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John Kingu

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By: John Kingu[1]

Abstract

The present study examines the validity of the Keynesian theory on economic growth in Tanzania from 1966 to 2022. Secondary data for the current study were collected from the Bank of Tanzania (BOT) database. The theoretical framework of this paper was based on the Keynesian model. For the empirical examination, the study employs advanced econometric techniques such as the ADF and Phillips-Perron (PP) unit root tests, the Johansen cointegration test, and the Error Correction Mechanism (ECM). The results exposed that all the variables (GDP, grants, recurrent and development expenditures and tax revenues) were non-stationary at the level and stationary at the first difference. Cointegration results indicate there is a long-run association ship between grants, recurrent expenditure, development expenditure, and tax revenues on economic growth. Long-run results indicate that grants, recurrent expenditure, development expenditure, and tax revenues have a positive effect on economic growth and variables are statistically significant at the 5% level of significance. This suggests that the Keynesian theory is supported in the Tanzanian economy. The results of the ECM indicate that grants, recurrent expenditure, and tax revenues are converging towards equilibrium at the speed of 5%, 13%, and 20% per annum, except for development expenditure. Therefore, the present study recommends that since the Keynesian theory has been supported, fiscal policy activities in the economy should be enhanced to boost the economy. Furthermore, non-distortionary taxes should be maintained when expanding the tax base. Fiscal policy activities should stimulate economic growth.

Keywords: *Keynesian theory, economic growth, Error Correction Mechanism, Variance Inflation Factor and Tanzanian Economy*

Introduction

Economic growth has been explained by various theories, but the main theories are anchored on classical economic theory propounded by Adam Smith in 1776. The classical economic theory explains growth through market economies, where market forces—namely, demand and supply—determine the economic growth of countries (Ofwona, 2013; Mtui, 2015). The neo-classical theory is vested in the values of the free market, which creates a competitive environment; as such, producers will engage in the global market (Booth, 1983; Gali, 2018). The neo-classical model asserts that the economic problem centres on the organisation and allocation of scarce resources to improve social well-being and eventually economic growth. In fact, neo-classical development theory supports the free market. According to this theory, economic plans can be made by individuals and firms, rather than by the government (Gordon, 1990; Ogero and Musyoka, 2021).

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[1]*Department of Insurance, The Institute of Finance Management (IFM), Email: john.kingu2@ifm.ac.tz*

In line with classical economic theory, Rostow developed the linear modernization theory as an extension of classical economic theory. He emphasizes free trade as a stimulus for growth. This theory explores both endogenous and exogenous factors that influence economic growth (Gali, 2018).

Following the economic depression of the 1930s, classical and neo-classical theory became unpopular, and Keynes' theory (1936) emerged to address the serious problems of low aggregate demand and high rates of unemployment (Howitt, 1986; Bilbiie, 2020). Keynesian theory advocates for government intervention rather than waiting for market equilibrium to resolve issues of low aggregate demand and unemployment. Keynesian theory insists that during an economic recession, fiscal policy is imperative to solve economic problems. The theory is anchored on expansionary government expenditure and reducing taxes (Colander, 1992; Pantaleo, 2015). During an economic recession, expansionary fiscal policy is called for raising aggregate demand in a country's economy, thus boosting economic growth. Keynes perceives public spending as an external factor that be instrumental policy tool to foster a country's economic development and economic growth (Kira, 2013; Mkemwa, 2017; Omondi, 2024). Keynes' model indicates that public expenditure can influence economic growth positively and quickly compared to monetary policy. Through government spending, multiplier effects are likely to increase production, employment, profitability, and investment levels (Maturu et al., 2006; Murungi and Okiro, 2018). Additionally, government spending tends to augment aggregate demand, which in turn increases output according to the level of multipliers.

When fiscal policy is deliberately directed towards spending and taxation, it tends to influence economic growth positively. However, in terms of taxes, the government should implement a non-distortionary taxation system to stimulate the economy positively (Mtui, 2015). If the government wishes to improve economic growth, it may implement deliberate actions towards spending by increasing government expenditure while simultaneously reducing tax rates. This action is expected to increase output and employment. For instance, such deliberate action was witnessed during the financial crisis of 2018 and COVID-19, where many governments implemented counter-cyclical policies in the form of government stimulus packages to enhance aggregate demand and, in turn, stimulate economic growth (Paul and Furahisha, 2017).

Keynesian theory explains the function of government spending also tax system in the economy. Government spending on recurrent and development expenditures can stimulate the economic growth

