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Econometric Analysis of the Impact of Taxes on Private Investment in Sub-Sahara Africa

William Albert Babu[*], Innocent M. Pantaleo[**], and Michael O. A. Ndanshau[**]

Abstract

This study examines the impact of taxation and other macroeconomic factors on private investment in sub-Saharan Africa, taking the case of East African Community (EAC) and Southern African Development Community (SADC) countries. By estimating a dynamic neo-classical investment model for developing countries using One-Step Difference GMM, the empirical results indicate that corporate income tax (CIT) and Value Added Tax (VAT) have significant and negative effect on private investment. The results also show that real interest rate is an important factor that explains the level of private investment in the EAC and SADC countries. Credit to private sector, though found to be statistically significant, the results suggests its effect is unexplainably negative and inconsistent with economic theories. The study finds no evidence, however, on the impact of personal income taxes, real Gross Domestic Product (GDP) growth rate, nominal exchange rate and inflation rate on private investment. On the policy front, the study findings indicate that, governments from the two economic blocs need to consider lowering the corporate income tax and VAT tax rates if they are to promote and attract more private investments. Lowering interest rates through the monetary policy channel is also recommended to make their economies more attractive to potential investors.

Key Words: Budget deficit, inflationary finance, inflation, Taxation, Private Investment, Sub-Saharan Africa

JEL: E31, E42, E620

[*]Ministry of Finance and Planning, P.O.Box 2802, Dodoma, Tanzania: E-mail: williambabu86@gmail.com.

[**] Department of Economics, Mwalimu Nyerere Main Campus, University of Dar es Salaam,innopanta@yahoo.com and michaelndanshau@gmail.com (as correspondence author).

1. Introduction

In the course of countries' economic growth, investment plays an essential role in raising productivity by providing for use of new production techniques, stimulating innovation and encouraging development including technology transfer. Investment also plays an enormous role in employment creation thereby making it an important vehicle for economic growth and development (Ahuja and Chand, 2007). Overtime, developing countries have recognized the crucial role played by private investment in promoting economic growth and development.

However, most Sub-Saharan African (SSA) countries for the past fifteen years have experienced growth rates that have been erratic, ranging from an average of between negative 0.1 and 7.4 percent, with an exception of Ethiopia, which had an average growth rate of 10 percent. Specifically, some SADC countries have experienced negative growth rates of up to 6.3 percent per year, being the lowest to be reached by the Seychelles in 2003.[1] In 2017, for example, growth rates in most SADC countries remained positive but below 7.1 percent, which was the highest growth rate attained by Tanzania. The lowest growth rates were recorded by Angola, which had an annual growth rate of negative 2.5 percent, Lesotho had negative 1.7 percent and Namibia recorded negative 0.8 percent.

Investment levels in the two economic regions have also been relatively low characterized by mixed trends. During the sample period, the highest average private investment to GDP ratio was recorded in Zambia at 34.9 percent, while the lowest average rate was 11.3 percent in Eswatini followed by 12 percent in the Democratic Republic of Congo (DRC) and 13.4 percent in Malawi that were below the thresholds of minimum rate of 15 percent and a maximum ratio of 25 percent or above that Gillis *et al*. (1996) consider necessary for attainment of sustainable rates of economic growth and Oshikoya (1994) considered insufficient to replace depreciated capital.

Given linkages between the level of private investment and the rate of economic growth as documented by Ndikumana (2000) and Oshikoya (1994), countries have been competing to improve business and policy environments so as to attract more investments by implementing macroeconomic policies and strategies targeted to address governance issues, develop socio-economic infrastructure, foster development of a market economy and macroeconomic stability. In fiscal policy context, from the 1980s, several countries in the EAC and SADC have been reducing tax burdens on private sector in order to promote trade and investment by the private sector and as a result, they elicit high and sustained rates of economic growth that would make a dent on poverty (Pfister, 2009).

