Fiscal Expansion, Adjustment and Economic Growth in Tanzania 1967–2016

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ABSTRACT

The study analyses the effect of fiscal expansion and adjustment on economic growth in Tanzania over the period 1967 to 2016. Use of descriptive analysis was complemented by econometric analysis based on estimation of an error correction model (ECM) conditioned on co-integration test by bounds (ARDL) technique. The bounds test procedure established the variables of the estimating equation were co-integrated. Expansionary fiscal policy regime was obviated by its negative effect on growth over the period 1967–1992 and its positive effect during its adjustment over the period 1993–2016. Other fundamentals, including inflation, human capital, domestic investment, financial deepening, and economic openness over the long-run had the sign theoretically predicted and were statistically significant. In the short-run the ECM regression results confirm the variables of the estimation model were indeed in equilibrium. Even though, results revealed contemporaneous and three-period lagged effects of fiscal expansion (adjustment) on economic growth were negative (positive) and statistically significant. The evidence on conditioning factors, were mixed. Generally, the findings suggest increase in government expenditure may not lead to economic growth over the long-run. Among others, and subject to further empirical works, the results underscore importance of macroeconomic stability for attainment of economic growth.

Key words: *Fiscal Expansion, Economic Growth, Macroeconomics, Econometric Analysis, Government Expenditure*

INTRODUCTION

After independence in 1961, Tanganyika was determined to foster economic growth and reduce income poverty, illiteracy and disease (Nyerere, 1968). The implicit demand for provision of public goods and existence in the country of a very small private sector demanded government expenditure on social services, but also on basic capital goods and basic infrastructure during the period 1961-1966. Increased role of the government in the macro-economy in Tanzania became enhanced after promulgation of Arusha declaration that led to evolvement of a public sector driven economy during the 1967–1992 period. As a small open but poor economy characterized by left leaning philosophy of *Ujamaa* and Self Reliance the finance options available to the government were few and supply was constrained. Domestic-wise, borrowing from both internal and external sources was supply constrained by the nascent financial system and also global competition for foreign aid and loans. As observed by Mwalimu J. K. Nyerere (Nyerere, 1968), no country in the world could give gifts and loans adequate for all development targets of the country; and, besides, globally there were many needy countries such that taxation was the only option available to generate all revenues required for development. This willy-nilly prompted the government to

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recourse to borrowing from the banking system to finance both recurrent and development expenditure.

The overall government expenditure as a share of Goss Domestic Product (GDP), which is a conventional measure of the size of government, rose from 16% in 1966 to about 29% in 1980; serve for 31% recorded in 1975 due to internal and external shocks. In tandem, owing to budget financing constraint, the monetized budget deficit rose from about 3% in 1966 to about 12% in 1980. Among others, monetization of budget deficit is considered one of the factors that accounted for economic crises suffered by Tanzania since the late 1970s through the early 1980s (Kilindo, 1997; Bagachwa, 1992). In accordance to the mainstream theory, "big government syndrome" was pointed out as the main cause of inflationary pressure and poor economic growth in Tanzania since the 1970s. Accordingly, both "home and foreign grown" macroeconomic stabilization programmes were implemented in 1981–82 and 1986–1992, respectively, emphasized fiscal adjustment as one of the central policy options for attainment of macroeconomic stability, economic growth and development in Tanzania (Daniel *et al*., 2006).[3]

The main purpose in this paper is to investigate empirically the effect of fiscal expansion and adjustment[4] on economic growth in Tanzania during the period 1967-2016. The null hypotheses of interest are two: a) fiscal expansion during the period 1967-1992 lacked adverse effect on economic growth in Tanzania; and, b) fiscal adjustment since 1993 through 2016 adversely affected economic growth in Tanzania. The value additions of the analysis are two-fold. It brings into realm analysis of the structural break in fiscal policy and its likely differing effect on economic growth in Tanzania, which has not been addressed by previous studies on Tanzania, serve for Segura-Ubiergo *et al*. (2009), Kweka and Morrissey (2000), Kayandabila (2008), Kapunda and Topera (2013), Kilindo (1992) and Nyasebwa and Ndanshau (2011).

While a study on the size of the government per se may lack direct policy relevance, better understanding of its effect on growth when "cut to size" is surely important for informing policy, in particular, likely output outcomes of a concessionary fiscal policy stance. Second, so far there is a dearth of empirical evidence on the relationship between fiscal expansion and adjustment and economic growth in Tanzania. Previous studies, among others, Kweka and Morrissey (2000) and Kapunda and Topera (2013), only focused on "total" evolution of government size and economic performance in Tanzania. Third, unlike the previous studies on Tanzania, the analysis is based on a longer sample period that ranges from 1967 to 2016; and, fourth, unlike previous OLS (ordinary least squares) based studies on Tanzania, the analysis control for endogeneity between economic growth and government expenditure by estimating a conditional error correction version of an Autoregressive Distributed Lag (ARDL) model. On this account the findings of this study stands to enrich the literature and inform better policy formulation in Tanzania.

The paper is organized as follows. Apart from this introductory section, section two presents an overview of the relationship between economic growth and both fiscal adjustment and expansion, which is measured by the behavior of government expenditure in Tanzania during the sample period. Section three reviews the relevant theoretical and empirical literature; and, methodology

[3] The "home grown" stabilization programmes were known as National Economic Survival Programme (NESP) and Structural Adjustment Programme (SAP) that were, respectively, implemented in the period 1981 - 1982 and 1983 – 1986. The "foreign grown" stabilization programmes were recommended and supported by the World bank and the IMF (International Monetary Fund) that were known as Economic Recovery Programmes (ERP) implemented in Tanzania in two phases, *viz*, ERP-I (June 1986 – June 1989) and ERP-II (July 1989 - June 1991).

