Macroeconomic Stabilization Effects of Public Expenditures: Empirical Evidence from Tanzania

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Abstract: This study examines macroeconomic stabilization effects of public expenditures in Tanzania. The study used co-integration and error correction modeling approach to analyze effects of public expenditures on macroeconomic stability. The results show that increase in development expenditure enhances macroeconomic stability. By contrast, the results reveal that increase in recurrent expenditure destabilizes macroeconomic environment. Also, the results show that increase in aggregate government expenditure dampens macroeconomic stability. Thus, to nurture macroeconomic stability, government needs to increase development expenditure in the expenses of reducing recurrent expenditure.

1.0 Introduction

In the late of 1970s and early 1980s many least developing countries were stricken with economic crisis. Tanzania, in particular, faced decline in gross domestic savings; foreign exchange constraints; high external debt ratios; widening fiscal and current account deficits, high inflation rate and macroeconomic imbalances. Also, the Gross Domestic Product (GDP) growth rates were negative or failing to match the population growth rates. The Kagera war; climatic change; poor transmission mechanisms of macroeconomic policies particularly the fiscal and monetary policies; weak institutional frameworks; and drastic and unfavorable changes in external conditions intensified the economic crisis (Mwakalobo, 2015).

Tanzania undertook economic reforms in the second half of 1980s in response to economic crisis. The impetus of economic reforms was to promote economic growth and achieve macroeconomic stability. As a result, between 1987 and 1991, GDP growth rebounded to 4.2% from 0.8% recorded between 1977 and 1983 and fiscal deficit reduced to 0.9% from 7.6% recorded between 1977 and 1983. But these limited achievements lived shortly as they were eroded in 1993-95 when the country entered into another deeper economic crisis; GDP growth declined to 1.8%, fiscal deficit widened to 5.6%, inflation elevated to the tune of 30% and the real exchange rate depreciated (BOT, 2015). Thus, the path of overall macroeconomic stability in Tanzania has not been smooth and predictable despite formulating and implementing the bold economic reforms. The persistent increase in fiscal deficits and public debts, for example, suggests that revenue mobilization has not been commensurate with growth of public expenditures. This paper is an attempt to investigate macroeconomic stabilization effects of public expenditures in Tanzania.

Scholars have devoted a great deal of empirical works tracing the effects of public expenditure in the economy. Gemmell et al. (2014) found that spending on infrastructure has greater positive impact on growth but spending on consumption has a modest negative effect on growth for OECD. Hammed et al. (2020) found that government spending can further generate more revenue in the long-run. Also, they found that variation in price level is weakly explained by expenditure in Nigeria. Alfonso et al. (2014) found that spending on human capital investments has positive growth-effect while spending on social security and welfare has a negative growth-effect in developing and developed countries. Galstyan and Lane (2009) found that public spending on consumption has appreciation effect whereas spending on investment has depreciation effect. Morozumi et al. (2013) found that rise in education spending financed by a fall in health or social protection spending has growth-enhancing effects in low-, middle and high-income countries. Kweka and Morrissey (2000) found that physical investment spending has a negative growth-effect, human capital investment spending has no effect, and consumption spending has positive growth-effect in Tanzania. Amuka et al. (2016) found that capital expenditure on economic services is a major cause of inflation in Nigeria.

But most of the previous studies examined the impacts of public expenditure on economic growth. Despite its undeniable importance, economic growth is surely not the only macroeconomic objective governments want to take into account when deciding allocation of public expenditures. Thus, while most of the previous studies focused on the impacts of government expenditure on economic growth, this paper contributes to the existing literature by analyzing macroeconomic stabilization effects of public expenditures. The scanty empirical works that have paid attention to macroeconomic stabilization effects of public expenditure used price stability as a proxy for overall macro stability. The previous studies used one indicator of macroeconomic stability undermined or overstated the impacts of public expenditures. Sahay and Goyal (2006) emphasize the use of multiple indicators jointly to evaluate macroeconomic stability because each variable has partial information separately. This study used inflation, exchange rate, fiscal deficit and public debt to determine macroeconomic stabilization effects of public expenditures. Analysis of macroeconomic stabilization effects of public expenditures is vital for policymakers in deciding which type of spending to rise while trying to maintain stability.

The rest of this paper is organized as follows: The review of related theoretical literature is presented in next section. It presents theoretical framework and analysis of public expenditure in relation to macroeconomic stability. This is followed by methodologies used to analyze the macroeconomic stabilization effects of public expenditures in Tanzania. Thereafter, the results of the research are chronologically presented and discussed. Lastly, concluding remarks, area for further studies and policy implications are summarized.

2.0 Theoretical Review
Earlier than the great depression, government activities in an economy were seen as source of economic 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-faire 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-faire 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 life. According to Keynes, people should not wait for the long-run before they take action to bring the economy back to full economic activities because in the long-run, we may have all died. Conversely, in the short-run, Keynesians recommended increase in government expenditure during economic slump and decline during economic prosperity.

