growth is ordered second assuming it reacts immediately to its own shocks and the shocks from the government expenditure as portrayed in the classical structure of the Keynesian multiplier. This directs that the shocks from tax revenue, public debt and inflation be restricted to remain zero. Tax revenue is ordered third considering that it reacts immediately to shocks from GDP growth and government expenditure and does not respond immediately to shocks from public debt and inflation. This implies the shocks from public debt and inflation are restricted to remain zero. Public debt is ordered fourth Assuming it reacts immediately to shocks from GDP growth, government expenditure and tax revenue but does not show instant response to inflation shocks. This directs us to restrict inflation shock to remain zero in this case. Inflation is ordered last on the assumption that it reacts instantly to all shocks emanating from the variables in the system and thus its structural coefficient is estimated with zero restrictions on the shocks emanating from the other variables in the system. With such restrictions the link between reduced errors and the structural errors takes the following matrix representation.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \alpha_{21} & 1 & 0 & 0 & 0 \\ \alpha_{31} & \alpha_{32} & 1 & 0 & 0 \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & 1 & 0 \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{EXP} \\ \varepsilon_{GDP} \\ \varepsilon_{TAX} \\ \varepsilon_{DEBT} \\ \varepsilon_{INF} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \mu_{EXP} \\ \mu_{GDP} \\ \mu_{TAX} \\ \mu_{DEBT} \\ \mu_{INF} \end{bmatrix} \quad (2.12)$$

RESULTS AND DISCUSSIONS

This section presents the empirical results and the discussions underlying this study.

DESCRIPTIVE STATISTICS AND TREND OF THE VARIABLES

Before subjecting the study variables to further analysis, their descriptive statistics were first calculated with an intention of determining their average, their maximum value and their minimum values. Table 1 shows the results of Descriptive statistics of the study variables.

TABLE 1. Descriptive statistics of the study variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln GDP	56	15.397	.572	14.3	16.176
Ln DEBT	56	14.375	.849	12.631	17.132
Ln TAX	56	13.651	.488	12.756	14.251
Ln EXP	56	13.998	.587	12.365	14.81
lnINF	56	7.614	2.839	4.1	16.2

From le 1, the largest and the smallest value for LnGDP were 16.1 and 14.3 units respectively. The mean value for LnGDP was 15.4 units. The maximum and the minimum v alue for LnDEBT were 17.1 and 12.6 units respectively. On average, LnDEBT was 14.4 units during the study period. The largest value for Ln TAX during the study period was 14.3 units while the smallest was 12.8 units. On average, the value for LnTAX was 13.7 units. The largest value for LnEXP was 14.8 units while the smallest was 12.4 units. The average Ln EXP was 14 units. The highest inflation rate that faced the economy during the study period was 16.2 units while the lowest was 4.1units. On average, the economy faced inflation rate of 7.6 units.

Additionally, to understand how the variables were evolving over time, we developed their time plots as displayed in Figure 1.