[4] Fiscal adjustment or fiscal consolidation refers to expenditure switching and reduction or revenue enhancing measures aimed at sharp government deficits reduction.

of the study is presented in Section four. Section five discusses the econometric results; and, the main conclusions and implications of the findings are in section six.

FISCAL EXPANSION, ADJUSTMENT AND ECONOMIC GROWTH IN TANZANIA: AN OVERVIEW

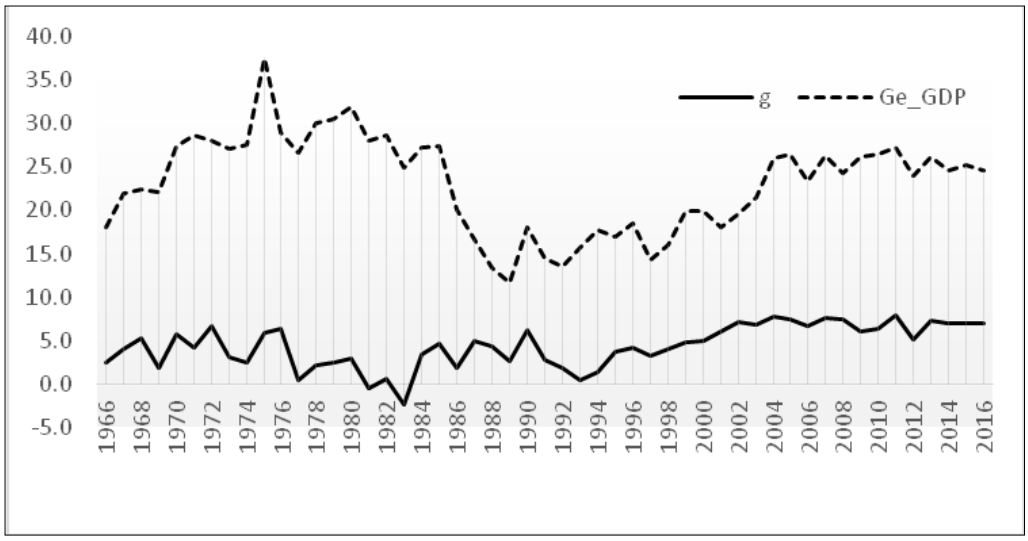
After the Arusha Declaration in 1967 the government was committed to developing and modernizing the economy in order to redress imbalances that existed in the economy. As better noted by the Nyirabu Commission "Government policy during the period, in most cases, (had) been aimed at strengthening the public sector with the view of attaining rapid growth (United Republic of Tanzania, 1990). Led by Mwalimu Julius Nyerere's philosophy of "people-centered development", the country adopted a tradition of formulating and implementing long term and medium term development plans since independence. The government also targeted to invest in public goods, including education, health, transport and urban development in order to raise life expectancy from 35 to 40 years by 1980. The Second Five Year Plan (SFYP) of the period 1969–1974 took into cognizance the development ideals of the Arusha Declaration promulgated in 1967. Among others, the SFYP targeted mechanization of agriculture and industrialization through Import Substitution Industrialization (ISI) strategy (Bigsten & Danielsson, 1999). In addition, the government targeted to redress structural imbalance in the economy by reducing dominance of agriculture by investing in basic industries. In the overall, the SFYP targeted a 6.5% per annum real economic growth, a rate that was slightly lower than that targeted in the FFYP.

Consistent with the Self Reliance Policy, which was one of the cornerstones of the Arusha Declaration, first, attainment of the targets of the SFYP was largely to be achieved through financing of investment in public enterprises (PEs) established to manage and operate the firms in key sectors of the economy that were nationalized by the government, especially between 1967 and 1972. Decentralization implemented in 1972 demanded an establishment of a new administrative machinery and infrastructure that led to expansion in government expenditure. The consequent expansion in public sector led to increase in government expenditure on productive economic activities, among others, transport, communication, and manufacturing sectors, and public services (Kilindo, 1992). The share of nominal government expenditure in nominal GDP rose from about 18% in 1967 to 32% in 1974/75; and, thereafter it fell to about 23% in 1976 before rising to 28 % in 1978 and 1979, partly due to internal and external shocks that included oil crisis, and war against the Idi Amin of Uganda. Notable, the escalation of government expenditures, coupled with low revenues due to a narrow tax base, inefficient tax administration and tax collection lags, led to chronic budget deficits since the late 1970s through the early 1980s (Mtui, 2015; Bevan, 2012; Mkupete & Ndanshau, 2017; Nyasebwa & Ndanshau, 2011; Osoro, 1997).

Two homegrown stabilization programs implemented by the government, namely, the National Economic Survival Program (NESP) in 1980/81 and the Structural Adjustment Program (SAP) of 1982/83 to 1984/85, had a dismal effect on macroeconomic performance (Bagachwa, 1992; Ndanshau, 2010). As a result, in June 1986 the government adopted the IMF and World Bank supported stabilization programs, that is, ERP. The short-run objective of the ERP, which was implemented in two phases, ERP-I and ERP-II, was to achieve macroeconomic stability by reducing the size of the government. This was to be achieved through improved revenue generation and cuts in expenditures. In the long-run, growth was to be attained mainly through liberalization of the economy, dismantling of the state-led sector by privatizing the public enterprises (PEs) and deregulation of the financial sector.

The fiscal adjustment included cut in government expenditure in health, defense, and public investment (Ruturagara, 2013). As a result of the fiscal adjustment during economic reforms the government expenditure that averaged 29.2% of GDP during 1974/75–1984/85, decreased to 14.2% in the second half of 1980s and 13% during the 1990s, before rising to 17.6% and 24.6% in 2000/01–2004/05 and 2006/07 to 2009/10, respectively. Notable, the fiscal adjustment was accompanied by gains, rather than decrease in economic growth. Nevertheless, owing to a stimulus fiscal package offered to private sector to redress the negative effect of the Global Financial Crisis (GFC) in 2008 the share of government in GDP rose sharply to 20% in 2009 but then decreased consistently to about 17% in 2016.[5] The fiscal stimulus seemingly impacted positively on economic growth: the rate of real economic growth rose from 6% in 2009 to an average of 7% over the period 2013-2016.