Keynesians diagnosis of the basic cause of depression of 1930s is deficiency of effective demand which is a result of low marginal propensity to consume coupled with low marginal efficiency of investments. Thus, if an economy enters into a deeper recession, government can restore equilibrium by stimulating investment and consumption activities through tax cut or rising public expenditure. Keynesians emphasize that increase in government expenditures or tax cut led to substantial increase in GDP through multiplier effects (Bhatia, 2008). Keynesians prescription was basically directed towards curing a state of economic depression - but the logic of their arguments can also be extended to that of curing an inflationary situation. That is, during a boom, government needs to curb extra aggregate demand. This may be done through reducing public expenditure while maintaining the same amount of taxation and/or borrowings. Here, taxation would drain away some consumers' purchasing power and public borrowings would cut market investment. Thus, curtailing of public expenditure would restrain inflation.

Analysis of Keynesians school of thought shows that increase in government expenditure or tax cut is closely linked with increase in inflation, fiscal deficit and public debt in an economy. If total government expenditure increases whereas total government revenue (tax and non-tax) declines or remains constant over time, fiscal deficit and public debt widens. Likewise, if a rise in total government expenditure exceeds a rise in total government revenue (tax and non-tax) over time period, fiscal deficit and public debt rise. In other words, high public expenditure financed through public borrowing and/or money creation has macroeconomic destabilization effect as it contributes to inflationary pressure. Thus, government revenue-financed expenditures enhance not only economic growth but also macro stability. But this effect decreases as tax rate increases because higher tax rate may reduce rather than rising tax revenues. The high tax rate has been cited as the main contributory factor for tax evasion and avoidance. Basically, Keynesian prescription suggests that to reduce inflation, fiscal deficit and public debt, government needs to curb effective demand by reducing public spending while retaining or rising revenues.

The endogenous growth model developed by Devarajan et al. (1996) from Barro (1990) theoretical framework postulates that government expenditure on investments and productive activities (in principle including state-owned production) contribute positively to GDP growth, because it adds to productive capacity of the economy. But, government spending 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. Adam Smith in Bhatia (2008) emphasizes that government expenditure which create tangible assets and that enables the economy to produce more in the future have positive growth-effects while wasteful and avoidable spending have zero or negative effects on economic growth. This school of thought implies that in the short-run, a rise in physical investment spending enhances productivity. But, in the long-run, it reduces inflation while sustaining high growth. Likewise, a rise in consumption spending reduces productivity in the short-run. But, in the long-run, it increases inflation while maintaining poor growth.

Analysis of Barro (1990) theoretical framework indicates that a rise in public expenditure on investments and productive activities may reduce public debt level in the long-run; this is due to the fact that loans plus accumulated interest rate would be repaid out of the increased production. Also, in the long-term, increase in government expenditure on public investments is more likely to narrow down the level of fiscal deficit; this is because of the expected net investment returns and/or revenues generated from developed infrastructures. On the other hand, increase in government expenditure in the nature of consumptions is anticipated to increase public debt; this is because repayment of such non-productive loans plus accrued interest rates involves deductions from national product. Moreover, increase in government consumption spending is expected to widen fiscal deficit because most of social welfare expenditures have zero or negative net returns. The opposite outcome, however, occurs if public investment spending crowd out private investment and consumption spending rise willingness and ability to work and save.

Mundell - Flaming model shows that a rise in public spending or a tax cut has effect on exchange rate. The model holds that in a small open economy with a floating exchange rate regime, increase in public spending widens fiscal deficit which results to high interest rate. As soon as domestic interest rate starts to rise above world interest rate, capital quickly flows in from abroad to take advantage of higher return. This capital inflow has exchange rate appreciation effect: because foreign investors need to buy the domestic currency to invest in the domestic economy, the capital inflow increases demand for the domestic currency in the market, bidding up the value of the domestic currency. The appreciation of domestic currency makes domestic goods more expensive relative to foreign goods, reducing net exports, which in turns, off-sets the growth-effects of fiscal expansion (Mankiw, 2016). But this effect dominates in the short-run, because investors can quickly shift their funds from one country to another in response to changes in interest rates.

The government spending components may have different impact on long-run behavior of macroeconomic stability, particularly, real exchange rate. Balassa and Samuelson (1964) cited in Galstyan and Lane (2009) argue that an expansion in public capital stock is expected to enhance productivity; if increase in productivity goes mostly to tradable sector real exchange rate appreciates. But, if increase in productivity comes mostly from non-tradable sector real exchange rate depreciates. Analysis of human capital shows that investment on health and education increases productivity mostly on non-tradable sector, thus expected to depreciate exchange rate. An analogy conventional investment on physical capital adds productivity on tradable sector, thus expected to appreciate exchange rate. Obstfeld and Rogoff (1995) argue

that increase in government spending in the nature of consumptions is expected to depreciate exchange rate if more spending goes to imported goods relative to home-produced goods. But the opposite outcome occurs if government consumption spending is mostly concentrated on home-produced goods.