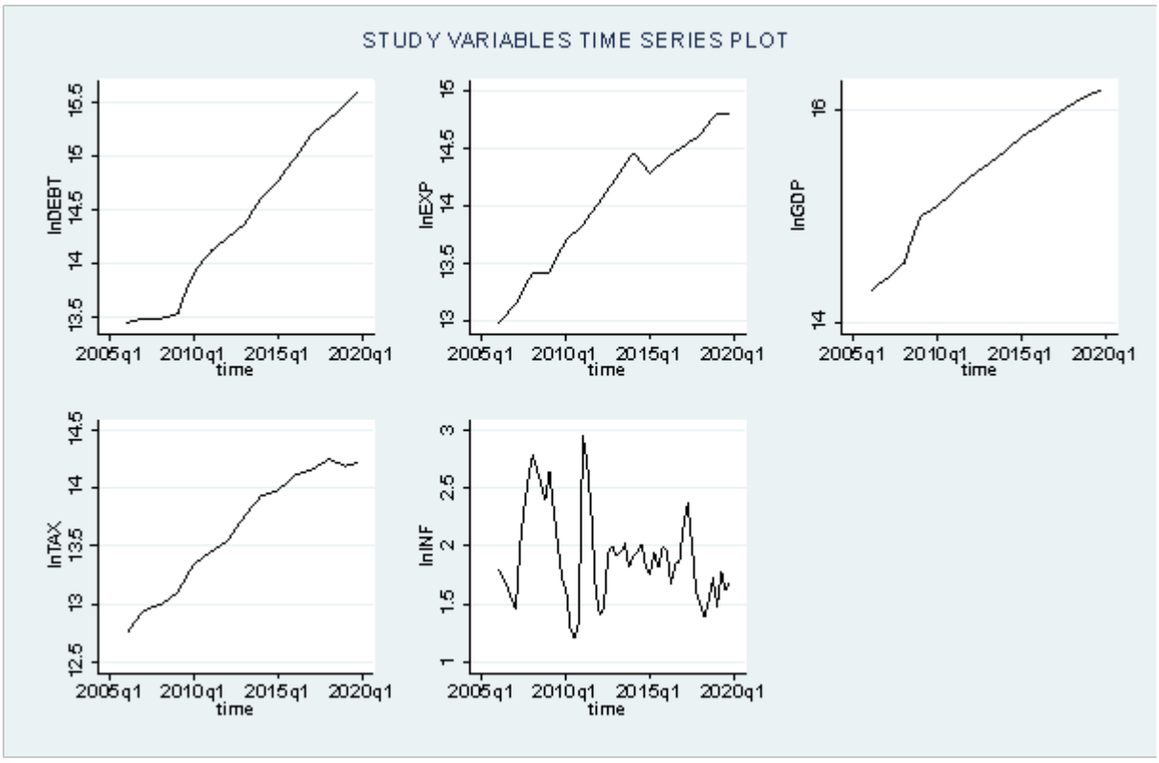

FIGURE 2. Time series plot of the study variables.

From Figure 1, we notice all the study variables with exception of inflation rate were trending upwards. The upward trend portrayed by the fiscal variables is a clear suggestion of the progressive use of fiscal policy by the Kenyan government. It is worth noting that lower variations in inflation rates are followed by lower variations and higher variations were followed by higher variations. This infers inflation rate is very volatile in Kenya.

PRELIMINARY TESTS

This section presents the necessary preliminary tests results required before an estimation of SVAR model.

UNIT ROOT TEST

A necessary condition to be met before running a SVAR (P) model is that the series used should be integrated of order zero. We checked the order of integration of

the study variables using three unit root tests: Phillips-Perron (PP), Augmented Dickey Fuller test (ADF) and the Kwiatkowski-Phillips – Schmidt- Shin (KPSS). The null hypothesis tested was that the series had unit root at level. The decision rule was to reject the null hypothesis if the resultant P-values corresponding to the resultant test statistic z (t) were less than the level of significance employed (5%). The unit root test results are presented in Table 2.

TABLE 2. Phillips- Perron unit root test

TEST	ADF				PP				KPSS			
Result	Z(t)	Critical value	p-value	Integration order	Z(t)	Critical value	p-value	Integration order	Z(t)	Critical value	p-value	Integration order
Ln GDP	1.05	-3.51	0.99	I(1)	-0.97	-3.49	0.94	I(1)	0.32	0.15	0.00	I(0)
Ln TAX	-0.78	-3.49	0.96	I(1)	0.45	-3.49	0.99	I(1)	0.41	0.15	0.00	I(0)
Ln DEBT	-2.42	-3.49	0.08	I(1)	-7.48	-3.49	0.00	I(1)	0.06	0.15	0.00	I(0)
Ln EXP	-6.41	-3.49	0.06	I(1)	-2.41	-3.49	0.00	I(1)	0.20	0.15	0.00	I(0)
Ln INF	0.24	-0.11	0.00	I(0)	-3.45	-2.86	0.00	I(0)	0.06	0.15	0.00	I(0)

As indicated in Table 2, the null hypothesis for lnINF was rejected since their p-values were less than the 5% significance level in all the three tests used. This implied that lnINF was stationary at level. The null hypothesis for lnTAX, lnDEBT, lnEXP and lnGDP were not rejected since their p- values were greater than the 5% significance level when ADF and PP were used. However, when KPSS test was used, the four series were found stationary. Since two tests (ADF and PP) out of three tests employed for testing unit root suggest lnTAX, lnDEBT, lnEXP and lnGDP are non-stationary at level, we take their first differences to make them stationary before running the model.