The main objective of this study was to investigate empirically, responsiveness of the private sector investment to fiscal policy actions and practices by the governments in EAC and SADC

[1] World Bank Database (World Development Indicators), 2019.

countries. Specifically, the analysis targeted to establish effect of different types of taxes on private investment in EAC and SADC countries; and in relation, the study sought to examine the impact of other macroeconomic factors on private investment in EAC as well as SADC countries. This study has some value addition. First, there is a dearth of empirical studies on effect of taxation on private investment in the two regions in SSA, for example, on a few studies like those on Nigeria by Nwokoye and Rolle (2015)as well as Njuru *et al*. (2013) in the case of Kenya. Second, and even more significant, taxation is not one of the fore factors included in country-specific and cross-country private investment models estimated for the SSA countries (Ade *et. al.*, 2017; Asiedu, 2002).[2] However, on account of maintained existence of a positive impact of private investment on economic growth in an economy, the analysis sheds light on extent to which tax regime could serve as an instrument for enhancing the impact of private sector investment on economic growth in the EAC and SADC member states. Nonetheless, the paper also adds to literature on taxation and investment in these countries.

Apart from this introductory section, the rest of this paper is organized as follows: Section 2 gives an overview of private investment in the selected SSA countries; Section 3 presents study methodology; Section 4presentsdiscussion of empirical results; and Section 5 provides conclusion, policy implications of the study and proposed areas for future research.

2. Background

Most Sub-Saharan Africa(SSA) countries experienced decline in economic growth during the late 1970s and in early 1980s. For the period from 1973 to1980, economic growth per capita fell from 0.4 percent per annum to negative 1.2 percent per year in from 1980 to1989.[3] Gross Domestic Product (GDP) in SSA countries fell substantially during the 1980s and remained depressed across the region. Average GDP growth rate during 1980to1990 in selected SSA countries was 3.96 percent. Table 1 shows that for the periods between 1980 and89 as well as1990 and99, the average GDP growth rates in SSA, instead of rising, they remained very small and they fell in some countries (for example, Kenya, Rwanda and Zambia).In Tanzania, the rates of economic growth grew slightly from 2.2 percent to 3.3 percent; and in Uganda, from 3.0 to 6.8 percent (Table 1). During these periods, countries were also characterized by high inflation rates with the highest average rate recorded in Zambia at 76.19 percent in the period from 1990 to99.

Because of such slow growth, the International Monetary Fund (IMF) and the World Bank advocated for introduction of Structural Adjustment Programs (SAPs) in the region in mid-1980s. The reforms, among others, aimed at promoting growth of investment and the private sector to ensure sustainable long-term growth. However, right after adoption and implementation of the reforms, economic growth rates remained depressed due to weak implementation and

[2] For some of such studies on private investment in the SSA countries, see studies on Tanzania by Kilindo (2016) and Aikaeli and Michael (2014); study on Ghana by Asante (2000); and, a cross-country study by Ndikumana (2000).

[3] See World Bank Development Report, 1991.

macroeconomic uncertainties that prevailed in the period. In the period from 1990 and1999, average economic growth rates in Tanzania were 3.3 percent, in Kenya 2.2 percent, in Rwanda 1.8 percent and in Zambia 1.3 percent. From 2000s, the economies started to respond positively to the relatively favorable macroeconomic policies. The growth rates started to improve and inflation rates started to fall. In the period from 2000 to2004, the growth rates for the selected countries improved whereby in Tanzania, growth averaged 6.7 percent, in Uganda 6.1 percent and in Zambia 5.5 percent.

For the period from 2010 to2017, growth rate in these countries averaged 4.64 percent, which is still below the desired rate of at least 7 percent for them to attain sustainable long-term growth as suggested by the United Nations (UN) through Sustainable Development Goals [(SDGs)UN, 2015]. Kim (2018) argued that without special emphasis on enhancing development progress of these countries, the prospects of achieving the SDGs and leaving no one behind, will be very restricted. Efforts to promote private investment so as to stimulate growth have to be taken to ensure average growth for each country stands above 7 percent in order to ensure sustainable long-term growth. Table 1 shows average values of some macroeconomic variables for the selected countries for the period from 1980 to2017.