3.0 Methodology
3.1 Data
The study used annual time series data covering 1970 to 2015. The data were collected from Bank of Tanzania (BoT), World Bank (WB) and International Monetary Fund (IMF). After compilation, time series data were managed by using SPSS and later analyzed by using STATA. Time series analysis uses statistical techniques to identify the behavior of one or more variables in terms of statistical regularities in their own past behavior in order to estimate a pattern in the variable's evolution over time. The estimated pattern is important for forecasting, assuming that the pattern behaves the same in the future. Adams et al. (1991) noted that observing events overtime enables researchers to draw inferences.

3.2 Measurement Issues
3.2.1 Macroeconomic Stability
The study used inflation rate, exchange rate, fiscal deficit and public debt to measure macroeconomic stability. This is because most of the economic theories suggest that inflation rate and exchange rate are good indicators of monetary stance of an economy. Likewise, fiscal deficit and associated public debt are good indicators of fiscal stance of a state. So, macroeconomic environment is "stable" when inflation rate is low, exchange rate is less volatile, fiscal deficit is small, and public debt level is low. According to World Bank (1990) macroeconomic framework is described as "stable" when inflation rate is low and predictable, real interest rate is appropriate, real exchange rate is competitive and predictable and balance of payments situation is perceived as viable. Todaro (2009) pointed that macroeconomic instability is characterized by high inflation and severe government budget and foreign-payments deficits along with growing foreign-debt obligations.

Since these indicators (inflation rate, exchange rate, public debt and fiscal deficit) are not identical in several aspects, including their measurement ranges and units (for example, they have different maximum and minimum values); then, it seems that, it is not logical to construct a combined index from their simple summation and/or average (Ismihan, 2003). Therefore, to solve this problem, the study adopted a methodology of the United Nations Development Program (UNDP) in computing Human Development Index (HDI). According to UNDP, macroeconomic instability index (MII) is constructed in two main stages:

Stage1: Sub-indexes of the four mentioned indicators were derived based on relation one:

$$Y_t = \frac{X_t - X_{\min}}{X_{max} - X_{min}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where: Xt; is real value of indicator X in year t, Yt; represents X's sub-index value, Xmin; is the minimum value of X in the sample, and Xmax; is the maximum value of X in the sample.

Stage 2: MII was computed as average of the derived four sub-indexes as in relation two:

$$MII = \frac{Y_1 + Y_2 + Y_3 + Y_4}{4} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2)$$

The value of MII ranges from 0.00 to 1.00, the smaller the value of MII the more the stability. Therefore, macroeconomic environment is described as "stable" if MII ranges between 0.00 - 0.20; "moderate" if MII varies between 0.21 - 0.50; and "unstable" if MII ranges between 0.51 - 1.00. This interpretation is based on the interpretation of HDI computed using UNDP approach. A rise in MII implies an increase in at least one indicator of macroeconomic stability.

3.2.2 Public Expenditure

It is conventional to classify public expenditure into various functional or economic categories. The functional classification enables the government to maintain an effective control and check over public expenditure. That is, it assists the government to identify possible leakages and wastage, diversion and misappropriations of public expenditure. Also, this classification enables the government to ensure that public expenditures are used only for sanctioned purposes. Such a classification is necessary for auditing and safeguarding against misuses, but not sufficient for designing appropriate fiscal policy (Bhatia, 2008). Appendix 1 shows functional classification of public expenditure in Tanzania.

This study used economic classification of public expenditure; in which, total government spending was disaggregated into three main components: development expenditure; recurrent expenditure in the nature of human capital investments i.e., recurrent expenditure on health and education; and recurrent expenditure in the nature of consumptions i.e., total recurrent expenditure less recurrent expenditure on human capital investment. Afterward, the study considered macroeconomic stability-effect of aggregated public expenditure. This approach overcomes the problem of double counting and perfect collinearity encountered in most previous studies. The aggregated public expenditure and disaggregated public expenditures were expressed as a ratio of GDP.

The recurrent expenditures on health and education are treated as joint human capital investment because they are closely related. The greater health capital may improve return to investments in education, in part because health is an important factor in school attendance and in formal learning process. Likewise, greater education capital may improve return to investments in health, because health programs rely on skills learned at school.

3.2.3 Control Variable

To analyze macroeconomic stabilization effects of public expenditure, the study used real per capita GDP as a control variable. The 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 the overall level of economic activity (Todaro, 2009). GDP measures total value for final use of output produced by an economy by residents and nonresidents usually expressed as total income earned by factors of production or total value added from all sectors or total spending by households, firms,

government and foreigners. The real per capita GDP is expected to strengthen the relationship between public expenditure and macroeconomic stability.

3.3 Estimation

The study employed the Phillips-Perron (P-P) non-parametric test to examine the presence of the unit root. The unit root analysis is necessary to avoid possibility of spurious results that might exist with non-stationary series even if the sample size is large (Yule, 1926). 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 the unit roots when the structural breaks are incorporated in the data set (Indraratna, 2003; Li, 2001). In addition, P-P test is adjusted to take into account serial correlations by using Newey-West (1994) covariance matrix. Thereafter, the Johansen's co-integration was used to ascertain whether variables are bound together in the long-run. Within the Johansen approach, both the trace ($\lambda trace$) and the maximum Eigen-value (λmax) statistics were applied to ensure robustness of the results. The Johansen's approach is superior over Engle and Granger two-step method because it enables testing existence of multiple co-integrating vectors and thus it exploits all dynamic interactions of the variables included in the model and it gives a room for normalization (Verbeek, 2004).