positively via government multiplier's effects on AD (aggregate demand). Similarly, increasing government spending and reducing taxes pulls the economy out of economic recession quickly, whereas lowering government expenditure and increasing taxes lagging down the economic growth tremendously (Mkali and Rajab, 2021). Generally, Keynesian theory has some impact on economic growth, whether positive or negative. Positive impact can be harnessed through spending in productive sectors, which tend to influence the additional product of capital and enhance economic growth. Conversely, spending in unproductive sectors affects the additional product of capital negatively, leading to no economic growth (Elseoud, 2018). In taxation, the system can also affect the economy positively or negatively through the presence of distortionary or non-distortionary taxes. Distortionary taxes affect the economy negatively since they erode the purchasing power of individuals and firms, while non-distortionary taxes provide incentives to investors and consumers, hence stimulating economic growth (Al Shawarby and El Mossallamy, 2019; Godana, 2023).
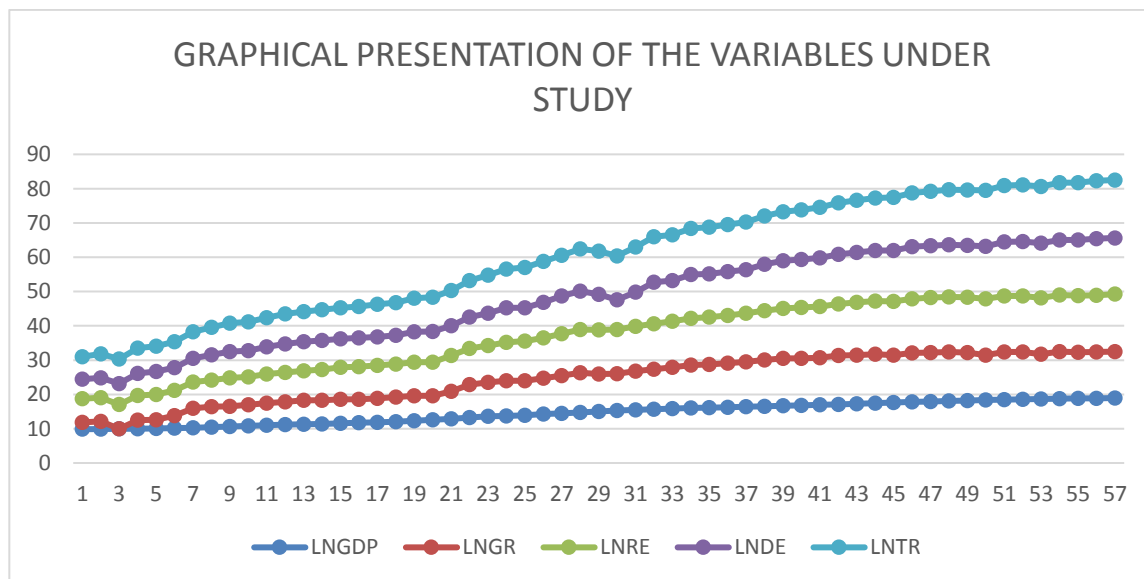
Tanzania is among the countries implementing Keynesian theory to stimulate economic growth. The government has made a tremendous progress in collecting taxes. The government has increased the tax base means the ratio of tax to GDP has increased from 10 percent in 2004/2005 to 11.8 percent in 2022/2023. In the same line, public expenditure has up surged from 12.6 percent of gross domestic product to 18.2 percent of gross domestic product (World Bank in Tanzania, 2023). Thus, the current study uses the GDP to represents the economic growth, grants, recurrent and development expenditures, as well as tax revenues

to investigate the applicability of Keynesian theory in the Tanzanian economy. All these variables are in natural logarithms as shown in figure one below. LNGDP, LNGR, LNRE, LNDE, and LNTR stand for natural logarithms of gross domestic product, grants, recurrent expenditure, development expenditure, and tax revenue, respectively.

Thus, the study intends to explore the usefulness of Keynesian theory in the Tanzanian economy since the government is implementing both expansionary and contractionary fiscal policies. Additionally, the paper will argument the knowledge to the literature on the ongoing debate regarding the validity of Keynesian theory in the Tanzanian economy, as opposed to classical theory and other existing growth theories.

The current paper is structured as follows. Section 2 bestow a summary of theoretical literature and empirical literature on Keynesian theory and the relation between fiscal policy activities and economic growth. Section 3 shows the data and theoretical structures of this study. Section 4 explains the estimation techniques and findings. And section 5 presents conclusion and the recommendations.

Literature Review

Theoretical Review

Keynesian theory was put forward by John Maynard Keynes in the 1930s following the economic crisis after WWI (Aliu, 2022). Keynesian theory advocates that a raise in the proportionate of government spending can overcome the economic problem of recession. Keynes viewed government expenditure as an external factor that called for policy instrument for economic growth. Alongside government spending, the taxation system also employed as policy instrument for growth (Obi et al., 2022). Keynes (1936) in Obi et al. (2022) contended that government spending was the simplest way for the economy to recover from a recession. A simple economic multiplier effect asserts that any change in government spending will significantly increase economic growth. Government spending is seen as an exogenous variable in economic growth, unlike the endogenous variables proposed by Wagner. Keynes' theory was asserted in 1930's during the Great Depression.

Expanding government spending and reducing tax rates are aimed at improving aggregate demand, reducing unemployment, and ultimately achieving economic growth. Keynesian theory postulates that the cause of unemployment during a recession is that businesses reduce production due to inadequate aggregate demand,

leading them to lay off employees to sustain production costs, thus increasing the unemployment rate (Gordon, 1990; Elseoud, 2018). Therefore, Keynes contended that expansionary fiscal policy, which entails increasing government expenditure and lowering taxes, might revitalizing economic growth through increasing aggregate demand, raise economic activities, and lower unemployment more quickly than monetary policy by lowering interest rates. Keynesian theory underscores the significance of government intervention in stabilising the economy and improving other macroeconomic variables such as balance of payments, full employment and economic growth. Contrary to Keynesian theory, classical economic theory opposes government intervention, advocating that market forces can bring economic stability (Bilbiie, 2020). Thus, this study intents to determine the applicability of Keynesian theory in the Tanzanian economy. This study will fill the gap left by previous studies, which often investigated the association ship between government expenditure and economic growth while ignoring the role of taxes. This study considers tax revenues as well.