Figure 1: Real Economic Growth and Real Government Expenditure to GDP Ration in Tanzania, 1967 – 2016



Source: Drawn from the basic data set

Plots in Figure 1 appear to suggest economic growth *(g)* and share of government expenditure in GDP *(Ge_GDP)* were weakly positively related during the period between 1967 up to 1985 but not during the period 1986 through 1988, that is, the very early period of ERP-I. Moreover, economic growth appears positively related to the share of government expenditure in GDP since 1993, that is, a year after commencement of fiscal adjustment started in earnest in 1992. This factual evidence is consistent with the mainstream theory that fiscal adjustment, particularly small governments, impacts positively on economic growth. The positive relationship noted in Figure 1 is also consistent with that noted in some previous studies on Tanzania, among others, Mkupete and Ndanshau (2017), Nyasebwa and Ndanshau (2011), as well as Rwegasira (1976).

LITERATURE SURVEY

Fiscal expansion and adjustment, respectively marked by marked by increase and contraction (cut) in government expenditure, is a policy action used in management of aggregate demand in an economy (Scully, 1989). In the context of Tanzi (1994) the ultimate objective of fiscal policy, that

[5] The government restrained borrowing from the banking sector in order to make more resources available to the private sector. As a results credit to private sector as a ratio of GDP increased significantly from 4.6% in 2001 to 17% in 2009 (p. 15).

is taxation and spending by the government, is to achieve economic wellbeing in order to promote economic growth over the long run period. The effectiveness and relevance of either fiscal action is nonetheless contested in the literature (Engen & Skinner, 1992).

On the one hand, the fiscal expansion is considered to undermine economic growth as it diverts resources from high return and highly productive expenditure in the private sector in favour of low return expenditures, for example, rent-seeking government pursuits that undermines economic growth (Scully, 1989; Buchanan, 1980). Besides, expansion in government expenditure indirectly undermines economic growth by starving private sector with credit for investment either through high interest rates or centrally directed credit allocations to the public sector (Günalp & Gür, 2002). In relation, it is argued that the multiplicity of taxes and high tax rates charged to generate tax revenues for government spending partly distorts incentive to private sector investment in productive economic activities; and, partly distorts incentive to work and hence productivity of labour in the economy (Daniel *et al*., 2006; Günalp & Gür, 2002). Moreover, in the context of the endogenous growth model high multiple taxes and tax rates adversely affect the marginal rates of return to private capital leading to reduced rate of growth of income per capita (Easterly & Rebelo, 1993; Barro & Sala-i-Martin, 1992).[6] In this view, fiscal adjustment is considered critically necessary for the attainment of economic growth and development. As maintained fiscal prudence provide for existence of macroeconomic stability which is a prerequisite for economic growth and development (IMF, 2015).[7]

On the other hand, it is maintained in the literature that the impact of fiscal expansion on economic growth and development is positive (Cooray, 2009; Kormendi & Meguire, 1986; Ram, 1986; Ahmad & Ahmed, 2005). As maintained fiscal expansion increase aggregate demand that through the multiplier effect lead to increase in output and economic growth. As also argued, the increase in aggregate demand elicits (crowds in) private investment that, again through the multiplier, increases output and economic growth. The positive effect of fiscal expansion would particularly result, first, when spending or cut in taxes affects public investment in core infrastructure – education, electricity generation, health, transport and communication, etc. (Lucas, 1988; Barro, 1990; Ram, 1986). Second, is when fiscal expansion is only in traditional core areas of the government, *viz*, to secure better private property and, as a result, promote private investment that impacts positively on economic growth (Grossman, 1988). Third, following Ghali (1999) and Ram (1986), it is also noted by Günalp and Gür (2002) that a larger government "is likely to promote economic growth since the government has an important role of reconciling conflicts between private and social interests and provide a socially optimal path for economic growth" (p. 312).

Not least, in the context of the endogenous growth theories, it is maintained that fiscal expansion by either increase in government spending and/or cuts in taxes, particularly in innovation, research and development (R&D) may enhance productivity and hence impact positively on economic growth in an economy (Romer, 1987, 1990). Specifically, fiscal expansion in terms of tax cuts at the households and firm levels and increase in government expenditure "can boost economic growth by promoting development of human capital and promote factor productivity" (IMF,

[6] An argument exists in the literature that growth effect of fiscal actions depends on type of tax and/or expenditure and also the level of and mixture between the two. Negative growth effect would result if productive expenditure is financed by distortionary taxes.

[7] Notable, however, the short run macroeconomic outcomes of fiscal adjustment in and outside the developed countries remains quite contestable in theory and in empirical literature. In the Keynesian and also the new-structuralists context fiscal adjustment, among others, by cuts in government spending, harm economic growth (Agénor & Montiel, 1999; Gupta *et al*., 2005; Ram, 1986). Indeed, even IMF (2004) contends that economic growth may fall over the long-run due to cut in public investment during economic stabilization.

2015). In this view, fiscal adjustment is potentially harmful to economic growth, particularly so in less developed countries (LDCs). The extent of the fall in economic growth from fiscal adjustment would, however, depend on the type of fiscal action. A cut in government spending that reduces expenditure on public investment would impact more adversely on economic growth than would be experienced from cuts in government consumption expenditure.