Finally, error correction model (ECM) was estimated. To avoid spurious results, with co-integrated but non-stationary time series data, the best way is to estimate (ECM) of the form:

$$\Delta Y_t = \theta + \beta_1 \Delta X_t + \gamma ECT + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Where: Y is macroeconomic stability index (MII) and X is a vector of public expenditures such as recurrent expenditure on consumption, recurrent expenditures on human capital investment, and development expenditures. $\gamma = (\alpha-1)$; is adjustment coefficient i.e. coefficient on the error correction term. The expected value of adjustment coefficient is negative, which implies that there are dynamic stability in the long-run within error correction model; ECT = $(Y_{t-1} - \beta_2 X_{t-1})$, is error correction term, which can also be obtained from residuals of co-integration equation. The coefficient β_1 can be interpreted as elasticity, showing the short-run impact of public expenditure on macroeconomic stability. The Johansen's maximum likelihood (ML) method was used to estimate ECM jointly with co-integrating vectors. Given the existence of co-integration, all terms in ECM are stationary; therefore, standard regression techniques with their associated statistical inferences are valid (Green, 2003). The ECM was used to capture short-run and long-run macroeconomic stabilization effects of public expenditures. This is important because policymakers need to consider both short-run and long-run effects of their policy change decisions.

4.0 Results and Discussion

4.1 Unit Root Test

The study employed the Phillips - Perron (P-P) test to examine the presence of the unit root. The P-P test was carried out to each variable in log - levels and log - differences. 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.

After taking their first differences, however, all variables became stationary, as supported by their test statistics which are less than their corresponding critical values at 1% levels of significance. Thus, the null hypothesis of a unit root or non-stationary is rejected at 0.01 significance level; 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	
MII	-3.283	-3.614	-9.451***	-3.621	1(1)
DV	-2.243	-3.614	-6.387***	-3.621	1(1)
RH	-1.889	-3.614	-6.684***	-3.621	1(1)
RC	-2.724	-3.614	-6.729***	-3.621	1(1)
GE	-1.693	-3.614	-5.380***	-3.621	1(1)
GDP	0.565	-3.614	-6.206***	-3.621	1(1)

Note:

MII is natural log of macroeconomic instability index; DV is natural log of development expenditure; RH is natural log of recurrent expenditure in the nature of human capital investments; RC is natural log of recurrent expenditure in the nature of consumptions; GE is natural log of aggregate government expenditure; GDP is natural log of real per capita gross domestic product; *** indicates rejection of the null hypothesis of a unit root or non-stationary at 1% level of significance.

4.2 Lag Selection

The study applied Akaike Information Criteria (AIC), Hannan - Quin Information Criteria (HQIC) and Schwarz Bayesian Information Criteria (SBIC) to establish the optimum lag length. The results in Table 2 show that SBIC selects one (1) lag while AIC and HQIC select five (5) lags. The maximized five (5) lags suggested by AIC and HQIC was chosen as opposed to one (1) lag recommended by SBIC. This is 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 the 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	7.07	7.16	7.32
1	1.92	2.56	3.67**
2	1.41	2.59	4.67
3	-0.21	1.52	4.55
4	-1.12	1.16	5.15
5	-3.71**	-0.88**	4.06

Note:

** indicates optimum lag selected by respective criterion at 0.05 levels of significance.

4.3 Co-integration Test

The co-integration test results in Table 3 show that both $\lambda trace$ and λmax test statistics rejected the null hypothesis of no co-integration (r = 0) against the alternative (r ≠ 0). This is evidenced by test statistics of both $\lambda trace$ and λmax which are greater than the critical values at 5% significance levels. This implies that there exists long-run relationship among variables included in the model. Moreover, the co-integration test reveals that there are more than one co-integrating vectors. The $\lambda trace$ statistics suggest existence of at most three (r ≤ 3)

co-integrating vectors while λmax statistics suggest existence of at most two (r ≤ 2) 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 account all the smallest eigenvalues. Therefore, the study concludes that there exist at most three (r ≤ 3) co-integrating vectors.

Table 3: Johansen's Co-integration Test Results

Null Hypotheses	Trace Statistics	Critical Value	Max-Eigen Statistics	Critical Value
r = 0	124.16**	68.52	59.94**	33.46
r ≤ 1	64.21**	47.21	32.20**	27.07
r ≤ 2	32.02**	29.68	17.78	20.97
r ≤ 3	14.24	15.41	10.6	14.07
r ≤ 4	3.64	3.76	3.64	3.76

Note:

r is 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; Total public spending was treated separately; ** indicates rejection of the null hypotheses at 5% levels of significance.