LAG-LENGTH SELECTION

For the purposes of reducing lag redundancy and for correct model specification, three criterions were used to select the ideal lag length: Akaike Information Criterion (AIC), Hannan – Quinn information criterion (HQIC) and the Schwarz-Bayesian information criterion (SBIC). The guideline for selecting the lag length was to take the lag length that was chosen by at least two criterions used, as this produces the lowest log-likelihood ratios relative to considering a single criterion. Accordingly, the best selected lag- length was one. Table 3 displays the results on the best selected lag-length.

TABLE 3. Lag-Length selection results

lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-205.309		0.019636	10.259	10.3351	10.4679
1	-126.151	158.31	0.0014*	7.61714	8.07372*	8.87097*
2	-100.35	51.602*	0.00143	7.57807*	8.41513	9.87676

Note: * Represents the optimal number of lags chosen by each criteria

EMPIRICAL RESULTS AND THE DIAGNOSTIC TESTS OF THE ESTIMATED SVAR (1) MODEL

This section presents the relevant residual diagnostical tests and the empirical results of the estimated SVAR (1) model.

RESIDUALS NORMALITY TEST, SERIAL CORRELATION AND MODEL STABILITY

Since SVAR (1) model was estimated using ordinary least squares (OLS) technique, the resultant residuals are expected to be approximately normal if not perfectly normal, the disturbances should not be serially correlated and the model parameters should be stable for estimates to be consistent over time (Sohail et al. 2021). In compliance to this, the study conducted the Jarque-Bera test to test for residual normality, the Breusch Godfrey LM test to check whether the disturbances were serially correlated and the AR root test to check the stability condition of the model. The test results are presented in Table 4 and Figure 2.

TABLE 4. Diagnostic results for normality and serial correlation

Test	Tested Hypothesis	chi2 statistics	p-value at 5% significance level	Decision
Jarque Bera test	H_0: Residuals are normal	0.47	0.61	Accept H_0
Breusch Godfrey LM-Test	H_0: No serial correlation	0.56	0.39	Accept H_0

The results in Table 4 confirmed the absence of serial correlation amongst residuals and the errors were found to have followed a normal distribution. Stability test results in Figure 2, shows that all the Eigen roots of the companion matrix lied within a unit circle. This implied that the estimated model met the stability conditions.

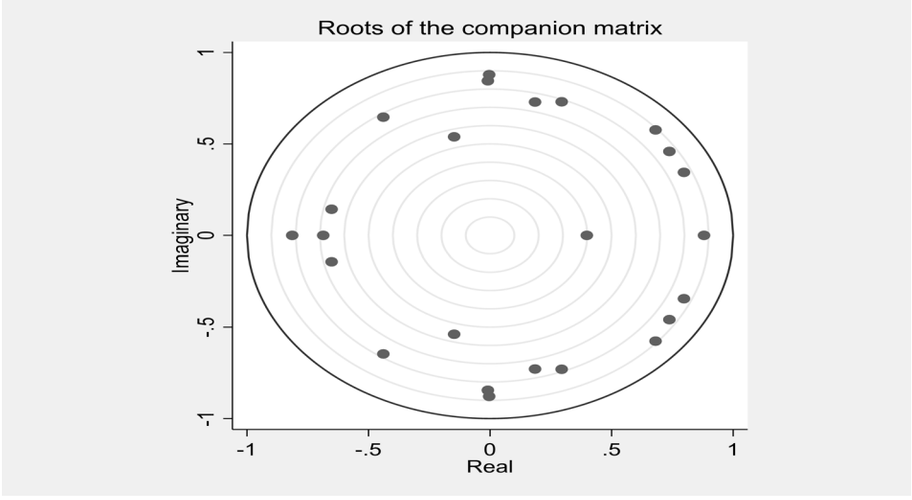

FIGURE 3. SVAR (1) Stability condition

EMPIRICAL RESULTS

This section presents the empirical results of the estimated model and their discussions.