In the context of the preceding arguments literature is replete with controversial empirical evidence on the impact of government expenditure (size) on economic growth in developing countries.[8] Some cross-country studies, for example, found the effect of government expenditure on economic growth was negative and/or insignificant: Cooray (2009) in a study which covered 71 countries (including 13 African countries) over the period 1996–2003; Gunap, (2002), Lin, (1994), Sattar, (1993), as well as Ahmad and Ahmed (2005) in 8 developing countries (D8), including Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey for the period 1973–2002; Guseh (1997) in a study which used data for 59 middle income developing countries of varying political and economic systems (mixed, socialist, and capitalists) over the period 1960–1985; Jong-Wha, 1995; and Barro (1991) that covered 98 developed and developing countries (including Tanzania) over the period 1960–1985. Similar evidence emerged from study by Grier and Tullock (1989) which covered 113 developed and developing countries (including Tanzania) over the period 1951–80; study by Scully (1989) which covered 115 developed and developing market economies for the period 1960–1980; and, Landau (1983) which covered over 100 developing countries in the period between 1961 and 1976.

A few cross-country studies established existence of a positive effect of government expenditure on economic growth in developing countries, among others, Lin (1994) in a study which developed and developing countries; Sattar (1993) in a study of 24 OECD countries and a group of 31 low income countries for the period 1950–1985; Günalp and Gür (2002) in a panel data study of 34 developing countries of Africa (not including Tanzania), the Latin America and Asia over the period 1979–1997; and, Gupta (1988) also in a study which used a sample of developed countries and positive in developing countries. Similarly, some country specific studies also have established existence of a positive effect of government expenditure on economic growth in developing countries. Among others, Mba and Olugu (2011) established a positive impact of public expenditure on economic growth in Nigeria during the period 1961–2011. Also, Ekpo (1994) as well as Kweka and Morrissey (2000) established existence of a positive effect of government expenditure on economic growth in Nigeria. Moreover, M'Amanja and Morrissey (2005) also found government expenditure had a positive impact on economic growth in Kenya. Other country specific studies, however, found the effect of government expenditure on economic growth was negative and/or insignificant, for example, Yovo (2017) in a study on Togo over the period 1980–2009; and, Nketiah-Amponsah (2009) in a study on Ghana for the period 1970-2004.

The review of empirical literature, first, attests to dearth of country specific studies on the effect of fiscal policy actions on economic growth in sub-Saharan Africa (SSA). Likewise, the studies on Tanzania, among others, are few: study by Morwa (2016) for the period 1970–2015; Ruturagara (2013) for the period 1970–2010; Kweka and Morrissey (2000) for the period 1965 to 1996; Kayandabila (2008) for the period 1965 to 2004; and, Kapunda and Topera (2013) who covered the period 1964–2010. Among others, previous studies on Tanzania established the effect of

[8] The review does not cover studies on government expenditure (size) and economic growth that specifically sought to test the Wagner's (1890) Law on the nature of the link between economic growth and government size.

government capital expenditure on growth was positive. Second, it is implicit from the review of empirical literature that the effect of fiscal expansion through increase in government expenditure is controversial: increase of government expenditure may bolster or undermine economic growth.[9] In this regard, therefore, either fiscal expansion or fiscal adjustment may impact negatively or positively on economic growth. Mishkin (1995), specifically maintains that expansionary fiscal policy that increase government spending or decrease taxes impact positively on aggregate demand and thereof the equilibrium level of output. Nevertheless, previous empirical studies in and outside Tanzania lack a specific analysis of the effect of fiscal expansion (big government) and fiscal adjustment (cut of government expenditure) to small government size, a feature in previous stabilization programmes (Schmidt-Hebbel, 1995). Third, serve for Kayandabila (2008) the previous studies on Tanzania only used the ordinary least squares (OLS) method to estimate linear model not subjected to cointegration test. This study addresses the gaps in the literature and, among others, it attends to the "gray matters" in methodology and empirical results for Tanzania that could be "whitened" by use of a longer sample period and superior econometrics approaches, namely bounds cointegration test and estimation of an error correction model.

METHODOLOGY

The impact of fiscal actions on economic growth in Tanzania is investigated by using a log-linear model which is based on the endogenous growth model of Barro (1990) that reads as:

$$(1) \qquad g_t = \delta + \alpha ge_t + \beta_j Z_t + \gamma D + u_t$$

where g is real rate of economic growth, ge is real government expenditure as a ratio of real GDP, Z is a vector of some growth conditioning factors , $(j = 1,2, \dots ,5)$, D is a dummy variable for shift in fiscal policy regime, t is a time signature, and u is a properly behaved stochastic error term.

For robustness sake, instead of the ratio of real government expenditure to the real GDP (ge), the ratio of real total tax revenues to real GDP (tr) and rate of growth of real government expenditure (g_GE) were tried as alternative measures of fiscal expansion and adjustment in Tanzania during the sample period.[10]

The selected economic growth conditioning factors are common in the so-called "growth regression studies" on developing countries (Barro, 1991). Besides, they also are considered the most relevant in this study on Tanzania. In accordance with the mainstream theory the effect of ge and π on economic growth (g) is expected to be negative; and, while all the elements of Z are expected to impact positively on economic growth, their relative importance is an empirical question of interest in this study on Tanzania.[11] Not least, on the basis of the mainstream theory, a negative effect on growth is expected from the shift in fiscal regime, specifically, fiscal adjustment by major budgetary cuts in since 1992.

[9] The inconclusive evidence in previous studies on economic growth and government size is attributed to several factors, among others, differences in levels of socio-economic, political, democracy, corruption, and economic development of the country covered particularly by cross-country panel data based studies (IMF, 2015). In addition, variation in estimation models, method of estimation put to use, and chosen proxies for the measure of government size across studies. In diverse models estimated in terms of the conditioning variables "it is difficult to disentangle the effect of fiscal reforms from other factors and to determine the causality with certainty" (IMF, 2015; Bose, Haque & Osborn, 2007; Easterly & Rebelo, 1993; Levine & Renelt, 1992; Barro, 1990; Rao, 1989).

[10] Carr (1989) informs about likely double counting in the measure of government expenditure due to yet to be agreed upon distinction between intermediate and final government expenditure. The distinction is nonetheless factored in the analysis carried out in this paper.