4.4 Estimated Co-integrating Vector

The Johansen's ML method was used to estimate the interested co-integrating vector. The results in Table 4 show that, in the long-run, development expenditure relates negatively and significantly to macroeconomic stability index. This implies that increase in development expenditure notably reduces inflation rate, exchange rate depreciation, fiscal deficit and public debt. The results reveal that, in the long-run, a rise in development expenditure by a percentage point enhances macroeconomic stability by 2.38 percentage points, holding other factors constant. This outcome suggests that development expenditure adds to productive capacity of the country, which in turns reduces inflationary pressure and exchange rate depreciation, in the long-run. Also, the results reflect that development expenditure reduces public debt level, in the long-run, because loans plus accrued interest rates are paid out of the increased capital expenditure driven production.

A close examination of the results of the estimated co-integrating equation demonstrates that in the long-run, recurrent expenditure in the nature of human capital investments relates positively and significantly to macroeconomic stability index. This implies that increase in recurrent expenditure on health and education substantially increases inflation rate, depreciation of exchange rate, fiscal deficit ratio and public debt level, and hence destabilized macroeconomic environment. The results show that, holding other factors constant, increase in recurrent expenditure on health and education by one percentage point deteriorates macroeconomic stability by 3.64 percentage points, in the long-run. This outcome suggests that most of the recurrent expenditures on health and education rise productivity of non-tradable, which has exchange rate depreciation effects. Also, it reflects that productivity of non-tradable goods and services does not help an economy to reduce its external debt obligations, rather it increases debt burden to future generation.

The estimated co-integrating vector reveals that recurrent expenditure in the nature of consumptions relates positively and significantly to macroeconomic stability index. This implies that increase in recurrent expenditure in the nature of consumptions jointly and considerably increases inflation rate, exchange rate depreciation, fiscal deficit and public debt.

The results show that, in the long-term, increase in recurrent expenditures in the nature of consumptions by one percentage point destabilizes overall macroeconomic environments in Tanzania by 1.60 percentage points, holding other factors unchanged. This outcome is expected, because most of economic theories suggest that a rise in government spending on consumptions and social welfare services causes demand pull inflation. That is, it stimulates aggregate demand to the extent that outpaces aggregate supply. Also, this outcome reflects that most of government spending on consumptions goes for imported goods rather than home produced goods, leading to exchange rate depreciation.

Also, the results of the estimated co-integrating equation reveal that, in the long-run, aggregate government expenditure relates positively and significantly to macroeconomic stability index. This outcome implies that increase in total government expenditure considerably increases inflation rate, exchange rate depreciation, fiscal deficit and public debt. The results show that, in the long-run, holding other factors constant, a rise in total government spending by one percentage point weakens overall macroeconomic stability environment by 2.02 percentage points. This outcome is attributable to the fact that greater share of public expenditure in Tanzania is in the nature of recurrent expenditures, which has macroeconomic destabilization effects. Appendix 2 demonstrates that over the study period 1970 - 2015, on average, government allocated about 72.83 percent of its budget for recurrent expenditure and the remaining 27.17 percent for development expenditure.

Moreover, the results demonstrate that, in the long-run, increase in economic growth as measured by real GDP per capita enhances macroeconomic stability in Tanzania. This is strongly substantiated by a negative and statistically significant coefficient of per capita GDP; which implies that increase in growth rate of the economy reduces inflation rate, exchange rate depreciation, fiscal deficit and public debt. It is evident that increase in real GDP per capita by one percentage point improves macroeconomic stability to the tune of 1.87 percentage points, holding other factors constant. This outcome suggests that the more a country becomes productive the more its economy becomes stable. These findings coincide the previous study by Eyeli et al. (2012) that high growth rate of the economy significantly enhances macroeconomic stability in Nigeria. But, this study by Eyeli et al. (2012) used inflation alone as a criterion for evaluating macroeconomic stability.

Table 4: Estimated Co-integrating Vector

Variables	MII			
	Coefficients	Std error	Z	P > |Z|
DV	-2.387	0.398	-6	0.000**
RH	3.6392	0.7186	5.06	0.000**
RC	1.6019	0.3758	4.26	0.000**
GE	2.0196	0.1375	14.69	0.000**
GDP	-1.8708	0.3661	-5.11	0.000**
CON	19.066			

Note:
DV is natural log of development expenditure; RH is natural log of recurrent expenditure on human capital investments; RC is natural log of recurrent expenditure on consumptions; GE is natural log of total government expenditure; GDP is natural log of real per capita gross domestic product; MII is natural log of macroeconomic instability index; CON is constant; ** means significant at 5% levels.

4.5 Error Correction Model

The results of error correction model in Table 5 show that there exists long-run relationship between macroeconomic stability and development expenditure, recurrent expenditure in the nature of human capital investments, recurrent expenditure in the nature of consumptions and per capita GDP. This is strongly substantiated by a negative and statistically significant coefficient of the error correction term, i.e., the speed of adjustment - 0.7211, which implies that about 72% of the last period's disequilibrium is corrected for in the following period. In other words, the estimated coefficient of the error correction term suggests that macroeconomic stability adjusts towards long-run equilibrium in response to changes in development expenditure, recurrent expenditure in the nature of human capital investments, recurrent expenditure in the nature of consumptions, and real GDP per capita. This outcome confirms that compositional change of government expenditure matters for long-run macroeconomic stability in Tanzania.

