Can Governments Enhance Long-run Growth by Reallocating Public Expenditure? Empirical Evidence from Tanzania

Mussa Ally Mwamkonko[†]

Abstract
This study examines whether the government of Tanzania can enhance long-run economic growth by changing the composition of public expenditure. The Johansen's maximum likelihood method is used to test for co-integration and then estimate the long-run relationship. The study shows that while government spending on physical and human capital investments has positive impact on economic growth, government spending on consumptions has negative effect on economic growth. Moreover, the results reveal that switching expenditure from consumption to physical and human capital investments enhance economic growth, but the opposite is growth retarding. The study, however, found no evidence of output costs associated with a bilateral switch between physical investment spending and human capital investment spending.

Key Words: Economic growth; Public expenditure; Reallocation; Tanzania.
JEL Classification Codes: O47, C13, C20

[†] Department of Economics, College of Business and Economics, The University of Dodoma, P. O. Box 1208 Dodoma, Tanzania. mmwamkonko@yahoo.com or mussa.ally@udom.ac.tz Cell: 0787 211 436

1.0 Introduction

The question of whether a government can promote economic growth by changing composition of public expenditure has been the subject of debates and controversies around the world. Keynes (1936) postulates that increase in public expenditures (of all kinds) enhance GDP growth through stimulating aggregate demand. Keynes argue that even when public investment is totally unproductive, increase in public expenditure itself will lead to expansion of output because of a multiplier effect in the economy (Stiglitz *et al*., 2006). By contrast, Barro (1990) holds that the nature of the impact of public expenditure on economic growth depends on its form. It is contended that government expenditure on investments promotes growth as it adds to productive capacity of the economy, and government spending in the nature of consumptions is growth retarding because it is meant for redistribution and social welfare programs.

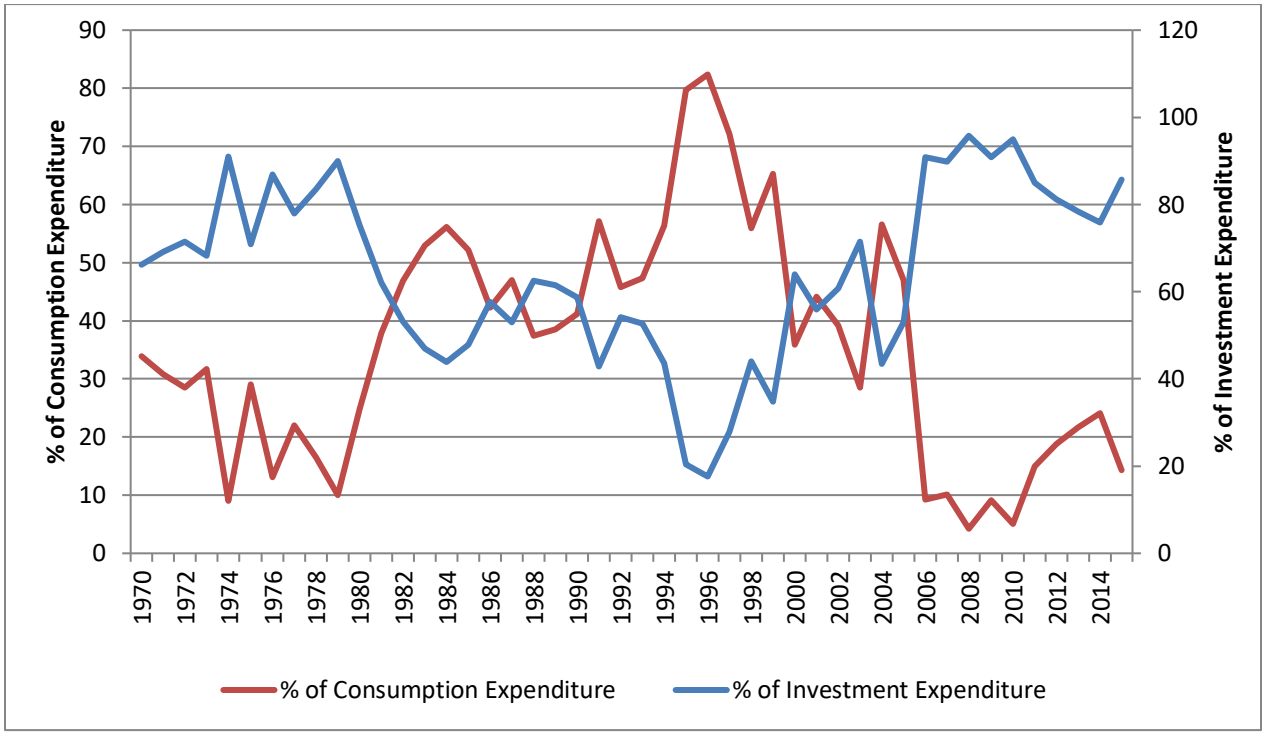
There exists numerous empirical works that have traced the relationship between public expenditure and economic growth in developing and developed countries: Kweka and Morrissey (2000); Nijkamp and Poot (2004); Alfonso and Furceris (2010); Acosta-Ormaechea and Morozumi (2013); Alfonso and Jalles (2013); Gemmell, *et al*. (2014); Paul and Furahisha (2017) Ibukun and Osinubi (2020); Hammed and Arawomo (2020); and Olayiola *et al*. (2021). But most of these studies are based on cross-section regression analysis, which assumes that coefficients are the same for all countries in the sample, and thus do not provide relevant policy lesson to a particular country. Also, most of the previous studies examined the direction of causality between public expenditure and economic growth to validate Keynesian theory and Wagner's hypothesis. Moreover, most of these studies do not clarify which components of public expenditure are used as compensating factors when total government spending remains unchanged; thus failed to show a trade-off associated with a bilateral switch between different forms of public expenditure. Therefore, this study fills this gap in literature by analyzing whether government of URT can enhance long-term economic growth by reallocating public expenditures.