GRANGER CAUSALITY TEST

To test the cause effect relationship between fiscal policy, inflation and GDP growth, the Granger causality Wald test was carried out. The null hypothesis tested was that none of the excluded variable caused the dependent variable in the equation of lnGDP, lnEXP, lnTAX, lnDEBT and lnINF. The results of the hypotheses tested are displayed in Table 5.

TABLE 5. Granger causality test result

Equation	Excluded	chi2	Df	Prob>Chi2
Ln GDP	lnEXP	1.73	2	0.48
	lnTAX	6.29	2	0.01
	lnDEBT	13.67	2	0.05
	lnINF	24.04	2	0.00
	ALL	12.93	5	0.00
Ln EXP	lnGDP	2.31	2	0.00
	lnTAX	3.67	2	0.00
	lnDEBT	1.78	2	0.00
	lnINF	13.47	2	0.56
	ALL	23.18	5	0.00
Ln TAX	lnGDP	7.25	2	0.00
	lnEXP	8.67	2	0.00
	lnDEBT	5.67	2	0.01
	lnINF	23.15	2	0.38
	ALL	12.89	5	0.00
Ln DEBT	LnGDP	9.13	2	0.01
	LnTAX	11.25	2	0.04
	LnEXP	12.91	2	0.00
	lnINF	8.14	2	0.58
	ALL	21.63	5	0.00
Ln INF	lnGDP	7.35	2	0.00
	lnEXP	11.23	2	0.00
	lnTAX	9.25	2	0.02
	lnDEBT	13.76	2	0.00
	ALL	20.56	5	0.00

On one hand, Table 4 shows that only tax revenue and inflation Granger caused GDP growth. On the other hand, it is observed that GDP growth Granger-causes Tax, debt, government expenditure and inflation. Considering other variables, tax was found Granger-causing GDP growth, government expenditure, debt and inflation. On reverse, apart from inflation the remaining variables Granger -caused Tax. Government expenditure was found granger-causing tax, debt and inflation only. In reverse, only inflation did not Granger-cause government expenditure. Public debt was found Granger-causing government expenditure, tax and inflation. In return, only inflation did not Granger -cause public debt. Inflation Granger- caused GDP growth only but was found being granger –caused by all the other study variables.

RESPONSE OF KENYA'S GDP GROWTH TO FISCAL POLICY AND INFLATION

To disclose how GDP growth in Kenya responds when a fiscal policy action is taken in presence of internal effects of inflation, a positive shock was imposed on each of the fiscal policy variable and inflation and the reaction of GDP growth was captured through the resultant impulse response functions as displayed in Figure 3.