[11] Government budget constraint is implied in the model: G-R=D, where R is revenues and D is deficits. In the case of Tanzania, the R and D are excluded from the analysis, mainly due to inability to obtain adequate and consistent data for government tax revenues for the entire sample period.

Estimation Procedures

Estimation of the long-run and short-run dynamics in equation (1) was preceded by cointegration test by using bounds technique developed by Pesaran, Shin and Smith (2001). The technique is characterized by an estimation of an unrestricted conditional equilibrium error correction model (ECM) by using Autoregressive Distributed Lag (ARDL) model that reads as:

$$(2) \qquad \Delta g_t = \emptyset + \alpha_1 g_{t-1} + \alpha_2 ge_{t-1} + \theta_j Z_{t-1} + \sum_{i=0}^{p} \beta_i \Delta g_{t-i} + \sum_{i=0}^{p} \vartheta_i \Delta ge_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta Z_j + \gamma D + u_t$$

where Δ is a first difference operator, the β_i, ϑ_i, and γ_i are short-run impact multipliers, the α_i $(i = 1,2)$ and $\theta_j (j = 1,2, \dots 5)$ are long-run parameters; p is lag length; and u_t is a well behaved stochastic error term.

The bounds (ARDL) cointegration test technique is considered superior to Johansen and Joselius (1990); and Engle and Granger (1987) cointegration tests for several reasons. Among others, first, it assumes all variables of the estimation model are endogenous and give unbiased long-run parameter estimates; second, it accommodates small sample that characterizes the data set used in the analysis. Third, the techniques provide for a capture of both long-run and short-run dynamics that characterizes growth and government expenditure; and, fourth, the technique "has advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I(1) or I(0)" (Pesaran, Shin & Smith, 1996). On only this account, the analysis was subjected to augmented Dickey and Fuller (1979), hereafter ADF unit root test, to ensure the variables of the estimation model were not I(2) or a higher order.

Ordinary least squares (OLS) method was used to estimate equation (2) and other ARDL equations based on each normalized implicit function in Table 1.

Table 1: Implicit ARDL Function for Cointegration Test by F-test Technique

S/N	Equation
1	$F_g \mid ge, \pi, hc, fd_{m2}, inv, op$
2	$F_\pi \mid g, ge, hc, fd_{m2}, inv, op$
3	$F_{ge} \mid g, \pi, hc, fd_{m2}, inv, op$
4	$F_{hc} \mid g, ge, \pi, fd_{m2}, inv, op$
5	$F_{fd\_m2g} \mid g, ge, hc, inv, op$
6	$F_{inv} \mid g, ge, \pi, hc, fd_{m2}, op$
7	$F_{op} \mid g, ge, \pi, hc, fd_{m2}, inv$

Existence of the long-run equilibrium in each of the seven (7) equations in Table 1 was tested by using F-test method. The testable hypothesis is that: $\alpha_1 = \alpha_2 = \theta_i = 0$; and, the alternative hypothesis was: $\alpha_1 \neq \alpha_2 \neq \theta_i \neq 0$. Following Pesaran, Shin and Smith (2001), a null hypothesis is rejected if the F-statistic is above the upper bound critical value; and, it is accepted if it is below the lower bound critical value.

On the one hand, rejection of no cointegration, meaning existence of a long-run equilibrium in equation (1), provide for estimation in level of a conditional equilibrium long-run ARDL model that reads as:

(3) $$g_t = \alpha + \sum_{i=1}^{k} \beta_i g_{t-i} + \sum_{i=0}^{p} \vartheta_i ge_{t-i} + \sum_{i=0}^{m} \gamma_i Z_j + \gamma D + u_t$$

On the other hand, it is likely for the F-statistics to lie between the upper and lower bound critical value such that cointegration is neither rejected nor accepted. On this account evidence on existence of a long-run relationship in equation (1) is conditioned on establishment of a negative and statistically significant coefficient of the one-period lagged error term estimated in equation (3) included in the estimation of an error correction model (ECM) that reads as:

(4) $$\Delta g_t = \emptyset + \sum_{i=1}^{k} \beta_i \Delta g_{t-i} + \sum_{i=0}^{m} \vartheta_i \Delta ge_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta Z_j + \partial ec_{t-1} + \epsilon_t$$

In theory, the one-period lagged coefficients of the error correction term (∂) measure the speed of adjustment of short-run disequilibrium in estimated equation over the long-run period. Accordingly, the ∂ should be negative signed and statistically significant to suggest reversion to equilibrium after a short-run shock.

The analysis is based on annual time series data for the period 1967 to 2016. The lag lengths of the estimation models were selected by using Shwartz Bayesian Criteria (SBC) that has been found good in economizing lag lengths when compared with Akaike Information Criterion (AIC) (Pesaran & Shin, 1999). The data for nominal GDP, gross domestic capital formation (GDFCF), total and specific government expenditure on education and health were obtained from various Economic Surveys and National Accounts published by the National Bureau of Statistics (NBS) in Tanzania over the sample period. The data for the consumer price index (CPI), exports and imports, money supply, and commercial banks credit to the private sector were obtained from the publications of the Bank of Tanzania (BoT). The CPI was used to deflate the nominal variables.

EMPIRICAL RESULTS

All the variables (in natural logarithm) have a skewness of about zero. The standard deviations of all the variables are also very small; and, serve for aggregate investment, the kurtosis statistics suggest the remaining variables are about normally distributed. This suggests estimation of the model would lead to almost unbiased parameter estimates for making reliable statistical inferences.

Table 2 shows real economic growth (g) is negatively correlated to inflation (π) as theorized; and, the correlation between economic growth and the alternative measures of fiscal actions, that is, (g_GE) and (tr), are positive. Notable, however, the correlation between (g) and both g_GE and tr are smaller than that between g and ge that was retained in the analysis. Unexpectedly, economic growth (g) is negatively correlated to financial deepening (fd_m2) but not its alternative measure, that is, the fd_cr.