Empirical Review

According to Keynesian theory, government spending and taxes are among the key fiscal policy instruments for any government aiming for growth. The theory contends that an expansionary fiscal policy would stimulate a country's growth (Pantaleo, 2015; Colander, 1992). This is expected to increase aggregate demand, which one at a time steer to an increase in economic growth. Furthermore, it is clear that non-distortionary taxes spur economic growth since investors will be more willing to invest, ultimately increasing output (Kira, 2013; Mkemwa, 2017). However, the reality between expansionary fiscal policy and growth in the economy has spurred intense debate among academicians and researchers for many decades. Empirical findings offer inconclusive results: some countries show a negative influence of government spending on growth, while others show a positive impact. Moreover, causality may run from economic growth to government expenditure or conversely. Theories behind these arguments come from Wagner's law and Keynesian theory, respectively. Generally, empirical results on the influence of fiscal policy on growth of the economy are mixed. Prevoius studies find a positive influence on economic growth, while others find a negative impact. Elseoud (2018) examined the Keynesian multiplier on economic growth in Egypt utilizing data for time series and confirmed that Keynesian theory was valid in Egypt, as consumption as well as government spending confirmed a positive effect on growth. Similarly, Eldemerdash and Ahmed (2019) extended the analysis by investigating the soundness of Keynesian hypothesis versus Wagner's law in Egypt. The time series data were employed and the study indicted a

positive influence of government spending on economic growth, with causality moving from economic growth (GDP) to government expenditure. Thus, the findings contended that Keynesian theory and Wagner's law were valid in Egypt.

Another study confirmed the validity of Keynesian theory in Kenya by examining the relationship between fiscal policy and unemployment (Gachari and Korir, 2020). Additionally, Ben (2020) reviewed the applicability of Keynesian and classical economic theory on economic growth following the COVID-19 pandemic shock, concluding that Keynesian theory was widely used by many countries to revamp their economies. Also, Reda (2021) explored the contribution of government spending on economic growth using panel analysis, examining the sectoral impact on growth in Ethiopia. The results indicated that economic growth was positively influenced by the government spending, with Granger causality confirming a bidirectional association ship between government expenditure and economic growth. The study supported Keynesian theory in Ethiopia.

Olanrewaju and Funlayo (2021) studied the soundness of Wagner's and Keynesian hypotheses in Angola and Nigeria, examining government spending on education, capital investment and health. They confirmed the cogency of Wagner's theory in Nigeria and Angola concerning health expenditure. Further, both Keynesian hypothesis and Wagner's theory were supported in Angola concerning education expenditure, while only the Keynesian hypothesis was supported in Nigeria. The study also contended that Keynesian hypothesis was valid in both Angola and Nigeria concerning government spending on capital investment. Similarly, Mostafa (2021) employed time series data to study the relationship amongst the government expenditure and economic growth, concluding that government spending influenced the economic growth positively, thus supporting Keynesian theory in Egypt.

Furthermore, Gizaw (2022) conducted a study in Ethiopia using time series analysis, particularly the ARDL model, and found a positive impact of monetary and fiscal policies on economic growth, with fiscal policy being more effective. The study confirmed the validity of Keynesian hypothesis in Ethiopia, similar to Reda (2021). Mpainei (2022) analyzed the role of government expenditure and economic growth, focusing on the applicability of Keynesian theory, Wagner and Musgrave's theory, and Peacock and Wiseman's theories on public expenditure in Kenya. The empirical findings confirmed the validity of these theories on growth, as government spending had a positive impact. Contrary to many studies, Obi et al. (2022) examined public

spending and economic growth in Nigeria and refuted the Keynesian hypothesis, finding that public expenditure had no long-run causality on growth.

Lema et al. (2023) investigated the influence of monetary and fiscal policy on structural change in Tanzania, concluding that fiscal policy influences structural change. However, this study did not concentrate on the applicability of Keynesian theory on growth. Thus, the current study will examine the validity of Keynesian theory on growth in Tanzania. Kijjambu et al. (2024) studied Keynesian theory from an unemployment perspective, using time series data and a VECM model, and confirmed that Keynesian theory was valid, as government spending reduced unemployment in Uganda. Given these conflicting results about the validity of Keynesian theory, the current study is imperative for Tanzania. This will shed light on fiscal policy's role in economic growth for policymakers and practitioners.

Methodology

The present study utilizes a research design aimed at determining the validity of Keynesian theory on economic growth, particularly examining the causal linkages between fiscal policy's actions and economic growth. To examine the fundamental relationship amongst the variables, the current study uses econometric techniques specialized in time series analysis, specifically the error correction (ECM) model.

Data and Data Sources

Study utilises secondary data that are in annual basis spanning from 1966 to 2022 from the Central Bank of Tanzania (BOT). In order to perform data analysis, the EViews 10 software was employed.