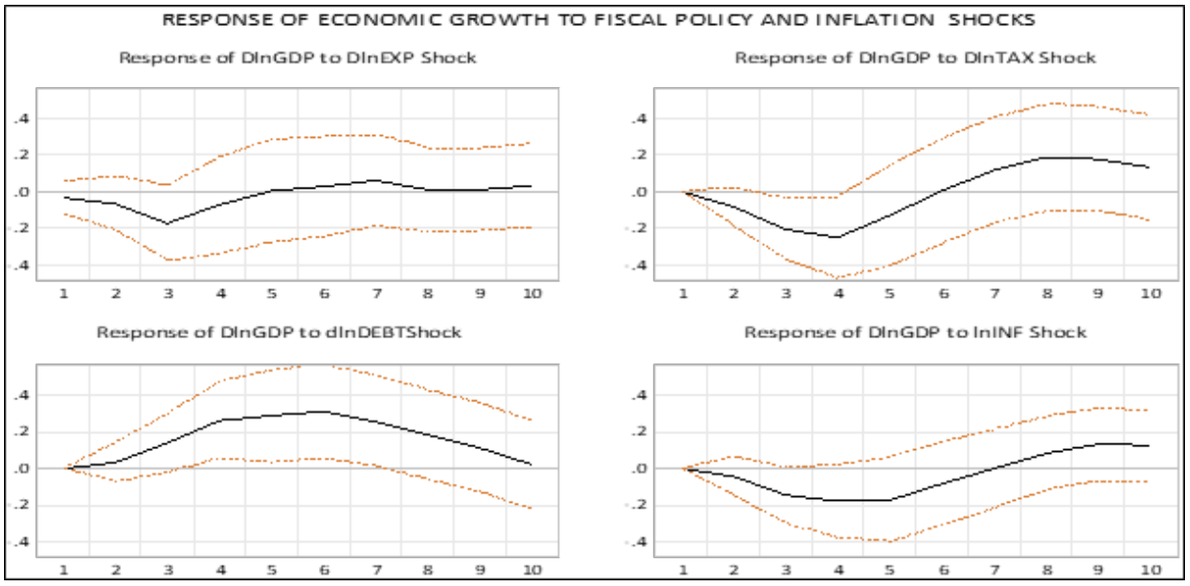

FIGURE 4. The response of GDP growth to fiscal policy impulse

As displayed in Figure 4, it is observed that when a positive shock on government expenditure is introduced in the system, GDP growth responds negatively for five quarters. However, it is worth noting the response is insignificant in the entire forecast horizon since GDP growth response curve remained at the middle of the two 95% confidence interval bands and appears on both sides of the optimal value (zero). This finding infers that, a sudden injection of government expenditure into the economy of Kenya does not attract increased GDP growth at all. A deliberation on this finding is that a larger percentage of the Kenyan government expenditure is done on recurrent activities as compared to development projects. This leaves little funds for financing developmental projects whose effect is negligible in augmenting GDP growth of Kenya. This finding agrees with the work of Nuru and Gereziher (2020), Liargovas et al. (2021) and Kamal et al.(2021).

Assessing the response of GDP growth when a positive shock on tax revenue is induced in the system, GDP growth is clearly observed to respond significantly but in a negative course in the first four quarters. Beyond the fourth quarter, GDP growth responds positively but the shock appear to have no significant influence on growth as the forecast horizon approaches the end. The implication of this finding is that a sudden augmentation of tax revenues in Kenya yields growth contraction rather than expansion. This growth feedback is probable since Kenya being a developing economy which centers on tax revenues to fund its budget, a sudden increase in tax revenue is only achievable with increased tax rates that diminishes usable income held by households. Furthermore, augmented tax rates dampen firms' interest to invest more since enlarged tax rates truncate their turnover. Additionally, sophisticated tax charges promulgate cost push inflation which heightens production costs. This scenario diminishes productivity index in the country and hence decreased growth. This finding appear consistent to the work of Amalu et al.(2020) but contradicts the work of (Abbadi et al. 2021).

Considering the response of GDP growth to an introduction of a positive innovation on public debt, Figure 4 shows that GDP growth responds positively, significantly and in an increasing manner for the first four quarters, it remains constant and upon reaching the sixth quarter, growth assumes decreasing trend in the remained forecast period .This finding suggests that public borrowing enhances increased GDP growth in Kenya in the short run. However it is critical to note that in the long-run growth decreases. A plausible deliberation on this finding anchors around the cost of servicing the debt as well as the sired cost effects associated by debt servicing such as increased tax rates. Kenya being a country that is heavily dependent on debts to balance its revenue with its expenses, the cost of repaying the acquired debts may counsel out the welfare gains resulting from the loans and therefore growth contraction. Further, it is worth noting higher tax rates which may be necessary in raising extra revenue for debt servicing will further attract inflation which essentially reduces consumer purchasing power. This in tandem scales down aggregate demand and investment levels the effect of which is declining growth rates. This finding is also traceable in the studies of Mukui et al. (2020) and Arestis (2021).