Table 2: Correlation Matrix

	g	π	ge	g_GE	tr	hc	fd_m2	fd_cr	inv	op
g	1.00									
π	-0.53	1.00								
ge	0.30	-0.54	1.00							
g_GE	0.26	-0.44	0.24	1.00						
tr	0.27	-0.52	0.92	0.16	1.00					
hc	-0.41	-0.02	0.37	-0.16	0.28	1.00				
fd_m2	-0.64	0.48	0.11	-0.44	0.07	0.72	1.00			

fd_cr	0.48	-0.52	0.34	0.48	0.27	-0.20	-0.49	1.00		
inv	0.53	-0.40	0.05	0.32	-0.06	-0.17	-0.37	0.48	1.00	
op	0.00	-0.16	0.28	0.18	0.27	0.25	0.19	0.34	0.07	1.00

Source**:** Estimates based on basic data set.

The former however, was used in the analysis because it has been used in most previous studies on Tanzania and pre-test revealed it increased the explanatory power of the estimation model. Notable also, as expected economic growth is positively but very weakly correlated with the degree of openness (op) of the economy; and, unexpectedly negatively correlated with the measure of human capital (hc). The latter is a finding that also appears in some of the previous studies on Tanzania, for example Mtui (2015).

Notable, real economic growth is only positively correlated with the alternative measures of financial deepening (f_cr) and fiscal policy action (g_GE) (Table 2). Some of the prospective explanatory variables, including fd_m2 and tr were highly correlated with the key variables of the estimation model, namely hc and ge and thus dropped from the analysis to avoid likely multi-collinearity problem in the analysis.

The unit root test by ADF suggests the (natural logarithm of) all variables, except the growth in real government expenditure (g_GE), were not stationary in level but integrated of order one (I(1)) in first differences (Table 3). This finding suggests fulfillment of the required condition for an estimation of the conditional ECM based on the ARDL cointegration technique presented by Pesaran, Shin and Smith (2001).

Table 3: ADF Unit Root Test Results

Variable	Variables in Level				Order of Integration	Variable in First Difference				Order of Integration
	tau statistic	1%	5%	10%	I(1)	tau statistic	1%	5%	10%	I(0)
g	-3.199	-3.571	-2.922	-2.599	I(1)	-10.667	-3.571	-2.922	-2.599	I(0)
π	-1.948	-3.571	-2.922	-2.599	I(1)	-7.901	-3.574	-2.924	-2.600	I(0)
ge	-1.138	-3.568	-2.921	-2.599	I(1)	-6.461	-3.571	-2.922	-2.599	I(0)
g_GE	-0.994	-3.568	-2.921	-2.599	I(0)	-8.205	-3.571	-2.922	-2.599	I(0)
hc	-1.980	-3.568	-2.921	-2.599	I(1)	-7.617	-3.571	-2.922	-2.599	I(0)
fd_m2	-1.093	-3.568	-2.921	-2.599	I(1)	-6.036	-3.571	-2.922	-2.599	I(0)
fd_cr	-3.203	-3.571	-2.922	-2.599	I(1)	-9.659	-3.574	-2.924	-2.600	I(0)
inv	-5.388	-3.578	-2.925	-2.601	I(1)	-8.252	-3.578	-2.925	-2.601	I(0)
op	-2.336	-3.571	-2.922	-2.599	I(1)	-5.519	-3.571	-2.922	-2.599	I(0)

Source: Estimates based on basic data set.
Notes: Test include a constant term but not trend.

ARDL Cointegration Results

A priori, results of cointegration test by bounds testing technique proposed by Pesaran *et al*. (2001) are presented in Table 4. The estimated F-statistics for all except two equations F_{hc} andF_{ge}, are larger than the upper bound critical value of 3.83 at the 5% level of significance test. In general, the results rejects the null hypothesis that that all long-run parameter estimates in equation (2) are

equal to zero, that is, $\alpha_1 = \alpha_2 = \theta_i = 0$. In particular, the F-statistics in Table 4 suggest the variables of the estimation model were cointegrated.

Table 4: F-Test Statistics for Cointegration

Normalized Equation	F-Statistic	Critical level	Bound	Critical Values
$F_g \mid (...)$	5.640*	1%	I(0)	3.88
$F_\pi \mid (\ldots)$	5.618*		I(1)	5.30
$F_{ge} \mid (\ldots)$	3.332**	5%	I(0)	2.72
$F_{hc} \mid (\ldots)$	2.202		I(1)	3.83
$F_{fd\_m2} \mid (\ldots)$	4.071*	10%	I(0)	2.17
$F_{inv} \mid (\ldots)$	7.577*		I(1)	3.19
$F_{op} \mid (\ldots)$	1.133			

Source: Estimates based on basic data set.

Note: The bounds test statistics for upper (I(1)) and lower ((I(0)) tests are from Pesaran & Smith (2004), Table C1, p. 300.

The results also indicate there are more than one cointegrating equations, including the basic equation ($F_g \mid (...)$) of the study. This finding suggests estimation of the long-run equation (3) will not lead to spurious regression results.

Empirical Results of the Long-run Model

Table 5 presents the long-run ARDL (1,0,3,1,2,0,2) regression results normalized by the coefficient of the one period lagged rate of economic growth based on equation (2). The overall model estimated is considerably powerful: the R^2 suggests about 80% of the variation in real economic growth is explained by the chosen regressors; and, the $F-statistic$ is high and statistically significant at the 1% test level.

The estimated long-run elasticity of government size (ge) with respect to the rate of economic growth is unexpectedly negative but is statistically significant at the 5% test level and is very small (about 0.03 in absolute terms): a unit increase in ge over the long-run will lead to less than proportionate (-0.03) decrease in economic growth. The finding, in general suggests either fiscal expansion or adjustment exerted a weak but a statistically significant negative effect on real economic growth in Tanzania during the sample period. The negative effect of government size on economic growth over the long-run is consistent with results obtained, among others, by Muse, Olorunleke, and Alimi (2013) in a study on Nigeria.