Analysis of whether governments can enhance growth by reallocating public expenditure is important in this study because Tanzanian government has experienced limited ability to generate sufficient revenue to finance government expenditure (Kazungu, 2019). The revenue generation is sluggish in Tanzania compared to Kenya and Uganda (Mwakalobo, 2015). For instance, from 1970 to 2015, on average 66% of the budget was financed by own revenues while the remaining 34% was financed through borrowing and grants (BOT, 2015). Given this budget constraint, the government has attempted to change its public spending envelope; the quantity of physical and human capital investment spending, for example, has been increasing from 1995 onwards in the expenses of reducing consumption spending. Figure 1 shows trends of public investment spending versus consumption spending in Tanzania.

The focus of this paper is, therefore, to examine the growth-effects of increasing one component of public expenditure by reducing another component of public expenditure. This information is essential for budget preparation, authorization and execution. In addition, this study is important for policymakers in deciding which type of public spending to reduce while trying to preserve growth.

The rest of this paper is organized as follows: section 2 provides literature review; section 3 deals with methodology; section 4 presents results; and section 5 presents conclusion and policy implications.

Figure 1: Trends of Public Investment Expenditure versus Consumption Expenditure in Tanzania, 1970 – 2015



2.0 Literature Review

2.1 Theoretical Review

Earlier than the great depression, government activities in an economy were seen as source of poor economic growth and macroeconomic instability. The classical school believed that government intervention in economic activity in any way will disrupt smooth functioning of the economic system. The classical advocated for laissez fair economic system in which market directs the type of goods an economy can produce and consume. In the classical economic system, the role of the government is limited to maintenance of law and order needed to ensure that free market functions well for equilibrium to be maintained. Failure of the market to restore equilibrium in 1930s put serious question mark on laissez fair economic thought. Keynesian revolution and subsequent emergence of the Keynesian economics in the late of 1930s revealed that public expenditure is a source of macroeconomic stability. Keynes in his general theory was able to convince even the classical scholars that increase in public spending, especially during economic recession will help to revive the economy back to equilibrium. Thus, Keynes recommends increase in public expenditure during economic slump and decline during economic prosperity.

There is some disagreement among economists about whether reallocation of public expenditure matters for economic growth. Keynesians emphasize that increase in government expenditures or

tax cut lead to substantial increase in economic through multiplier effects in the economy (Bhatia, 2008). This is because a large share of the money paid by the government is re-spent, and the more that's re-spent, the greater the aggregate demand and the multiplier effect. This implies that even when public investment is totally unproductive, the expenditure itself will lead to an expansion of output because of a multiplier effect throughout the economy. And if expenditure is on productive investment, social benefits would be enormous (Stiglitz et al, 2006). Though government expenditure may have two main components: investment and consumption; Keynesian school of thought implies that it is the "size" and not "composition" of public spending that matters for growth. Also, it suggests that multiplier effect of public expenditure may not be realized if most of the resources are spent on imported rather than home produced goods.

Barro (1990) strongly believes that government expenditure on investments and productive activities (in principle including state-owned productive economic activities) contribute positively and significantly to economic growth, because it adds to productive capacity of the economy. But, government expenditure in the nature of consumptions is anticipated to be growth retarding because it is meant for non-growth objectives such as redistribution and social welfare programs. This school of thought implies that output falls when government increases consumption-enhancing public expenditure in the expenses of reducing production-enhancing public expenditure, regardless what happens to total spending. Likewise, it implies that output rises when increase in consumption-enhancing government expenditure is compensated by a decline in production-enhancing government expenditure, regardless of the changes in total government expenditure. Landau (1983) pointed out that although increase in public expenditure in the nature of consumptions is anticipated to be growth retarding, it may improve welfare of the households.

There are often significant complementarities between public investment and private investment. It is argued that when the economy is operating below full employment public investment spending can increase without decreasing private investment because size of the pie is not fixed (Stiglitz et al, 2006). That is, public investments can increase returns in the private sector, which in turn, increase private investments. The success of China during the East Asian economic crisis provides a case in point. Part of the reason for China's success was that government spending drew upon a set of strategic investment plans that focused on improving infrastructure. The improved infrastructure increased returns to private investments. This, in turn, encouraged productive investments that stimulated China's long-term growth. By contrast, when the economy is operating at full capacity increase in public investment spending must come at the expenses of reducing consumption or private investment elsewhere in the economy because size of the pie is fixed (Stiglitz *et al*, 2006). This argument does not hold water for the case of Tanzania because its economy is not operating at (or even close to) full employment. However, Blejer and Khan (1984) emphasize that the sources of finance for public sector investment may crowd out private investment hence reduce economic growth (be it taxes or debts). High internal public debt, for example, may crowd out private investments as it reduces credit available to private sector.