Table 1: Trends in GDP Growth Rate and Inflation Rate in Selected Countries (%)

Year	Tanzania		Kenya		Uganda		Rwanda		Zambia	
	GDP Growth rate	Inflation Rate	GDP Growth rate	Inflation Rate	GDP Growth rate	Inflation Rate	GDP Growth rate	Inflation Rate	GDP Growth rate	Inflation Rate
1980-89	2.20	28.90	4.20	11.80	3.00	-	3.20	4.69	1.40	69.32
1990-99	3.30	23.12	2.20	17.42	6.80	29.00	1.80	8.62	1.30	76.19
2000-04	6.70	5.12	2.60	7.82	6.10	3.47	7.90	5.79	5.50	21.81
2005-09	6.40	8.24	4.60	13.99	8.20	9.39	8.70	11.06	8.10	12.77
2010-14	6.73	9.77	6.06	7.99	5.51	8.24	7.25	4.28	6.64	7.26
2015-17	7.01	5.36	5.49	6.96	4.61	5.50	6.97	5.99	3.36	11.52

Source: World Development Indicators, 2019.

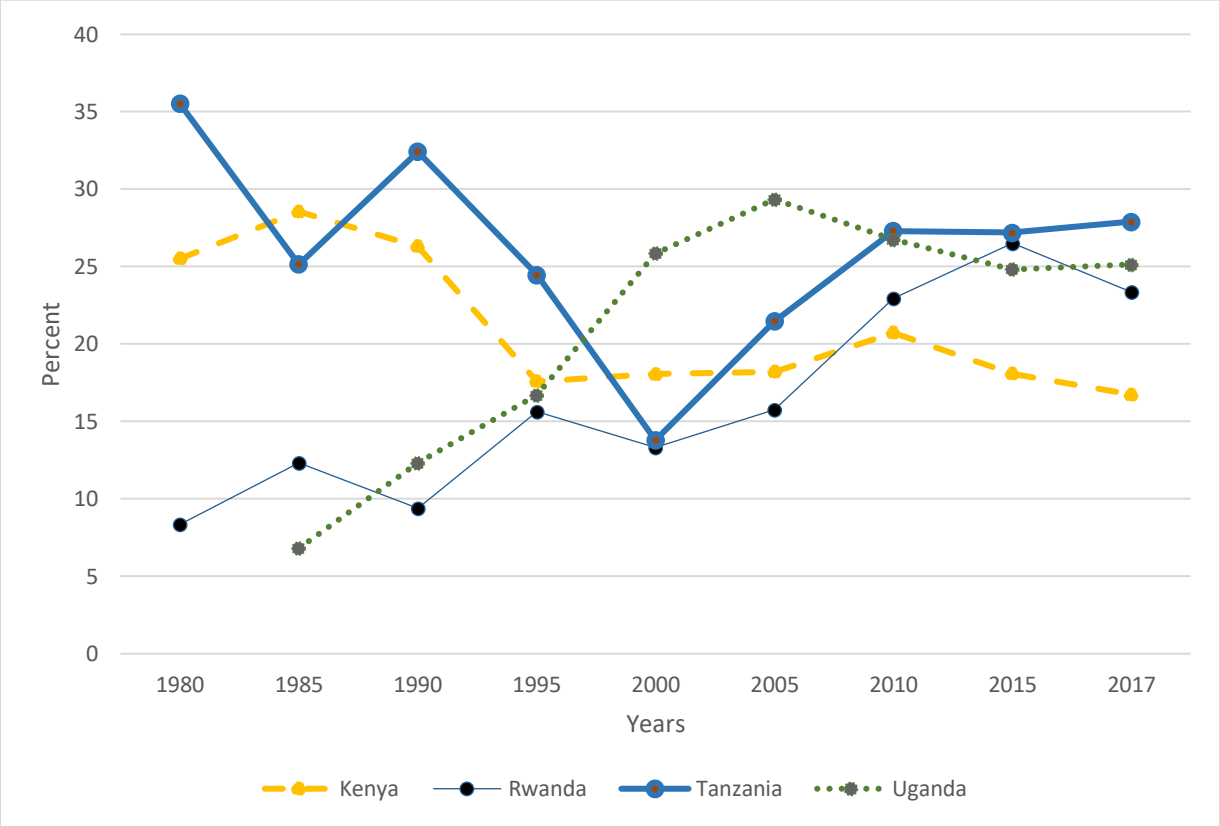
Figure 1 and Figure 2 show investment ratio to GDP fell during the 1980s mainly, due to drought as well as both oil and macroeconomic crises that hit most of the SSA countries. In Tanzania, for example, investments fell following the Kagera war and the economic crises of the 1980s. Similarly, severe droughts and poor terms of trade in Malawi led to an average economic growth of 1.06 percent between 1980 and 1983.