Table 1. Descriptions of variables

Drivers	Variables	Symbol	Definitions
Dependent variable	Economic Growth	GDP	Spliced GDP at current prices (Millions of TZS)
Explanatory variables Grants	Grants	GR	Grants (Millions of TZS)
Recurrent Expenditure	Recurrent Expenditure	RE	Recurrent Expenditure (Millions TZS)
Development Expenditure	Development Expenditure	DE	Development Expenditure (Millions TZS)
Tax Revenue	Tax Revenue	TR	Tax Revenue (Millions TZS)

Source: Literature reviewed

Theoretical Framework

The investigation in this study was informed by the existing literature as well as the theoretical frameworks from economics to identify the independent and dependent variables (Paul and Furahisha, 2017; Gizaw, 2022; Lema et.al, 2023; Kijjambu et.al, 2024). The present study incorporated the necessary alterations to ensure the relevance of the context in the study. In investigating the relationship between fiscal policy, including grants, recurrent expenditure or current expenditure, development or capital expenditure and tax revenues, on economic growth proxied by GDP, the study developed the multiple linear regression model. The error correction model (ECM) was specified. The functional form is formulated as follows:

$$LNGDP_t = f(LNGR_t, LNRE_t, LNDE_t, LNTR_t,) \qquad (1)$$

Where: Economic Growth is proxied by GDP, GR is grants, RE is Recurrent Expenditure, DE is Development Expenditure, and TR is Tax Revenue. Then equation 1 transformed into the econometric model as follows:

$$Ln(GDPt) = \beta_0 + \beta_1 LnGt + \beta_2 LnREt + \beta_3 LnDEt + \beta_4 LnTRt + \varepsilon_t \qquad (2)$$

Definition of all variables are shown in Table 1 and expressed in natural logarithmic form. The intercept parameter, β_0, and the slope parameters, β_1, β_2, β_3, and β_4, evaluate the impact of grants, recurrent expenditure, development expenditure and tax revenue on GDP. The error term is represented by ε_t in Equation 2.

Descriptive Statistics

The study performed descriptive statistics to guarantee that the data was suitable for estimation and would not produce inaccurate empirical findings. Table 2 below summarises the values of the median, mean, maximum, minimum, skewness, kurtosis, standard deviation and normal distribution. The EViews 10 software was used to process and analyse the data. Generally, the tendency of the data to cluster around the mean values is indicated by the small standard deviation, and the values are almost constant across all variables. This implies that the data is largely representative of the study population. Further, the Jarque-Bera test and its p-values did not reject the null hypothesis of normality among the study variables. This suggests that the data are normally distributed, and therefore the estimation in this study is appropriately specified. Instituting the natural logarithms in all variables mitigated the problems of outliers and variability of the variables under study.

Table 2: Description of Statistic Results

	LNGDP	LNGR	LNRE	LNDE	LNTR
Mean	14.56547	10.00868	12.19744	11.19093	12.16855
Median	14.99159	10.97687	12.81129	10.39222	12.61120
Maximum	18.95281	14.35434	16.80315	16.52890	16.87943
Minimum	9.857502	0.000000	6.914731	5.683580	6.535241
Std. Dev.	3.081950	3.964970	3.311583	3.394975	3.281174
Skewness	-0.133426	-0.709605	-0.152619	0.092469	-0.114458
Kurtosis	1.571138	2.402942	1.574378	1.591135	1.622343
Jarque-Bera	5.018034	5.630260	5.048221	4.795369	4.632060
Probability	0.081348	0.059897	0.080130	0.090928	0.098665
Sum	830.2318	570.4949	695.2539	637.8828	693.6075
Sum Sq. Dev.	531.9111	880.3754	614.1286	645.4479	602.9017
Observations	57	57	57	57	57

Source: Researcher's computation, 2024.

Pre-estimation diagnostic tests

The current study conducted pre-estimation diagnostic tests to ensure that the variables under study are fit to be included in the model before estimation. Modelling variables with the different orders of integration say one in I(0) and another in I(1), may result in spurious or meaningless results.

Unit Root Results

This study utilized the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine the unit root among the variables. The findings show that all variables are non-stationary at the level in both ADF and PP results. Similarly, all variables are stationary at the first difference in both ADF and PP test results. This implies that all modelling in this study is appropriate and the findings are meaningful. See Table 2 presenting both ADF and PP results at the level and at first difference.

Table 2: Summary Unit Root Test Results

AT LEVEL		Order of Integrations	Decisions
Constant no trend			
Variables	P-values		
LNGDP(ADF)	0.1339	*I(1)*	Non-stationary
LNGR(ADF)	0.2722	*I(1)*	Non-stationary
LNRE (ADF)	0.6952	*I(1)*	Non-stationary
LNDE (ADF)	0.8420	*I(1)*	Non-stationary
LNTR(ADF)	0.3122	*I(1)*	Non-stationary
LNGDP(PP)	0.8559	*I(1)*	Non-stationary
LNGR(PP)	0.2332	*I(1)*	Non-stationary