It is also worth noting the short-run effects of public expenditure on macroeconomic stability. The results show that, in the short-run, development expenditure relates negatively and significantly to macroeconomic stability index. This implies that, holding other factors constant, increase in development expenditure improves macroeconomic stability in Tanzania, i.e. rise in development expenditure jointly reduces inflation rate, exchange rate depreciation, fiscal deficit and public debt. This outcome supports the previous findings by De Castro and Fernandez (2013) and Benetrix and Lane (2013). However, their studies focused on exchange rate alone as a proxy for macroeconomic stability. This suggests that, in the short-run, increase in development expenditure increases expected returns on physical investments (roads, railways, electricity, etc.), which in turns, appreciates domestic currency. In other words, increase in capital expenditure boosts productivity in tradable sector which has exchange rate appreciation effect.

By contrast, results of the error correction model show that in the short-run, recurrent expenditure in the nature of human capital investments relates positively and significantly to macroeconomic stability index. This implies that, in the short-run, increase in recurrent expenditures on health and education increases inflation rate and exchange rate depreciation, widens fiscal deficit and public debt, and hence weakens overall macro stability. This outcome suggests that increase in most of the recurrent expenditures on health and education; particularly wages and salaries have positive, immediate and considerable effects on general price level. This is partly because increases in wages and salaries entail more household income, which results to high household consumption, which in turns, increases demand pull inflation. This outcome also reflects that, in the short-run, increase in government recurrent spending on health and education cannot generate sufficient revenues to off-set fiscal deficit and public debt. This is perhaps because socio-economic benefits of human capital investments take long-time to be realized.

The error correction model also reveals that in the short-run recurrent expenditure in the nature of consumption and social welfare relates positively and significantly to macroeconomic stability index. This implies that, in the short-run, increase in recurrent expenditures on consumptions increases inflation rate and exchange rate depreciation, widens fiscal deficit and public debt levels, and hence dampen overall stability. This outcome entails that a reasonable

share of government recurrent expenditure in the nature of consumption is financed through domestic and/or foreign borrowing. Also, it appears that increase in government spending on consumption increases demand for foreign goods relative to domestic goods leading to imported inflation. This outcome contradicts findings by Amuka et al. (2016) in Nigeria that inflation responds sharply and negatively to shock in recurrent expenditures in general administration. This discrepancy may be brought by difference in public spending categorization, i.e., recurrent expenditure in general administration is a subset of the recurrent expenditure on consumption.

Moreover, the results of the error correction model reveal that, in the short-run, total government expenditure relates positively and significantly to macroeconomic stability index. This outcome implies that an increase in total government expenditure notably dampens macroeconomic stability environment, i.e., a rise in total government spending increases inflation rate, exchange rate depreciation, fiscal deficit and public debt and vice versa. That is, with a floating regime increase in government expenditure widens fiscal deficit, which results to high interest rate. The high domestic interest rate, in turns, attracts capital inflows, which has exchange rate appreciation effects because it increases demand for domestic currency relative to foreign currency. Since our sample covered both pegged and floating exchange rate regimes, it appears that fiscal expansion is more effective with pegged regime than with floating regime.

Table 5: Error Correction Model Estimation Results

Variables	MII			
	1	2	3	4
MII	0.3667	0.2192	-0.1231	-0.0717
	(0.094)*	-0.3941	-0.582	-0.675
DV	-1.259	-1.0332	-0.7905	-0.4662
	(0.000)***	(0.000)***	(0.000)***	(0.005)***
RH	2.0559	0.3535	0.2503	0.4514
	(0.000)***	-0.351	-0.329	(0.042)**
RC	-0.0259	1.4135	0.9888	0.2804
	-0.936	(0.000)***	(0.011)**	-0.277
GE	-0.4829	1.825	-0.38	2.4911
	-0.427	(0.003)***	-0.522	(0.000)***
GDP	-4.3546	-4.0293	0.0746	-1.0893
	(0.000)***	(0.003)***	-0.913	(0.069)*
ECT	-0.7211			
	(0.000)***			
CON	0.0168			
	-0.664			

Note:

DV is natural log of development expenditure; RH is natural log of recurrent expenditure on human capital investments; RC is natural log of recurrent expenditure in on consumptions; GE is natural log of total government expenditure; GDP is natural log of real per capita gross domestic product; MII is natural log of macroeconomic instability index; ECT is error correction term; CON is constant. Columns 1 to 4 are coefficient estimates of lagged dependent and independent variables and figures in parentheses are their corresponding p-values. ***, ** & * means statistically significant at 1%, 5% & 10%, respectively.

Furthermore, error correction model reveals that, in the short - run, per capita GDP influences macroeconomic stability. This is substantiated by a negative and statistically significant coefficient of per capita GDP; which implies that an increase in economic growth notably reduces inflation rate, exchange rate depreciation, fiscal deficit and public debt. A plausible explanation is that as an economy becomes more productive, it's general price level falls as its aggregate supply increases; its fiscal deficit and public debt narrows down because of additional tax revenues and non-tax revenues collected from increased production; its real exchange rate appreciates as exports rise relative to imports. Also, a close examination of the results shows that over time there are partial adjustments in macroeconomic stability; as evidenced by significant coefficient of lagged dependent variable. The general and the most plausible interpretation is that the previous state of macroeconomic stability influences the current status of macroeconomic stability. Thus, the current macroeconomic stability conditions predict the future macroeconomic stability environment, assuming that the pattern behaves the same in the future.