Implementation of structural adjustment programs appear to have improved the level of investment and economic growth in the SSA countries since the 1980s. Investment as a share of GDP fell from 35.5 percent in 1980 to 25.1 percent in 1985 and further to 13.8 percent in 2000 in Tanzania (Figure 1). In Kenya, the same declining trend was observed as investment and as a share of GDP, fell from 28.5 percent in 1985 to 26.3 percent in 1990 to 18.0 in 2000. However, the fact that economic growth remained low since the late 1980s through the 1990s probably resulted from macroeconomic uncertainties that prevailed in the period (Oshikoya, 1994).

Improvements in investment levels that were observed from the 2000s could be due to efforts taken by the SSA countries in ending their deadly hostilities and conflicts; improving macroeconomic conditions and policies; and undertaking microeconomic reforms to create better business climate.

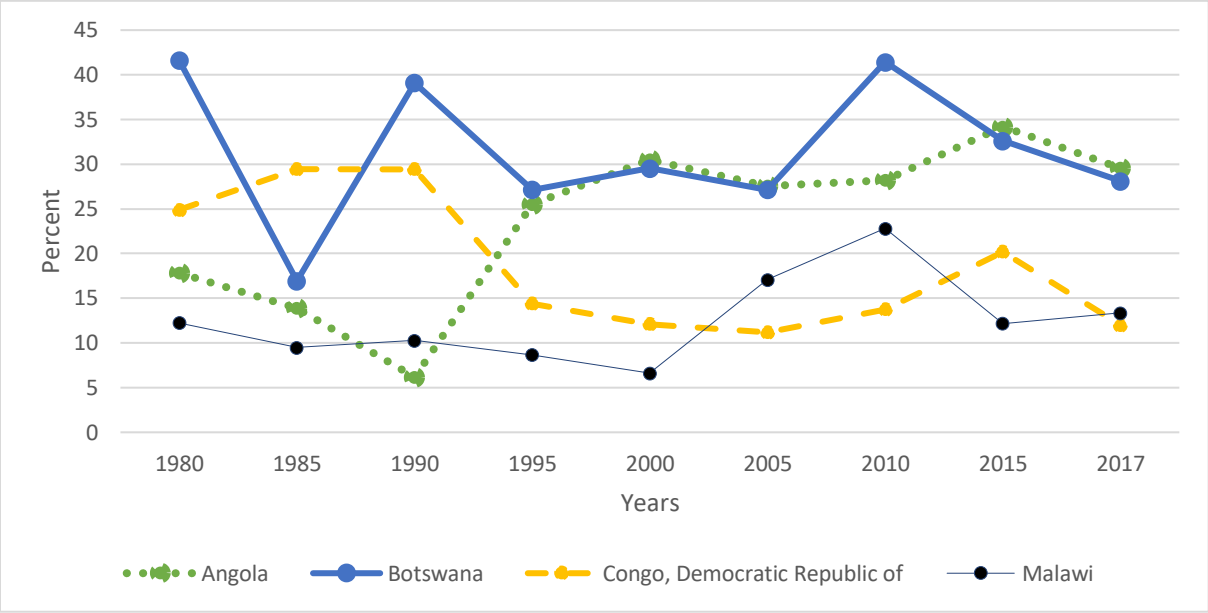
In the EAC bloc, investment in Uganda exhibited an upward trend in the period from 1985 to2000. However, during the period from 2010 to2015, investment as a share of GDP in the selected four East African countries had a slight downward trend with that of Kenya falling from 20.7 percent in 2010 to 16.7 percent in 2017.