LNRE (PP)	0.7310	*I(1)*	Non-stationary
LNDE (PP)	0.8732	*I(1)*	Non-stationary
LNTR(PP)	0.4329	*I(1)*	Non-stationary
AT FIRST DIFFERENCE			
Constant no trend			
ΔLNGDP(ADF)	0.0000	*I(0)*	Stationary
ΔLNGR(ADF)	0.0000	*I(0)*	Stationary
ΔLNRE (ADF)	0.0000	*I(0)*	Stationary
ΔLNDE (ADF)	0.0000	*I(0)*	Stationary
ΔLNTR(ADF)	0.0000	*I(0)*	Stationary
ΔLNGDP(PP)	0.0000	*I(0)*	Stationary
ΔLNGR(PP)	0.0000	*I(0)*	Stationary
ΔLNRE (PP)	0.0000	*I(0)*	Stationary
ΔLNDE (PP)	0.0000	*I(0)*	Stationary
ΔLNTR(PP)	0.0000	*I(0)*	Stationary

Source: Researcher's computation, 2024.

Note: The rejection level is at the 1% and 5% significance levels respectively. Δ describe first difference operator.

Testing for the Cointegrating Rank r

Being certain that all variables are integrated in the same order of integration, the current study conducted cointegration employing the Johansen cointegration test. This test helps to examine if variables have a long-run association. These findings can be used to forecast the future relationship among the variables, which is imperative for policy implications. Johansen (1988) investigates the cointegration of the variables under study using rank. It assumes that β coefficient has a rank r.

$$\lambda_{r+1} = \lambda_{r+2} = \ldots\ldots\ldots = \lambda_p = 0$$

But λ_i is the parameters of population related with $\hat{\lambda}$ i and if $\lambda_1 = 0$ this implies that r = 0. Hence, tells no co-integrating vectors among variables. Again, if $\lambda_2 = 0$ while $\lambda_1 \neq 0$, then r = 1. Thus, it indicates one co-integrating vector. Then the estimation process for testing rolls over and over. Therefore, the study test

$$H_0: \lambda_i = 0$$
$$H_1: \lambda_i \neq 0$$

Johansen test suggests a trace statistic, the study uses the following model:

$$\lambda_{\text{Trace}}(r) = \text{Trace} = -T \sum_{i=r+1}^{p} \ln(1 - \hat{\lambda}_i) \qquad (3)$$

Furthermore, Johansen also suggests another test known as the "Maximum eigenvalue" statistic to examine the co-integrating vectors amongst variables. The present study is using the following model:

$$\lambda_{max}(r, r+1) = (LRMAX = -Tln(1-\hat{\lambda}_1) \qquad (4)$$

Where $\hat{\lambda}_i$ is the largest eigenvalue under Johansen (1988), test established r is the co-integrating rank while T is the number of observations.

Thus, based on findings the test results showing that variables have four cointegrating equations as such variables have long-run relationships. Trace statistic test confirms four cointegrating equations similar to Maximum Eigenvalue where four cointegrating equations. These findings imply that grants, recurrent expenditure, development expenditure, tax revenues and GDP have a long-run relationship. See Table 3 below. Thus, short-run and long-run estimations are imperative in this study.

Table 3: Cointegration Results

TRACE STATISTIC RESULTS					MAXIMUM EIGENVALUE RESULTS				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	P-Value.**	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	P-Value.**
None *	0.816123	203.5994	69.81889	0.0000	None *	0.816123	93.14184	33.87687	0.0000
At most 1 *	0.591781	110.4575	47.85613	0.0000	At most 1 *	0.591781	49.27736	27.58434	0.0000
At most 2 *	0.541863	61.18017	29.79707	0.0000	At most 2 *	0.541863	42.93226	21.13162	0.0000
At most 3 *	0.277767	18.24791	15.49471	0.0188	At most 3 *	0.277767	17.89745	14.26460	0.0128
At most 4	0.006352	0.350466	3.841466	0.5538	At most 4	0.006352	0.350466	3.841466	0.5538

*Source: Researcher's computation, 2024. NB * denotes rejection of the hypothesis at the 0.05 level*

In addition to the statistical presentation, a graphical presentation showing that GDP, grants, recurrent expenditure, development expenditure and tax revenues have a long-run association ship, as they all move in the same direction. Cointegration means moving together. Therefore, the variables in the current study, which are shown to be moving together, indicate a long-run association. Figure 2 illustrates the direction of the variables from 1966 to 2022.