2.2 Empirical Review

The empirical evidence on growth-effects of public expenditure composition also yield mixed conclusions. Gemmell *at al*. (2014) examined the long-run growth impacts of changes in total government expenditure and in the shares of different spending categories for a sample of OECD countries since the 1970s, taking account of methods of financing expenditure changes and

possible endogenous relationships. The study found that reallocating total spending towards infrastructure and education is positive for long-run output levels while reallocating spending towards social welfare (and away from all other expenditure categories pro-rata) may be associated with modest negative effects on output in the long run. The empirical investigation by Kweka and Morrissey (2000), however, contradicted this position. They found that government spending on physical investment has notable negative growth-effect; government spending on human capital investment has no significant effect on economic growth; and government spending on consumption has positive growth-effect in Tanzania. The discrepancy in findings may be attributable to the fact that Kweka and Morrissey (2000) used residual based regression analysis with relatively small sample and did not take into account methods of financing public expenditure.

Alfonso and Jalles (2014) analyzed the fiscal composition-growth nexus, using a large country panel, accounting for the usually encountered econometric pitfalls. The results showed that revenues have no significant impact on growth whereas expenditures have negative effects. The same is true for the OECD with the addition that government revenue has a negative impact on growth. From the results, taxes on income are not growth enhancing, as well as public wages, interest payments, subsidies and government consumption. Spending on education and health boosts growth; and there is weak evidence supporting causality running from expenditures and revenues to output. Moreover, Acosta-Ormaechea and Morozumi (2013) analyzed the impact of functional categories of public expenditure (transport and communications, defense, education, health and social protection) for a sample of 56 low, middle and high income countries. By acknowledging the existence of budget constraint, they considered the effects of a bilateral switch between these government spending categories. They found that only education expenditure has significant growth - enhancing effects. This happens specifically when a rise in education spending is financed by a fall in health or social protection spending. These studies, however, are based on cross-section regression analysis, which assumes that coefficients are the same for all countries in the sample, and thus do not provide relevant policy lesson to a particular country.

Paul and Furahisha (2017) examined government expenditure and economic growth nexus in Tanzania. The study tested the validity of Keynesian theory and Wagner's law for the case of Tanzania. They applied co-integration and vector error correction modeling approach to determine direction of causality using time series data for covering 1978 - 2014. The results revealed that recurrent expenditure and development expenditure from foreign sources promote economic growth, supporting Keynesian theory. By contrast, the study showed that economic growth increases development expenditure financed through domestic sources, supporting Wagner's law. The study used typical classification of government expenditure that considered sources of public expenditure; foreign sources vs. domestic source. The study, however, has not shown a trade-off associated with a bilateral switch between different public spending components.

Ibukun and Osinubi (2020) investigated the relationship among environmental quality, economic growth and health expenditure in 47 African countries using both dynamic (system GMM) and static (pooled OLS and fixed / random effect) estimation methods for a sample of 19 observations; 2000-2018. The study indicates evidence of a positive and significant effect of economic growth on health expenditure, while also revealing a positively significant relationship between poor environmental quality and health expenditure. The empirical findings of this study suggest that economic growth significantly increased health expenditure across the five African regions (North

Africa, East Africa, Central Africa, West Africa and Southern Africa) and that health is a necessity good and a deterioration of the environmental quality increases health expenditure. On the other hand, Olayiola et al (2021) examined the direction of causality between public health expenditure and economic growth in Nigeria, within the context of Wagner's theory of ever-increasing state activities. The study found evidence of a long-run relationship between public health expenditure and economic growth. The Granger-causality test results indicate neither uni-directional nor bi-directional relationship between public health expenditure and economic growth. However, public health expenditure as a share of total government expenditure and population has a uni-directional causal relationship with real GDP growth.

Nijkamp and Poot (2004) conducted meta-analysis of the effect of fiscal policies on long-run growth. A sample of 93 published studies, yielding 123 meta-observations, was used to examine the robustness of the evidence regarding the effect of fiscal policy on economic growth. Five fiscal policy areas were considered: general government consumption, tax rates, education expenditure, defence, and public infrastructure. Several meta-analytical techniques were applied, including descriptive statistics, contingency table analysis and rough set analysis. On balance, the evidence for a positive effect of conventional fiscal policy on growth is rather weak, but the commonly identified importance of education and infrastructure is confirmed. Afonso and Furceri's (2010) also analyzed the effects in terms of size and volatility of government revenue and spending on growth in OECD and EU countries. The results suggest that both variables are detrimental to growth. In particular, looking more closely at the effect of each component of government revenue and spending, the results point out that indirect taxes (size and volatility); social contributions (size and volatility); government consumption (size and volatility); subsidies (size); and government investment (volatility) have a sizeable, negative and statistically significant effect on growth. Prichett (1996) suggests existence of the so-called "white-elephant" hypothesis in developing countries in which public investment is often used for unproductive projects.