Figure 1: Investment Trends in Selected East African Countries (share of GDP)



Source: International Financial Statistics, Database and authors' computations.

Figure 2: Investment Trends in Selected Southern African Countries

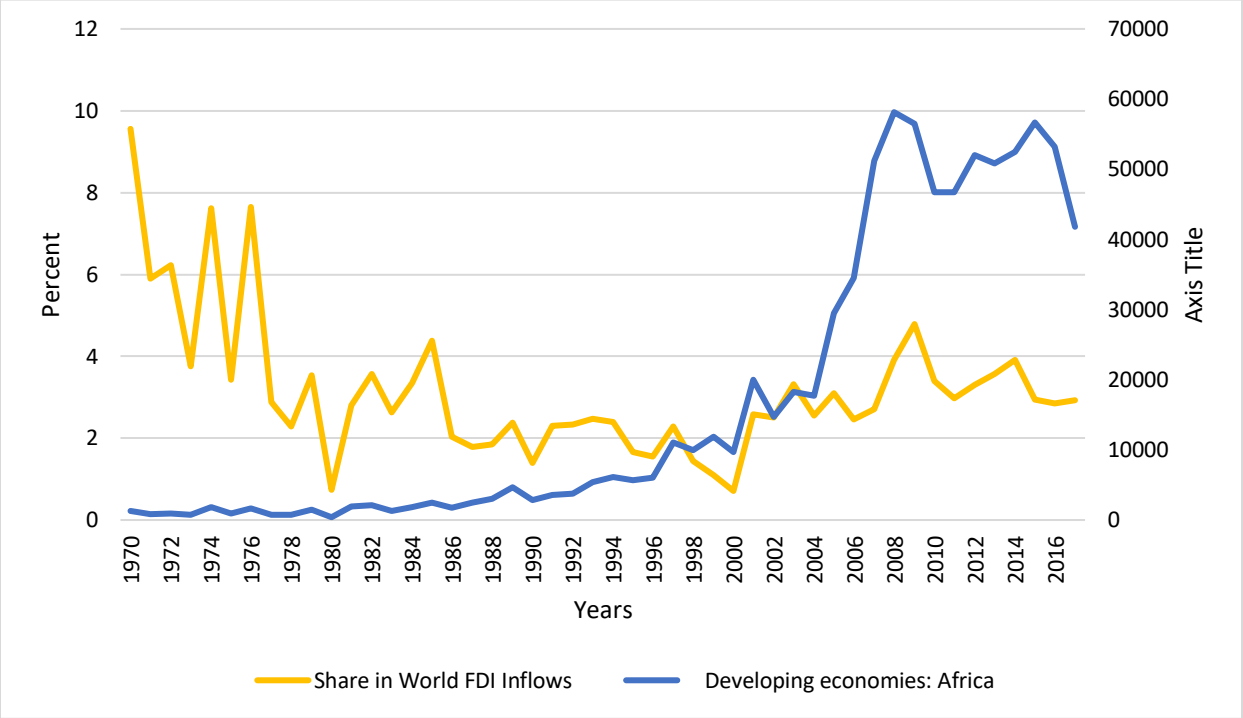


Source: International Financial Statistics, Database and authors' computations.

Figure 2 also shows investment trends in the four SADC countries covered by the study and shows also had mixed trends. Between 1980 and 1985, Botswana, Angola and Malawi had downward investment trends with Botswana having a sharp fall from 41.6 to 16.9 percent, Angola from 17.8 to 13.9 percent and from 12.3 to 9.5 percent in Malawi. In contrast, the Democratic Republic of Congo(DRC) had an upward trend in that period. Output expansion in the DRC during the period was due to increased revenues from oil (Bhattacharya and Ghura, 2006). From 2010, Botswana had a downward trend with the share falling from 41.4 to 28.1 percent in 2017. In Malawi, the share fell from 22.8 to 12.1 and then it rose slightly to 13.5 percent in 2017.

Evidences show that Foreign Direct Investment (FDI) to Africa have been rising since the 1990s (Ndikumana and Verick, 2008). The increase in FDI to SSA, mainly has been targeting natural resources sectors although the levels are still low compared to other developing regions. The increase in capital inflows to the SSA since 1990s mainly has been due to improvement in macroeconomic policies (Hansen and Rand, 2006).