Figure 1: Graphical presentation of the cointegration results
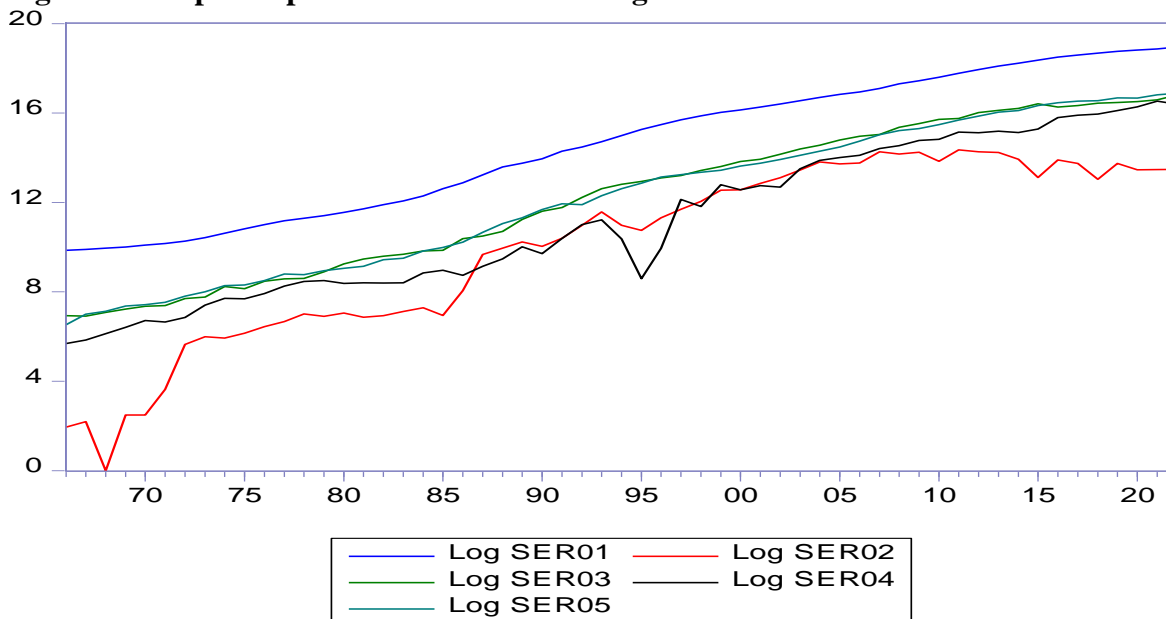
Source: Researcher's computation, 2024.
Notes: The log of SER01 stands for the log of GDP, the Log of SER02 stands for the log of GR, the Log of SER03 indicates the log of RE, the Log of SER04 means the log of DE and the Log of SER05 stands for the log of TR.

Multicollinearity Results

To determine the multicollinearity, the current study runs the multiple regression analysis using equation 5 as shown below:

$$Ln(GDPt) = \beta_0 + \beta_1 LnGt + \beta_2 LnREt + \beta_3 LnDEt + \beta_4 LnTRt + \varepsilon_t \qquad (5)$$

All variables are defined in Table 1 and variables are expressed in natural logarithm. The intercept parameter, β_0, and the slope parameters, $\beta_1, \beta_2, \beta_3$, and β_4, evaluate the influence of grants, recurrent expenditure, development expenditure and tax revenues on GDP. The error term is represented as ε_t in Equation 5. Table 4 shows the multiple regression results.

Table 4: Long Run Regression results

Variable	Coefficient	Std. Error	t-Statistic	P-Value.
C	3.024362	0.096056	31.48533	0.0000
LnGR	-0.026777	0.015306	-1.749464	0.0861
LnRE	0.428506	0.101053	4.240414	0.0001
LnDE	-0.039322	0.026034	-1.510381	0.1370
LnTR	0.577100	0.101443	5.688902	0.0000

The empirical findings shown in Table 4, the results show unexpected signs and p-values, indicating that many variables are statistically insignificant. Consequently, the present study suspects the problem of multicollinearity. The study conducted a multicollinearity test using variance inflation factors (VIF) and a pairwise correlation matrix, as shown in Table 5 and Table 6.

Variance Inflation Factor (VIF) results

Empirical results confirmed the presence of multicollinearity amongst the variables, as the obtained centred (VIF) value exceeds the threshold of 10. Decision criteria asserts that if the computed centred (VIF) value exceeds 10, there is a serious problem of multicollinearity. Therefore, grants, recurrent expenditure, development expenditure, and tax revenue are highly collinear. Running the regression in such a relationship will produce inconsistent results, such as unexpected signs and insignificant p-values, while the adjusted R-squared value is very high. See Table 5 below.

Table 5: Variance Inflation Factor (VIF) results

Variable	Coefficients of Variance	Uncentered VIF	Centred VIF
C	0.009227	31.29613	NA
LnGR	0.000234	91.87175	12.27287
LnRE	0.010212	5526.355	373.1831
LnDE	0.000678	313.9437	26.03233
LnTR	0.010291	5537.677	369.1957

Again, the study conducted the pairwise correlation matrix as a triangulation approach to verify the findings obtained from the VIF presented in Table 5. The pairwise correlation matrix yields similar results, indicating that the variables are highly collinear since the threshold of 0.8 is surpassed by all variables, as depicted in Table 6. All the variables have correlations of 0.9 or higher, which presents a serious problem of multicollinearity.

Table 6: Pairwise Correlation Matrix Results

	LnGR	LnGR	LnGR	LnGR
LnGR	1	0.9568206	0.9278880	0.9528402
LnRE	0.9568206	1	0.9786328	0.9985000
LnDE	0.9278880	0.9786328	1	0.9803864
LnTR	0.9528402	0.9985000	0.9803864	1

Therefore, based on the evidence from the VIF and pairwise correlation matrix indicating that the variables are highly collinear, the current study formulates bivariate regression analyses to determine the usefulness

of the Keynesian model in the Tanzanian economy. Equations 6 to 9 present the long-run association ship amongst the study variables.

Estimation Results and Discussion of Findings

After considering the pre-estimations test results the current study formulated the models for the long-run regression and short-run regression analysis as presented below:

Long Run Models

Having established that all variables are highly collinear, the current study formulates bivariate regression models to estimate the relationships amongst the variables as an option to avoid multicollinearity problems. These are presented in Equations 6 to 9.