Hammed and Arawomo (2020) used SVAR framework to investigate the impact of oil shocks on manufacturing output in Nigeria via fiscal variables using annual time series data from 1981 to 2019. They found that government revenue is explained by oil price in both short-run and long-run while expenditure explains revenue in the long-run, though very weak. This is an indication that spending by government can further generate more revenue in the long-run. Also, they found that government expenditure is not explained by its revenue which could suggest that it is financed largely by other means like borrowing. In Addition, variations in price level is weakly explained by expenditure - indicating the import-generating nature of inflation in Nigeria. Lastly, manufacturing output is jointly explained by inflation, revenue and oil price shocks.

3.0 Methodology

3.1 Data

Annual time series data from 1970 to 2015 were collected from Bank of Tanzania's various *Economic Bulletins*. This period was chosen because trend of public spending composition shows that from 1970 – 1994 on average public consumptions received higher priority than public investments while from 1995 - 2015 public investments received higher priority than public consumptions. Since the focus of this paper is to analyze growth - effect of increasing one component of public expenditure by reducing another component, it is logical to consider both periods. The BOT statistics were complemented with the Government Financial Statistics and

International Financial Statistics produced by the International Monetary Fund (IMF) and World Development Indicators and African Development Indicators produced by the World Bank (WB). After compilation, time series data were processed and analyzed by using SPSS and STATA. Time series analysis enables forecasting, assuming the pattern behaves the same in the future. Adams et al. (1991) noted that observing events overtime enables researchers to draw inferences.

3.2 Description of Variables

The study used real per capita income as a proxy for economic growth. Real per capita income is a ratio of real GDP to entire population. In accordance with the World Bank's income - based country classification scheme, real per capita GDP is the most common measure of overall level of economic activity (Todaro, 2009). GDP measures total value for final use of output produced by an economy usually expressed as total income earned by factors of production or total value added from all sectors of the economy or total spending by households, firms, government and foreigners.

Also, the study disaggregated public expenditure into three components; public expenditure on physical investments, public expenditure on human capital investments, and public expenditure on consumptions. Development expenditure was used as a proxy for physical investment expenditure; human capital investment spending is defined as recurrent expenditure on health and education; and public expenditure on consumptions was measured as total recurrent expenditure less recurrent expenditure on human capital investments. The government spending components were expressed as a percentage share of GDP. This approach overcomes the problem of double counting and perfect collinearity encountered in most of previous empirical works.

Moreover, the study used private investment and trade openness as control variables. As applied in this study, private investment is outlays by private sector added to its fixed domestic assets. Private investment was used as control variable because an economy is influenced by both public and private sectors. On the other hand, trade openness was measured as the value of export plus import expressed as a ratio of GDP. The trade openness was not measured in terms of international trade restrictions such as tariffs and quotas because such trade restrictions are not permanent and predictable. The trade openness was used as control variable because economists believe that external sector can strengthen the relationship between public sector and economic growth.

3.3 Model

The empirical specification is adopted to examine whether government can enhance growth by reallocating public expenditure is based on endogenous growth model. The model, as developed by Devarajan *et al*. (1996), generates an equation in which economic growth (Y) is a function of total spending to GDP ratio (G/Y) and a vector of shares of individual spending categories within aggregate expenditure (G_C /G). Private investment (PI/Y) is used as control variable. The model reads as:

$$Y = \alpha_0 + \beta_S \left(\frac{G}{Y}\right) + \sum \beta_c \left(\frac{G_c}{G}\right) + \beta_i \left(\frac{PI}{Y}\right) + \mu \qquad (1)$$

The problem with equation (1) is that total government spending (G) and its components (G_c) would be perfectly collinear if not estimated separately. To avoid perfect collinearity between aggregate expenditure and its components, total government spending was not included in the regression model. Rather, total government expenditure was disaggregated into three (3) main

components; government expenditure on physical investments, government expenditure on human capital investments, and government expenditure on consumptions. Thus, our model is specified as follows:

$$GDP = \beta_0 + \beta_1\left(\frac{PE}{Y}\right) + \beta_2\left(\frac{HE}{Y}\right) + \beta_3\left(\frac{CE}{Y}\right) + \beta_4\left(\frac{PI}{Y}\right) + \beta_5\left(\frac{OP}{Y}\right) + \mu \qquad (2)$$

Where; GDP is real per capita gross domestic product used as a proxy for economic growth, PE is physical investment expenditure i.e. development expenditure, HE is human capital investment expenditure i.e. recurrent expenditure on health and education, CE is government expenditure in the nature of consumptions i.e. total recurrent expenditure less recurrent spending on human capital investment, PI is private investment, OP is trade openness i.e. export plus import, Y is nominal gross domestic product, and μ is the classical error term. The private investment and trade openness were included in the regression model as control variables because the private sector and external sector strengthen the relationship between public sector and economic growth.