Table 5: ARDL (1,0,3,1,2,0,2) Results for Estimated Long-run Economic Growth Model

Variable	Coefficient	s.e	t-Statistic
Constant	-0.149	0.091	-1.580
ge	-0.030*	0.013	-2.284
π	-0.062	0.053	-1.166
hc	-0.012*	0.009	-1.282
inv	0.025***	0.014	1.786
fd_m2	0.007*	0.003	2.694
ope	0.004	0.015	0.266
$Dummy$	-0.027*	0.012	-2.225

R^2	0.795
$\bar{R}^2$	0.714
S.E.R	0.013
SIC	-5.605
F-stat.	9.834*
DW stat.	1.985

Source: Estimated by authors.
Notes: *, **, and *** denotes significance level at 1%, 5% and 10%, respectively.

Notable, first, unreported results for the basic model estimated with either growth in real government expenditure or ratio of revenues to the GDP were not superior: the explanatory power of the model is lower, the respective parameter estimates and that of some of the regressors were statistically insignificant at the conventional test levels.[12] This finding suggests superiority of the ratio of real government expenditure to real GDP over competing proxy variables in the literature. Second, the estimated long-run parameter for the structural break dummy in fiscal policy regime is statistically significant at the conventional test levels. This finding suggests change in fiscal regime in the country since 1992 had a significant adverse effect on the long-run relationship between economic growth and government expenditure, among others. Specifically, the negative and statistically significant structural break parameter suggests the fiscal adjustment from fiscal expansion in Tanzania impacted adversely on economic growth in Tanzania.

The rest of the long-run regression results in Table 5 shows inflation has the expected negative effect on economic growth but is not statistically significant over the long-run period. The results further show that human capital has an unexpected negative effect on economic growth but statistically significant at the 1% test level. The negative effect of human capital on economic growth in Tanzania is similar to that obtained by Mtui (2015) in a study on Tanzania and Aregbeyen (2007) in a panel study of 40 African countries; and, is inconsistent with Calamitsis, Basu and Ghura (1999) which obtained a positive effect on growth in a study that covered a panel of sub Saharan African countries for the period 1981–1997.

Moreover, the results show the effect of domestic investment on economic growth over the long-run period is positive and statistically significant at the 10% test level. The estimated elasticities of domestic investment with respect to economic growth is also very small (0.025), suggesting a very poor responsiveness of growth to domestic investment in Tanzania during the sample period. The effect of financial sector deepening has the expected positive effect on real economic growth which is statistically significant at the 1% level of significance test. However, the elasticity of the financial deepening is very small: a unit change in financial deepening will lead to just about proportionate (0.007) growth in real income. The positive and statistically significant effect on growth of financial sector deepening is consistent with results obtained by some previous studies on Tanzania, for example Nkoba (2008). It is also worth to note that the degree of openness has the expected positive sign but it is not statistically significant at the conventional test levels. Notable, however, the positive effect of openness on growth is consistent with results obtained by some studies on openness and economic growth in sub-Saharan Africa (SSA), for example, Kehol (2017). The coefficient of the structural break is negative signed and statistically significant at the 5% level of significance test. This suggests change in fiscal regime in 1992 caused a negative effect on economic growth during the sample period. The negative effect of the shift in fiscal

[12] The mentioned results have not been reported here in order to economize on space.

regime could be in support of observation by Fofack (2010) that fiscal adjustments (by expenditure switching and reducing) engendered deep and broad economic costs in SSA.

The Results of the ECM

Estimation of the ECM *a priori*, involved choice of the most appropriate lag length of the regressors. Even though Narayan (2004) suggest two lags are ideal for annual time series data, minimal values of both SBC and standard error of the estimated equation (see) suggested use of three lags as a benchmark that were reduced on case by case basis depending on the level of significance and effect on the SIC as well as the overall explanatory power of the estimated model.

The results of the basic model presented in Table 6 shows that about 79% of the variation in economic growth is explained by its determinants; and, the related F-statistic is about 4.621 and very statistically significant. Both statistics suggest the estimated model was powerful. The regression results in Table 6, first, show that the coefficient of the contemporaneous and three-period lagged government expenditure are, respectively, statistically significant at the 5% and 10% levels of significance test. However, the contemporaneous effect of government expenditure on economic growth is unexpectedly negative. Moreover, the effect of government expenditure (as a share of GDP) on economic growth is relatively larger over the short-run: a unit change in ge will decrease economic growth by 0.043 unit, compared to 0.006 over the long-run. The unexpected negative effect of government size on economic growth in Tanzania over the short-run is inconsistent with findings of some previous studies, for example, Garba and Abdullah (2013) in the case of Nigeria, it is consistent with findings of study by Yovo (2017), Devarajan, Swaroop and Zou (1996), Ghura and Hadjimichael (1996), and Ojo and Oshikoya (1995).

Table 6: Results of the ECM Estimates

Variable	Coefficient	t-Statistic	Prob
$Constant$	0.003	0.309	0.760
$\Delta g\ (-1)$	-0.052	-0.325	0.748
$\Delta g\ (-2)$	-0.259***	-1.726	0.097
Δge	-0.043**	-2.407	0.024
$\Delta ge(-1)$	0.006	0.378	0.709
$\Delta ge(-2)$	-0.012	-0.758	0.456
$\Delta ge(-3)$	0.031***	1.951	0.063
$\Delta\pi$	0.067	1.317	0.200
$\Delta\pi\ (-1)$	-0.025	-0.475	0.639
$\Delta\pi\ (-2)$	-0.081	-1.697	0.103
$\Delta\pi\ (-3)$	-0.100**	-2.295	0.031
Δhc	-0.017**	-2.127	0.044
$\Delta hc\ (-1)$	0.016***	1.920	0.067
Δinv	0.066*	4.564	0.000
$\Delta inv\ (-1)$	0.014	0.941	0.356
$\Delta inv\ (-2)$	0.024***	1.781	0.088
Δfd_m2	0.021	0.552	0.586
$\Delta fd\_m2(-1)$	-0.027	-0.764	0.452
Δop	-0.015	-0.920	0.367

$\Delta op\ (-1)$	0.017	1.022	0.317
$EC\ (-1)$	-1.318*	-4.585	0.000
R^2			0.794
$\bar{R}^2$			0.622
S.E.R			0.013
SIC			-5.619
F-stat.			4.621*
DW stat.			1.967

Source: Authors estimates.