Economic Growth and Grants Model

$$Ln(GDPt) = \beta_0 + \beta_1 LnGRt + \varepsilon_t \qquad (6)$$

Economic Growth and Recurrent Expenditure Model

$$Ln(GDPt) = \beta_0 + \beta_1 LnREt + \varepsilon_t \qquad (7)$$

Economic Growth and Development Expenditure Model

$$Ln(GDPt) = \beta_0 + \beta_1 LnDEt + \varepsilon_t \qquad (8)$$

Economic Growth and Tax Revenue Model

$$Ln(GDPt) = \beta_0 + \beta_1 LnTRt + \varepsilon_t \qquad (9)$$

Where the definitions of the variables remain the same as expressed in Table 1, β_0 is constant while β_1 in all models are coefficient of change.

The empirical findings indicate that the estimates for grants, recurrent expenditure, development expenditure, and tax revenues all have positive signs, which align with Keynesian theory. Keynesian theory postulates a positive effect on economic growth. All four estimates are statistically significant at the 5% significance level. This implies that there is a direct relationship between fiscal policy activities (grants, recurrent expenditure, development expenditure, and tax revenues) and economic growth in Tanzania. These findings are agreeing with those obtained by Paul and Furahisha (2017), Ben (2020), Reda (2021), Olanrewaju and Funayo (2021), Gizaw (2022), Mpainei (2022), and Lema et al. (2023). The results on grants show a positive and significant impact on GDP at the 5% level of significance (β = 0.739473 and p

< 0.05). This finding is consistent with Keynesian theory. It implies that a 1% increase in grants increases GDP by approximately 0.739473%. This finding is not surprising since many developing countries, including Tanzania, use grants to stimulate economic growth. This finding is congruent to Obi et al. (2022), who found similar results in Nigeria.

The results on recurrent expenditure indicate a positive and significant effect on GDP at the 5% level of significance ($\beta = 0.929323$ and $p < 0.05$). This suggests that increasing recurrent expenditure tends to improve the gross domestic product of Tanzania. This finding concurs with Mostafa (2021), who found similar results in Egypt. Again, the results for development expenditures show a positive and significant impact on GDP at the 5% level of significance ($\beta = 0.887523$ and $p < 0.05$). This implies that a 1% increase in development expenditure increases GDP by approximately 0.887523%. The findings align with Keynesian theory, which contends that increasing government spending is expected to boost economic growth in a country. The findings are similar to previous studies conducted by Paul and Furahisha (2017), Reda (2021), and Mpainei (2022), who found a positive contributions of government spending on growth in Tanzania, Ethiopia, and Kenya, respectively.

The results for tax revenues indicate a positive and significant influence on GDP at the 5% level of significance ($\beta = 0.938211$ and $p < 0.05$). This suggests that a 1% increase in tax revenues increases GDP by roughly 0.938211%. Similarly, finding is in line with Keynesian theory. It suggests that tax revenues collected in Tanzania are non-distortionary since they bolster economic growth. It is good to note that distortionary taxes tend to reduce economic growth. This finding is in line with Al-shawarby and El Mossallamy (2019), who conducted a study in Egypt. Thus, rest on the empirical findings obtained, the study suggests that the tax system in Tanzania is non-distortionary since the coefficient influenced the growth positively. The study then postulates that fiscal policy activities, as suggested by Keynesian theory, are significant economic drivers in Tanzania. Refer to Table 7 below.

Table 7: Long Coefficients Results

Models	Variables	Coefficient	Std. Error	t-Statistic	P-Value
	Constant	7.164319	0.347266	20.63065	0.0000
Model 6	LnGR	0.739473	0.032296	22.89680	0.0000
	Constant	3.230107	0.084844	38.07130	0.0000
Model 7	LnRE	0.929323	0.006717	138.3561	0.0000
	Constant	4.633224	0.300599	15.41329	0.0000
Model 8	LnDE	0.887523	0.025723	34.50294	0.0000
	Constant	3.148805	0.076199	41.32367	0.0000
Model 9	LnTR	0.938211	0.006050	155.0868	0.0000

Short Run Results

All the models in equations 6 to 9 were converted into first differences and incorporated the error-correcting term lag one (ε_{t-1}). This error-correcting term provides the long-run information in short-run periods. The paper then estimated the short-run equations as shown in equations 10 to 13 below. The Error Correction Mechanism (ECM) technique was performed and produced the short-run results as shown in Table 8. Economic Growth and Grants Model

$$\Delta Ln(GDPt) = \beta_0 + \beta_1 \Delta LnGRt + \varepsilon c_{t-1} + \mu t \qquad (10)$$

Economic Growth and Recurrent Expenditure

$$\Delta Ln(GDPt) = \beta_0 + \beta_1 \Delta LnREt + \varepsilon c_{t-1} + \mu t \qquad (11)$$

Economic Growth and Development Expenditure

$$\Delta Ln(GDPt) = \beta_0 + \beta_1 \Delta LnDEt + \varepsilon c_{t-1} + \mu t \qquad (12)$$

Economic Growth and Tax Revenue

$$\Delta Ln(GDPt) = \beta_0 + \beta_1 \Delta LnTRt + \varepsilon c_{t-1} + \mu t \qquad (13)$$

Where the Δ is the first difference operators, εc_{t-1} and μt are error correcting term lag one and noise term respectively.