4.6 Direction of Causality between Public Expenditure and Macroeconomic Stability

The granger causality test results in Table 6 reveal that there is one-way causality running from total public expenditure to macroeconomic stability. Likewise, there is one-way causality running from development expenditure to macroeconomic stability and from recurrent expenditure on human capital investments to macroeconomic stability. But there is bidirectional (two-way) causality between recurrent expenditure on consumptions and macroeconomic stability. Generally, Granger causality test shows that there was no simultaneity problem in measuring the macroeconomic stabilization effects of public expenditure; thus, the basic regression model does not suffer from endogeneity bias.

Table 6: Granger Causality Test Results

Null Hypothesis	Chi2	Prob > Chi2
DV # MII	19.84	0.000***
MII # DV	2.67	0.615
RH # MII	35.22	0.000***
MII # RH	2.11	0.715
RC # MII	24.35	0.000***
MII # RC	12.99	0.011**
GE # MII	25.55	0.000***
MII # GE	0.37	0.996

Note:

MII is natural log of macroeconomic stability index; DV is natural log of development expenditure; RH is natural log of recurrent expenditure on human capital investments; RC is natural log of recurrent expenditure on consumptions; *** and ** rejects the hypothesis of "no causality" at 1% and 5% levels respectively.

4.7 Diagnostic Tests

The results in Table 7 demonstrate 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. Also, the results show that residuals are normally distributed as strongly supported by p-value of JB tests which is greater than 5% level of significance. Moreover, Chow test reveals that there is no structural breaks of known dates as computed F value does not exceed critical *F value obtained from F table at 5% level of significance.

Table 7: Diagnostic Test Results

LM Test			
1		2	
Ch2	Prob>Ch2	Ch2	Prob>Ch2
31.96	0.66	42.43	0.21
JB Test			
Ch2		Prob>Ch2	
0.48		0.47	
Chow Test			
1979		1993	
F	*F	F	*F
1.8	2.98	1	2.47

5.0 Conclusion

The study examined macroeconomic stabilization effects of public expenditure in Tanzania. The study used co-integration and error correction modeling approach to analyze the short-run and long-run effects of public expenditure on macroeconomic stability.

The results show that increase in development expenditure enhances macroeconomic stability. This suggests that development expenditure adds to productive capacity of the country. By contrast, the results reveal that a rise in recurrent expenditures on human capital investments and consumptions deteriorates macroeconomic stability environment. Partly, this reflects that most of the recurrent expenditures go for imported rather than home produced goods. Also, it suggests that most of the recurrent expenditures are either non-productive or rise productivity of non-tradable. Furthermore, the results show that rise in aggregate public expenditure seems to dampen macroeconomic stability in Tanzania; perhaps because a greater share of total government expenditure is recurrent in nature. In recap, these results imply that given the budget constraints, a bilateral switch from recurrent expenditure to development expenditure can substantially accelerate macroeconomic stability, but the opposite scenario has macroeconomic destabilization effects. Thus, to nurture macroeconomic stability, government has to increase development expenditure in the expenses of reducing recurrent expenditure. But, a reasonable share of recurrent expenditure must be maintained for non-stability objectives. This prioritization should be at forefront in planning, authorization and execution of the government budget.

Though this study provides more specific insights relative to previous works, there is still room for further research. One obvious aspect is about quality or efficiency of public spending, i.e. this study focused on quantity (i.e., how much) of spending without explicitly considering its quality. If quality of a typical public spending is higher, an increase in this spending is expected to be robustly associated with higher growth and stability when compensated by a fall in other types of spending and vice versa. The main challenge in this regard is to find adequate proxies to control for quality of public spending among the different expenditure components considered in this paper, which is fruitful topic for further research.

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Appendix 1: Functional Classification of Government Expenditure in Tanzania

1. GENERAL PUBLIC SERVICES

1.1. General Administration

1.2. External Affairs

1.3. Public Order and Safety

2. DEFENCE

3. EDUCATION

4. HEALTH

5. SOCIAL SECURITY AND WELFARE SERVICES

6. HOUSING AND COMMUNITY AMENITIES

6.1. Housing

6.2. Community Development

6.3. Sanitary Services

7. OTHER COMMUNITY AND SOCIAL SERVICES

8. ECONOMIC SERVICES

8.1. General Administration

8.2. Agriculture, Forestry, Hunting and Fishing

8.3. Mining, Manufacturing, and Construction

8.4. Water Supply and Electricity

8.5. Roads and Bridges

8.6. Inland and Coastal Waterways

8.7. Other Transport and Communication

8.8. Other Economic Services (Tourism)

9. OTHER SERVICES

9.1. Public Debt

9.2. Financial and Capital Subscription

9.3. Pensions and Gratuities

Source*:* Economic surveys (various issues)