Notes: a) *, **, and *** denotes significance level at 1%, 5% and 10%, respectively and 'Δ' denotes first difference operator.

b) Figures in parentheses are t-statistics.

The short-run estimation results in Table 6 also show the estimated coefficients on inflation rate and its three lags are, as expected, negative signed but only that on three-period lagged coefficient is statistically significant at 5% test level. This finding is unexpected. Moreover, the results shows that the short-run effect of one-period lagged human capital on economic growth is positive as expected and is statistically significant at the 5% test level. This negative effect of inflation on growth is consistent with that obtained by some previous studies on Tanzania, for example, Mtui (2015) and also Aregbeyen (2007) in a panel study of 40 African countries. The finding of the study is, however, inconsistent with the finding obtained by Calamitsis, Basu and Ghura (1999) in a study that covered a panel of sub Saharan African countries for the period 1981–1997.

The results in Table 6 further show that the coefficient on contemporaneous measure of human capital is negative signed and statistically significant at 5% test level of significance; and, its one-period lagged the coefficient is positive and statistically significant at the 10% test level. Moreover, the contemporaneous and two-period lagged coefficients on investment are positive as expected and respectively statistically significant at the 1% and 10% test levels. The estimated parameter suggests a unit increase in investment spending over the short-run would only increase real economic growth by a small proportion (about 0.07), *ceteris paribus*. The results also show the estimated short-run coefficients on both contemporaneous and lagged measures of financial depth and the degree of economic openness are not statistically significant at the conventional test levels.

The insignificance of economic openness on economic growth over the short-run is inconsistent with results obtained by some of the previous studies, among others, Khungwa (2007) in a study on Malawi and by Anaman (2006) in the case of Ghana. It appears that the insignificant effect of openness on economic growth in Tanzania during the sample period could be attributed to poor performance in exports relative to imports during the sample period. Also notable the short-run coefficient on the structural break variable is again very statistically insignificant. Again, this suggests lack of a significant fiscal policy based structural break in the model over the short-run period.

Results in Table 6 show the coefficient on the one-period lagged error term is negative signed as expected and is statistically significant at the 1% test level. This finding first, affirms existence of a long-run equilibrium established by use of the F-statistic for cointegration test. Second, the size of the coefficient of the one-period lagged error term suggests that short-run disequilibrium in real economic growth would expressly be corrected, by more than proportionate change (about 1.132)

over one year period. This finding further suggests the response of adjustment of disequilibrium in economic growth during the sample period was very strong.

CONCLUSION AND IMPLICATIONS

This paper has established the effects of fiscal expansion and adjustment on economic growth in Tanzania. The analysis was based on an endogenous growth model that accommodates growth conditioning variables in the literature that are most relevant to Tanzania over the sample period. Both cointegration test by using Autoregressive Distributed lag (ARDL) bound test technique and estimation of an error correction model were carried out by using annual time series data for the period over 1967–2016.

The long-run results estimated by using the ARDL bound testing technique showed government expenditure had a very small statistically significant negative effect on economic growth during the simple period; and, its effect over the short-run was positive, small and lagged over a period of three years. As regards growth conditioning factors, the results revealed inflation had theoretically correct significant effect on economic growth over the long-run. Moreover, the results revealed the long-run effect of domestic investment, financial deepening, and economic openness on economic growth was positive and statistically significant. The results also suggested shift in fiscal policy regime exerted a negative and statistically significant effect on economic growth in Tanzania during the sample period: it was more apparent than real.

Generally, the findings of this study underscore importance of fiscal prudence, particularly in government expenditure if economic growth is to be realized. The conventional importance of the fight against inflation is emphasized by its negative effect on economic growth established by this study. Moreover, the positive effect of domestic investment, degree of economic openness, and financial depth on growth over the long-run augurs for provision of macroeconomic environment that would enhance their positive effects in the performance of the economy.

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Appendix I. ARDL Results for Estimated Long-run Economic Growth Model (different lag length)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.144	0.091	-1.580	0.124
ge	-0.029	0.013	-2.284	0.029
π	-0.019	0.057	-0.329	0.744
$\pi\ (-1)$	0.015	0.058	0.257	0.798
$\pi\ (-2)$	-0.107	0.051	-2.106	0.043
$\pi\ (-3)$	-0.128	0.048	-2.664	0.012
hc	-0.012	0.009	-1.282	0.209
inv	0.043	0.014	3.104	0.004
$inv\ (-1)$	0.005	0.014	0.375	0.710
fd_m2	0.007	0.003	2.694	0.011
op	-0.020	0.015	-1.314	0.198
$op\ (-1)$	0.028	0.016	1.742	0.091
$Dummy$	-0.026	0.012	-2.225	0.033
R-squared	0.795	Mean dependent var		0.044
Adj. R-squared	0.714	S.D. dependent var		0.024
S.E. of regression	0.013	Akaike info criterion		-5.605
SSR	0.006	Schwarz criterion		-5.054
Log likelihood	145.723	Hannan-Quinn criter.		-5.398
F-statistic	9.834	Durbin-Watson stat		1.985
Prob(F-statistic)	0.000			