The findings in the short-run showing that two variables (recurrent expenditure and tax revenues) have influenced the economic growth positively, thereby supporting Keynesian theory. This is congruent to the results of Olanrewaju and Funlayo (2021), who supported Keynesian theory in Nigeria and Angola. However, the other two variables (grants and development expenditure) have a negative influence on economic growth. Thus, Keynesian theory was not supported, similar to Obi et al. (2022), who found no impact in the long run and subsequently refuted Keynesian theory in Nigeria.

The results on recurrent expenditure show a positive impact on GDP at the 5% level of significance (β = 0.351108 and $p < 0.05$). This indicates that a 1% increase in recurrent expenditure increases GDP by roughly 0.351108%. Additionally, tax revenues have a positive influence on growth at the 5% level of significance (β = 0.391146 and $p < 0.05$). This implies that a 1% increase in tax revenues increases GDP by roughly 0.391146%. The finding suggests that the taxes implemented in the economy are non-distortionary.

The results on error correction terms (Ec_{t-1}) have the correct negative signs as expected, except for development expenditure (β = -0.046425 and $p < 0.05$; β = -0.125477 and $p < 0.05$; β = -0.195002 and $p < 0.05$, singly). This implies that grants, recurrent expenditure, and tax revenues are adjusting towards equilibrium after any shock at the speeds of 4.6%, 12.5%, and 19.5% per annum, respectively. Development expenditure, however, is not converging towards equilibrium in the short run. The empirical finding is not astonishing since development projects are not expected to have an immediate impact in the short run, except for public works projects. Table 8 presents the short-run results.

Table 8: Short Run Results

Models	Variables	Coefficient	Std. Error	t-Statistic	P-Value.
Model 10	Constant	0.164578	0.008982	18.32241	0.0000
	ΔLnGR	-0.015482	0.013962	-1.108834	0.2725
	Ect-1	-0.046425	0.009861	-4.708133	0.0000
Model 11	Constant	0.162176	0.009712	16.69886	0.0000
	ΔLnRE	0.351108	0.131646	2.667064	0.0102
	Ect-1	-0.125477	0.059096	-2.123274	0.0383
Model 12	Constant	0.167110	0.010316	16.19945	0.0000
	ΔLnDE	-0.025516	0.020904	-1.220590	0.2276
	Ect-1	0.045192	0.016108	2.805527	0.0070
Model 13	Constant	0.090278	0.017267	5.228450	0.0000
	ΔLnTR	0.391146	0.081635	4.791398	0.0000
	Ect-1	-0.195002	0.062899	-3.100253	0.0031

Source: Researcher's computation, 2024

Conclusions and Recommendations

This study analyzed the applicability of Keynesian theory to economic growth in Tanzania using time series data spanning from 1966 to 2022. Pre-estimation diagnostic tests were performed, including the ADF and PP tests also the Johansen cointegration test. A multicollinearity test was also conducted using VIF and the pairwise correlation matrix. Furthermore, the current study utilized the error correction mechanism (ECM) model to explore the relationship among the variables. Results show that all variables are non-stationary at the level but are stationary at the first difference, both the ADF and PP tests. Additionally, the variables

have four cointegrating equations, indicating that grants, recurrent expenditure, development expenditure, tax revenues, and GDP have a long-run relationship. Grants, recurrent expenditure, development expenditure, and tax revenues were found to be highly collinear in the VIF and pairwise correlation matrix tests. The study resolved the multicollinearity problems by formulating a bivariate regression analysis to investigate the relation among variables.

In the long run, the coefficients for grants, recurrent expenditure, development expenditure, and tax revenues are all statistically significant determinants of economic growth, proxied by GDP. In this context, Keynesian theory is supported in the Tanzanian economy. In the short run, only recurrent expenditure and tax revenues are statistically significant at the 5% level. This connotes that they are positively influencing economic growth, while grants and development expenditure have a negative effect on economic growth and are statistically insignificant at the 5% level. Furthermore, grants converge towards equilibrium at a speed of 4.6% per annum. Recurrent expenditure tends to converge towards equilibrium after any shock at a speed of 12.5% per annum, and tax revenues also adjust towards equilibrium at a speed of 20% per annum. Contrary to the other variables, development expenditure does not confluence towards equilibrium, indicating that any economic shock causes development expenditure to move away from equilibrium at a speed of 4.5% per annum. This is not surprising, as development projects are unlikely to produce an immediate impact on economic growth in the short run, but rather in the long run.

The empirical results of this paper have important policy implications: Firstly, policymakers should prioritise fiscal spending, such as recurrent and development expenditure, to spur economic growth in Tanzania. Secondly, to maintain a non-distortionary tax system when expanding the tax base in the country. Finally, spending grants in productive sectors should be encouraged to enhance economic growth, as grants have a strong impact on growth in the country.

Rest on the findings of the current study, areas for future research should examine the impact of Keynesian theory on specific sectors and provide insights into economic growth. This would inform policymakers and other stakeholders regarding policy reforms, interventions, or formulations.

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