The equation (2), however, does not explicitly show the trade-off associated with a bilateral switch between two public spending categories. To capture the growth-effects of increasing one component of public expenditure by reducing another component of public expenditure, the properties of derivatives were applied to estimated equation. For instance, the growth-effect of increasing the share of physical investment expenditure financed by reducing consumption expenditure is given by relation (3a). Conversely, the growth-effect of increasing consumption expenditure compensated by reducing physical investment expenditure is given by relation (3b). Gammell et al. (2014) noted that the output - effect associated with a bilateral switch between two government spending categories is a form of weighted sum of relevant coefficients of the estimated regressions equations, which can also be obtained by applying properties of partial derivative.

$$\partial PE/\partial CE = (\partial PE/\partial GDP) \,/\, (\partial CE/\partial GDP) \qquad (3a)$$

$$\partial CE/\partial PE = (\partial CE/\partial GDP) \,/\, (\partial PE/\partial GDP) \qquad (3b)$$

3.3 Estimation

Before estimating regression models, the unit root and co-integration tests were performed to examine properties of time series. Thereafter, Johansen's maximum likelihood (ML) estimation method was applied. Finally, the diagnostic tests were conducted to validate the research findings.

3.3.1 Unit Root Test

To examine the presence of a unit root the study employed the Phillips-Perron (P-P) non parametric test. The unit root test overcomes spurious regression, in which estimators and test statistics are misleading (Verbeek, 2004). The P-P test has an extra advantage over the standard Dickey-Fuller (DF) test because the DF test results are sensitive to different lag lengths of the dependent variable, therefore, biased towards non-rejection of unit roots when the structural breaks are incorporated in the data set (Indraratna, 2003; Li, 2001). Moreover, the P-P test is adjusted to take into account serial correlations by using the Newey-West (1994) covariance matrix.

3.3.2 Co-integration Analysis

The Johansen co-integration test was used to ascertain whether variables are bound together in the long-run. Within the Johansen test, both trace ($\lambda trace$) and maximum Eigen-value (λmax) statistics were used to ensure robustness of the results. Thereafter, the Johansen maximum likelihood (ML) method was used to estimate the co-integrating vectors. The ML estimates are consistent and asymptotically normally distributed (Green, 2003). The Johansen co-integration approach is superior over Engle and Granger two-step method (residual-based test) because it enables testing for existence of multiple co-integrating vectors, it exploits all dynamic interactions of variables included in the regression, and it gives a room for normalization (Verbeek, 2004).

3.3.3 Granger Causality Test

The basic regression model assumes that composition of public expenditure determines economic growth. In practice, however, economic growth may in turn determine reallocation of public expenditure. Thus, to examine direction of causality between public spending components and economic growth, granger causality test was implemented to estimate equation (4a) and (4b). Gujarati (1995) emphasized that this test goes beyond the conventional F-test because the F-test for determining joint significance of regression-derived parameters, used as a test of causality, is not valid if variables are non-stationary and the test statistic does not have a standard distribution.

$$InY_t = \alpha_O + \sum_{i=1}^{k+d} \alpha_{11} InY_{t-1} + \sum_{i=1}^{k+d} \alpha_{12} InX_{t-1} + \mu_{1t} \qquad (4a)$$

$$InX_t = \alpha_O + \sum_{i=1}^{k+d} \alpha_{21} InX_{t-1} + \sum_{i=1}^{k+d} \alpha_{22} InY_{t-1} + \mu_{2t} \qquad (4b)$$

If $\alpha_{12} \neq 0$ and $\alpha_{22} = 0$ causality runs from X to Y. Conversely, if $\alpha_{12} = 0$ and $\alpha_{22} \neq 0$ causality runs from Y to X. Bilateral causality, is suggested when sets of X and Y coefficients are statistically significantly different from zero in both regressions. Finally, independence is suggested when sets of X and Y coefficients are not statistically significant in both regression equations.

3.3.4 Diagnostic Tests

The Lagrange Multiplier (LM) test was used to ascertain the presence of residual autocorrelation. The LM test was employed instead of the Durbin Watson (DW) test because the DW test is biased towards accepting the null hypothesis of no autocorrelation when the regressors include lagged dependent variable in the model (Mukherjee at al. 1998). The Jarque-Bera (JB) test was employed to establish whether residuals are normally distributed. This asymptotic test uses both skewness and kurtosis coefficients (Gujarati, 2004). The assumption of asymptotic normality of distribution and consistency is known to give satisfactory results (Maddala, 1987). The Chow test was employed to examine the structural break or parameter stability of the regression model. The Chow test was preferred to recursive residual test because the structural breaks points were known.

4.0 Results and Discussion

4.1 Unit Root Test

The Phillips - Perron (P-P) test was applied to each variable in log - level and log - difference to establish the presence of the unit root. The results in Table 1 reveal that all variables were not stationary at their levels, as evidenced by their test statistics which are greater than their corresponding critical values at 1% levels of significance. However, after taking their first differences all variables became stationary, as supported by their test statistics which are less than their corresponding critical values. Therefore, the null hypothesis of the presence of unit root is rejected at 0.01 levels of significance; suggesting that all variables are integrated of order one 1(1).