Focusing on the effect of inflation rate on GDP growth in Kenya, it is revealed in Figure 4, when a positive shock on inflation rate is made in the system, GDP growth reacts negatively and significantly for five quarters. Beyond the fifth quarter, growth increases gradually even though the influence of inflation shock is observed insignificant in the remained forecast period. This finding suggests that sudden increases in inflation rate in Kenya scales its GDP growth downwards. This finding is expected since increased inflation rates reduce the consumer purchasing

power as the value of money diminishes. When consumer purchasing power is thwarted, aggregated demand in the economy decreases and fails to balance with supply. As a result, producers reduce their production indices to match the declining demand. When this occurs in the general economy, production indices will decrease and growth converges. This finding is also found in the works of Olayiwola et al.(2022), and Gurdal et al. (2021).

GDP GROWTH VARIANCE DECOMPOSITION

To identify the most effective fiscal policy variable for GDP growth stimulation in Kenya, the study performed variance decomposition on GDP growth to establish what percentage of GDP growth was predicted by which fiscal variable in a forecast horizon of ten quarters. Variance decomposition results are presented in Table 6.

TABLE 6. Variance decomposition of GDP growth

Period	S.E.	DlnGDP	DlnEXP	DlnTAX	DlnDEBT	lnINF
1	0.5	98.9	1.1	0.0	0.0	0.0
2	0.50	93.8	2.1	2.9	0.5	0.7
3	0.56	72.9	7.3	10.5	4.4	4.9
4	0.60	60.8	7.3	14.8	11.9	7.2
5	0.62	54.3	4.3	13.8	18.5	9.0
6	0.64	49.5	3.9	12.2	25.7	8.6
7	0.65	45.8	3.9	12.6	29.7	7.9
8	0.67	43.4	3.6	14.6	30.4	8.1
9	0.68	42.3	3.4	16.1	29.4	8.9
10	0.69	42.8	3.3	16.5	27.9	9.5

As shown in Table 6, variance decomposition of GDP growth using a forecast horizon of ten quarters revealed that, GDP growth is a powerful predictor of itself in Kenya. This is because, the percentage of variations explained by GDP growth in the entire forecast horizon is higher relative to other variables. However, it is key to notice that its prediction power decreases as the time horizon increases. Considering fiscal policy shocks and their statistical relevance, public debt is observed to be the greatest predictor of GDP growth in Kenya relative to tax revenues and government expenditure since its predictability power at the start and at the end of the forecast horizon is way above that of government expenditures and the tax revenue. Further, Table 6 showed that less than 10 % of the variations in the Kenya's GDP growth are predicted by inflation rate.

CONCLUSION AND RECOMMENDATION

The core objective of this study was to assess the effectiveness of fiscal policy in stimulating the GDP growth of Kenya and consequently determine the most effective channel for growth stimulation in Kenya if the policy was found effective. From the generated impulse response functions, we find that public debt and tax revenue influences GDP growth in Kenya in the short-run. Specifically, we realize surprise increases in public debt in Kenya increases growth significantly for four quarters while surprise increase in tax revenue reduces growth for four quarters. We notice that government expenditures in Kenya have insignificant influence on Kenya's GDP growth while inflation rate has negative and significant effects on Kenya's GDP growth. Regarding which fiscal policy item is more effective that the others in influencing the variations of GDP growth in Kenya, variance decomposition of GDP growth shows that public debt is more effective than tax revenue and government expenditure. Grounded on the said conclusions, this study recommends the use of expansionary fiscal policy by use of public debt with a careful control on inflation rate for GDP growth stimulation in Kenya.

NOTES

[1] The source of all Tables and Figures used in the study is the author computations using the study data

[2] lnDEBT, lnEXP, lnTAX, lnGDP and lnINF represents public debts, government expenditure, tax revenue, gross domestic product and inflation rate in their natural logs respectively in the paper.

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