Appendix 2: Data set

YEAR	MSI	(% of GDP)				(% of Total Spending)			GDP
		GE	DV	RH	RC	DV	RH	RC	
1970	0.15	22.99	6.66	5.30	11.03	30.77	35.36	33.88	258513
1971	0.23	25.20	8.45	5.50	11.25	34.66	34.53	30.81	260865
1972	0.24	22.66	6.92	5.60	10.14	32.51	38.98	28.51	272440
1973	0.23	25.93	7.24	6.40	12.29	30.16	38.15	31.69	273538
1974	0.29	27.55	10.27	7.40	9.88	40.98	50.04	8.98	272968
1975	0.45	34.25	11.70	6.70	15.85	37.11	33.79	29.1	278712
1976	0.18	25.58	8.80	6.60	10.18	38.98	47.94	13.08	276688
1977	0.41	28.18	9.57	6.90	11.71	36.5	41.43	22.07	269427
1978	0.31	29.79	11.77	6.70	11.32	42.11	41.41	16.48	266045
1979	0.4	29.46	13.11	6.50	9.85	46.66	43.37	9.97	265206
1980	0.71	31.16	11.71	6.00	13.45	40.45	34.79	24.76	271326
1981	0.54	31.40	8.36	6.60	16.44	29.33	32.76	37.91	262702
1982	0.55	30.59	7.24	5.70	17.65	25.79	27.36	46.85	255999

YEAR	MSI	(% of GDP)				(% of Total Spending)			GDP
		GE	DV	RH	RC	DV	RH	RC	
1983	0.37	28.91	6.34	5.00	17.57	23.21	23.83	52.96	242385
1984	0.56	26.35	5.23	4.10	17.02	21.88	21.96	56.16	241985
1985	0.48	25.86	6.21	3.40	16.25	27.26	20.53	52.21	244737
1986	0.44	20.72	5.28	3.70	11.74	29.03	28.65	42.32	245887
1987	0.41	16.10	1.89	3.60	10.61	16.19	36.78	47.03	249875
1988	0.23	10.87	1.84	3.00	6.03	20.52	42.07	37.41	257467
1989	0.26	10.05	2.06	2.70	5.29	22.8	38.68	38.52	255848
1990	0.3	13.44	2.69	3.30	7.45	22.73	36.04	41.22	264280
1991	0.23	13.14	1.52	3.00	8.62	13.09	29.78	57.13	264127
1992	0.2	13.15	2.38	3.20	7.57	20.19	34.02	45.79	261504
1993	0.39	17.02	3.50	3.50	10.02	22.91	29.74	47.35	255298
1994	0.5	18.63	3.25	3.10	12.28	19.92	23.73	56.35	251724
YEAR	MSI	(% of GDP)				(% of Total Spending)			GDP
		GE	DV	RH	RC	DV	RH	RC	
1995	0.33	14.97	1.05	1.50	12.42	7.96	12.37	79.67	253775
1996	0.21	12.39	0.14	1.80	10.45	1.28	16.34	82.38	257125
1997	0.24	12.16	0.61	2.30	9.25	5.61	22.26	72.13	257705
1998	0.19	13.29	2.97	1.60	8.72	25.55	18.49	55.96	259962
1999	0.13	12.09	1.89	1.70	8.5	16.72	18.05	65.23	264391
2000	0.17	15.20	4.41	3.30	7.49	30.79	33.26	35.94	269134
2001	0.18	15.13	3.15	3.80	8.18	21.93	33.94	44.12	276741
2002	0.13	15.35	3.30	4.00	8.05	23.5	37.25	39.24	290376
2003	0.19	18.35	4.14	5.70	8.51	25.18	46.36	28.47	304347
2004	0.25	19.99	5.27	1.80	12.92	29.27	14.13	56.6	318694
2005	0.31	22.08	5.60	2.10	14.38	33.85	19.18	46.97	651492
2006	0.35	23.26	5.20	6.80	11.26	31.28	59.52	9.21	657709
2007	0.31	23.69	5.00	8.60	10.09	29.88	60.00	10.12	699127
2008	0.24	24.12	5.53	7.70	10.89	34.77	61.00	4.23	715918
2009	0.36	26.34	5.44	7.50	13.4	30.48	60.44	9.08	732038
2010	0.39	28.53	5.96	8.00	14.57	31.95	63.05	5.01	755720
2011	0.44	29.80	6.52	6.60	16.68	33.67	51.36	14.98	791750
2012	0.4	28.93	5.83	6.50	16.6	31.03	50.13	18.84	823752
2013	0.4	28.51	5.53	6.50	16.48	29.4	48.95	21.65	859881
2014	0.38	21.54	4.92	6.08	12.12	27.97	47.95	24.07	895592
2015	0.42	19.39	3.93	8.88	11.46	21.99	63.74	14.27	932736

Note:

DV: Development expenditure; RH: recurrent expenditure on human capital investment; RC: recurrent expenditure on consumption; GE: total government expenditure; GDP: real per capita gross domestic product; MSI: macroeconomic stability index.