Table 1: The Philips - Perron Test Results

Variables	Levels		First Difference		Order of Integration
	Test Statistics	Critical Value	Test Statistics	Critical Value	
GDP	0.565	-3.614	-6.206***	-3.621	1(1)
PE	-2.243	-3.614	-6.387***	-3.621	1(1)
HE	-1.889	-3.614	-6.684***	-3.621	1(1)
CE	-2.724	-3.614	-6.729***	-3.621	1(1)
PI	-1.914	-3.614	-5.992***	-3.621	1(1)
OP	-2.249	-3.614	-5.486***	-3.621	1(1)

Note:

GDP is natural log of real per capita GDP; PE is natural log of physical investment spending; HE is natural log of human capital investment spending; CE is natural log of consumption spending; PI is natural log of private investment; OP is natural log of trade openness.

4.2 Lag Selection

Given the fact that the Johansen's co-integration approach is very sensitive to the lag order, the study applied Akaike Information Criteria (AIC), Hannan - Quin Information Criteria (HQIC) and Schwarz Bayesian Information Criteria (SBIC) to establish and select the optimum lag length. On the basis of the results shown in Table 2, SBIC selects one (1) lag while AIC and HQIC select five (5) lags. Therefore, the study chosen the maximized five (5) lag lengths suggested by AIC and HQIC as opposed to one (1) lag recommended by SBIC. This decision was made because using too few lags leaves the models potentially miss-specified, and therefore is likely to cause serial autocorrelation in the residuals (Baum, 2013). Moreover, given our large sample of series, maximized five (5) lag orders can still preserve some degrees of freedom for estimation.

Table 2: Lag Selection Results

Lag Order	AIC	HQIC	SBIC
0	5.27	5.36	5.52
1	-0.89	-0.25	0.87**
2	-0.82	0.37	2.44
3	-1.55	0.18	3.21
4	-2.24	-0.12	3.87
5	-3.87**	-1.04**	3.91

Note:

** indicates optimum lag order selected by respective criterion at 5% levels of significance

4.3 Co-integration Test

Having confirmed that all variables of interest are stationary and established the optimal lag length, the Johansen co-integration test was employed to determine whether the variables have long-run equilibrium. The results of the co-integration test in Table 3 reveal that both $\lambda trace$ and λmax statistics rejected the null hypothesis of no co-integration ($r = 0$) against the alternative ($r \neq 0$). This is evidenced by the test statistics of both $\lambda trace$ and λmax which are greater than the critical values at 5% levels of significance. This estimated result implies that there exists long-run relationship among variables included in the regression model. Also, the Johansen co-integration test shows that there is more than one co-integrating vector. The $\lambda trace$ statistics suggest existence of at most four ($r \leq 4$) co-integrating vectors while λmax statistics suggest existence of at most three ($r \leq 3$) co-integrating vectors. Johansen and Julius (1990) pointed that when conflict occurs between $\lambda trace$ and λmax, conclusion is made based on $\lambda trace$ because it is more powerful than λmax as it takes into accounts all the smallest Eigen values. Therefore, we conclude that there exist at most four ($r \leq 4$) co-integrating relationships or vectors.

Table 3: Johansen's Co-integration Test Results

Null Hypotheses	Trace Statistics	Critical Value	Max-Eigen Statistics	Critical Value
$r = 0$	178.33**	94.15	73.89**	39.37
$r \leq 1$	104.44**	68.52	44.34**	33.46
$r \leq 2$	60.21**	47.21	28.33**	27.07
$r \leq 3$	31.86**	29.68	16.89	20.97
$r \leq 4$	14.98	15.41	10.22	14.07
$r \leq 5$	4.76	3.76	4.76	3.76

Note:

r represent the number of co-integrating vectors; if there are k stochastic variables in the equation, there can be up to k-1 co-integrating vectors, i.e. $r = k-1$; if $0 < r < k$ there are r independent linear combinations of y's that are 1(0), but it may not be easily to give all these relationships an economic interpretation; if $r = k$ estimation of the model as VECM is not necessary; ** indicates rejection of the stated null hypotheses at 5% levels of significance.

4.4 Johansen ML Estimation Results

The Johansen ML estimation results presented in Table 4 reveal that government spending on physical investment relates positively and significantly to economic growth. That is to say, holding other factors constant, one percentage point increase in government spending on physical investments contributes to an increase of 0.24 percentage points in economic growth in the long-run. These outcomes are in line with Adam Smith theoretical view cited in Bhatia (2008) that public expenditures which create tangible assets and that enable the economy to produce more in the future are effective. However, the study by Kweka and Morrissey (2000), contradicted this position. They found that government spending on physical investments has negative effect on growth in Tanzania. The discrepancy in findings may be attributable to the fact that the previous study used residual based regression analysis with relatively small sample size.

Also, the results demonstrate that government spending on human capital investment has positive influences economic growth. That is, holding other factors unchanged, one percentage point increase in government spending on health and education contributes to an increase of 0.28 percentage points in GDP per capita in the long-run. These findings support a priori theoretical prerequisite that changing quantity and/or quality of labor force is a fundamental determinant of the country's productivity. Bhatia (2008) noted that productivity of government expenditure can also reside in the form of human capital investment. Thus, the more government spends on health and education, the more its citizens acquire wider and improved health and education services and become much productive. These results align with previous cross-section studies by Nijkamp and Poot (2004) and Alfonso and Jalles (2014) that improved health and education conditions contribute positively to growth through enhancing quality of work and labor productivity.

The results suggest that while increase in government spending on physical and human capital investments enhances growth, increase in government spending on consumptions is growth retarding. The results in Table 4 reveal that in the long-run a percentage point increase in government spending on consumption leads to a decrease of 1.78 percentage points in economic growth, ceteris paribus. This outcome could be attributable to the fact that in Tanzania greater share of government spending in the nature of consumptions goes for imported rather than home produced goods. These findings support Barro (1990) theory that government expenditure meant for social welfare provision and redistribution purposes inhibits growth-maximizing policy choices. These results also coincide with previous findings by Afonso and Furceri's (2010) that social contributions, government consumption and subsidies have negative effect on GDP growth.

The results show that growth rate of the economy is less sensitive to changes in both physical investment expenditure and human capital investment expenditure. This is evidenced by long-run inelastic coefficient; suggesting that larger change in physical and human capital investment spending led to small change in GDP growth. This outcome suggests existence of corruption and white elephant projects that reduce potency of investment spending. Mauro (1998) observed that corruption affects the composition of government expenditures, which in turn, affects GDP growth.

Moreover, the results reveal that trade openness has negative impact on economic growth. That is, holding other factors constant, as an economy becomes open to the rest of the world by one percentage point the real economic growth decline by 0.27 percentage points. This outcome reflects that trade openness increased demand for foreign goods relative to home produced goods.

This outcome confirms the traditional held view that most of the developing countries consume what they don't produce and produce what they don't consume. Moreover, these results are not surprising because most of the theoretical and previous empirical works suggest that more inward-oriented countries register poor economic performance. The results, however, contradict with findings by Gabriel et al. (2021) that trade openness has significant positive impact on growth in low income countries. The discrepancy in findings may be attributable to the fact that this study is dynamic panel analysis which applied generalized method of moments (GMM).

A closer examination of the results shows that private investment plays important role in promoting growth in Tanzania. This is strongly substantiated by the positive and significant long-run coefficient of 0.75; which implies that one percentage point increase in private investment contributes to an increase of 0.75 percentage points in GDP per capita. These results support the previous findings by Manamba and Massawe (2016) that domestic private investment and foreign direct investment play an important role in economic growth in Tanzania. Moreover, the results reveal that private investment is more effective than public investment in Tanzania; as evidenced by magnitude of coefficients of private investment (0.75) and public investment (0.24). This could be partly attributable to wastage of resources in public sector which has been frequently reported by several organs including office of the controller and auditor general.

Table 4: Johansen ML Estimation Results

Variables	GDP (Dependent Variable)			
	Coefficients	**Std error**	**Z**	**P > |Z|**
PE	0.2414	0.0812	2.97	0.003**
HE	0.2795	0.1305	2.14	0.031**
CE	-1.7829	0.2076	-8.59	0.000**
PI	0.7554	0.0802	9.42	0.000**
OP	-0.2795	0.0918	-2.96	0.003**
CON	2.5850			

Note:

GDP is natural log of per capita gross domestic product; PE is natural log of physical investment expenditure; HE is natural log of human capital investment expenditure; CE is natural log of government expenditure on consumptions; PI is natural log of private investment; OP is natural log of trade openness; CON is constant; ** significant at 5% levels.

4.5 The Growth - Effects of a Bilateral Switch Between Government Spending Components

The results in Table 5 show that holding other factors constant, a percentage point increase in government spending on physical investments financed by a percentage point decrease in government spending on consumptions contributes to an increase of 7.42 percentage points in GDP per capita. This reflects that reallocating government consumption spending to physical investment spending involves transforming unproductive resources to productive resources. These results support Barro's (1990) theory that when a government increases utility-enhancing public spending while reducing production-enhancing public spending growth rate of the economy falls regardless of the level of total spending. Conversely, the results show that a percentage point rise in government spending on consumptions compensated by a percentage point fall in government

spending on physical investments leads to a decline of 0.13 percentage points in GDP. This outcome supports Agénor (2010) hypothesis that reallocation from unproductive public spending to infrastructure spending helps a country move to a steady state of higher growth.

Also, the results show that holding other factors unchanged, a percentage point increase in government spending on human capital investments financed by a decline in government spending on consumptions contributes to an increase of 6.36 percentage points in GDP per capita. By contrast, the results reveal that a percentage point rise in government spending on consumptions in the expenses of reducing government spending on human capital investment lead to a decline of 0.16 percentage points in GDP per capita. These results clearly suggest that switching government spending from public investment to consumption crowds out private investment, dampen economic stimulus in the short-run and reduce capital accumulation in the long-run. These findings align with Gemmell et al. (2014) that increasing social welfare spending by reducing spending in other sectors is associated with poor growth for OECD countries.

A closer examination of the results demonstrate that a percentage point rise in government spending on physical investments compensated by a percentage point fall in government spending on human capital investments contributes to an increase of 1.16 percentage points in GDP. Conversely, the results reveal that one percentage point increase in government spending on human capital investment financed by one percentage point decrease in government spending on physical investments lead to an increase of 0.86 percentage points in economic growth. These results suggest no evidence of output costs linked with a bilateral switch between government spending on physical investments and government spending on human capital investments. Barro (1990) pointed that if public spending levels and shares have each been set in growth maximizing manner, there should be no evidence of output benefits or costs from reallocating expenditures. Thus, both physical investment expenditure and human capital investment expenditure have been set for growth – maximization in Tanzania. However, for prioritization purposes, the results suggest that physical investment is a leader while human capital investment is a follower.

Table 5: The Growth - Effects of a Bilateral Switch between Public Spending Categories

Bilateral Switch		Growth - Effects	
Spending Decreased	**Spending Increased**	**Direction**	**Magnitude**
CE	PE	Positive	7.42
PE	CE	Negative	0.13
CE	HE	Positive	6.36
HE	CE	Negative	0.16
HE	PE	Positive	1.16
PE	HE	Positive	0.86

Note:

PE is natural log of government spending on physical investment; HE is natural log of government spending on human capital investment; CE is natural log of government spending on consumption. All variables are statistically noteworthy at 5% levels of significance

4.6 The Direction of Causality Between Public Spending Categories and Economic Growth

The Granger causality test results in Table 6 reveal that there is no causality between physical investment spending and economic growth. Also, there is no evidence of causality between human capital investment spending and economic growth. Likewise, the results show that there is no causality between consumption spending and economic growth. In general, the study found no evidence of causality between public spending categories and economic growth. These results support the previous findings by Kweka and Morrisey (2000) in Tanzania. Also, these findings confirm that although regression analysis deals with the dependence of one variable on other variables, it does not necessarily prove or imply causation (Gujarati, 2004). Furthermore, these findings imply that there was no simultaneity problem in measuring the impact of government spending on economic growth; thus, our basic regression model does not suffer from endogeneity bias.

Table 6: Granger Causality Test Results

Null Hypothesis	Chi2	Prob > Chi2
PE # GDP	7.50	0.112
GDP # PE	0.93	0.919
HE # GDP	4.88	0.300
GDP # HE	0.70	0.952
CE # GDP	4.88	0.300
GDP # CE	1.99	0.738

Note:

GDP is natural log of real per capita gross domestic product; PE is natural log of physical investment expenditure; HE is natural log of human capital investment expenditure; CE is natural log of consumption expenditure; # means no Granger causality at 0.05 levels of significance

4.7 Diagnostic Tests

A closer examination of the results in Table 7 reveals that there is no serial autocorrelation at lag order. This is substantiated by p-values of LM test which are greater than 5% levels of significance. The LM test results suggest that our basic regression model was correctly specified. Also, the results show that residuals are normally distributed as supported by p-value of JB tests which is greater than 5% level of significance. The JB test results reflect that the data used followed normal evolution. Moreover, Chow test show that there are no structural breaks of known dates; 1979 and 1993; as evidenced by computed F-statistics which are less than critical F-statistics.

Table 7: Diagnostic Test Results

LM Test			
1		2	
Ch2	Prob>Ch2	Ch2	Prob>Ch2
39.17	0.33	32.84	0.62
JB Test			
Ch2		Prob>Ch2	
1.25		0.54	
Chow Test			
1979		1993	
F	*F	F	*F
0.43	2.98	1.69	2.47

Note:

F-computed values, *F-critical values obtained from F table; 1 & 2 are respective lags 1979-Kagera war and first economic crisis, 1993-financial liberation and second economic crisis.

5.0 Conclusion

The study explored whether governments can enhance growth by changing composition of public expenditure. Johansen's maximum likelihood method was applied to estimate the long-run relationship. The study shows that reallocating consumption spending towards physical and human capital investment spending enhances long – run growth. By contrast, the results show that reallocating physical investment spending and human capital investment spending towards consumption spending have negative growth-effects. The study, however, found no evidence of output benefits or costs associated with a bilateral switch between physical investment spending and human capital investment spending. Moreover, the study reveals that public investment and private investment are complementary. These results suggest that government expenditures on physical investment and human capital investment are "productive" whereas government expenditures in the nature of consumptions are not only "ineffective but counterproductive" as well. Thus, to spur economic growth, government has to increase spending on physical and human capital investments in the expenses of reducing spending on consumptions. However, a reasonable share of consumption spending must be maintained to improve non-growth objectives.

Though this paper provides more specific insights pertaining to the impact of reallocating public spending on economic growth, there is still a room for further research. One obvious aspect is that despite its undeniable importance, economic growth is surely not the only criteria a government wants to take into account when deciding how to allocate public expenditure. While this paper focused on economic growth, there are other crucial macroeconomic objectives such as employment, price stability, exchange rate stability and income inequality that should also be considered. For instance, even when government spending in the nature of consumption is not growth-enhancing; it may help to promote income equality. Thus, analyzing the effects of public expenditure composition on these other key macroeconomic variables is also an important area in future work.

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