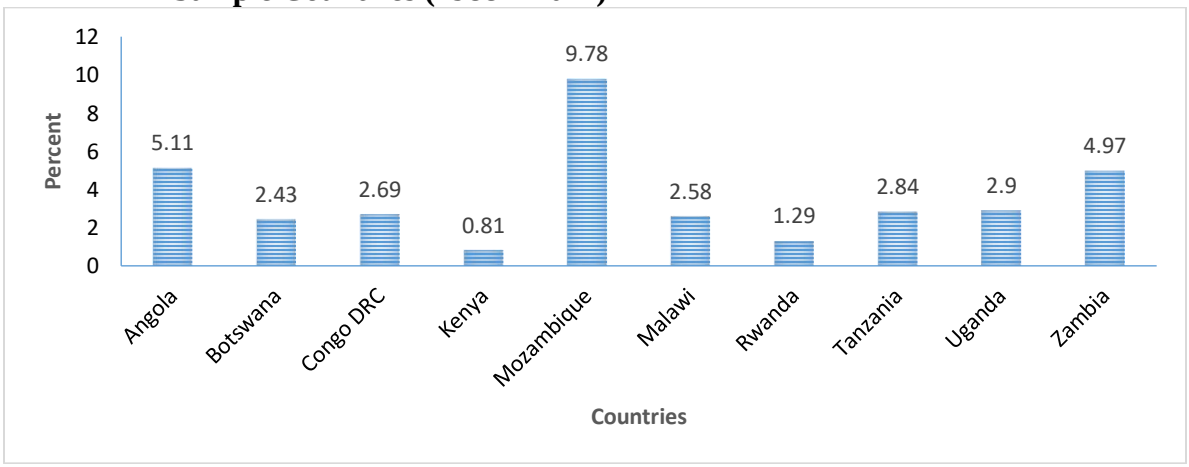
Figure 3: FDI to Developing Economies (Africa): Volume and Share in World Inflows (1970 - 2017)



Source: UNCTAD, FDI online database.

Figure 3 shows the trend of FDI inflows to developing economies in Africa compared to its share in the world inflows. As evidenced by the graph, FDI inflows to SSA region have been on the rise since the 1990s although there has been a slight decline from 2015 to 2017. The increase could be attributed to improved macroeconomic policies and other efforts made to attract FDI. The decline from2015 could be due to low level of commodity prices that impacted on resources seeking FDI, which are predominant in Africa (UNCTAD, 2017).

Figure 4: Average Foreign Direct Investment inflows (% of GDP) in the Selected Sample Countries (1988 – 2017)



Source: World Development Indicators (WDI) Database, 2019.

Figure 4 presents cross-country differences for the period from 1988 to2017.On average, foreign direct investment inflows (% of GDP) reveal significant variations across the selected countries (Figure 4). The countries with the highest FDI to GDP ratio are Mozambique (9.78 percent) and Angola (5.11 percent). The high ratios for Angola and Mozambique represent recent investments in natural resources, especially in oil, gas and minerals. On the other hand, DRC and Tanzania that have large reserves of natural resources have surprisingly lower ratios (2.69 percent and 2.84 percent, respectively). Rwanda and Kenya have the lowest average ratios with that of Kenya being below 1 percent.

It is noteworthy that the trend in both domestic and FDI does not appear to follow the trend of taxes, mainly composed of direct and indirect taxes, in the EAC and SADC member states.[4]Nonetheless, the sampled countries in the SSA have been engaged in a fierce competition over corporate income tax (CIT) in efforts to attract private investment. Compared to the 1980s, tax incentives at present are widely used, for many countries offer tax holidays to attract investment. Establishment of Export Processing Zones (EPZs) and Special Economic Zones (SEZs) offering tax holidays has also become a common practice. In Tanzania, for instance, new investments established in the EPZs with a capital of United States of America dollars (USD) 500,000 for foreign companies and USD 100,000 for local companies are granted 10 years exemption from paying corporate taxes. In Kenya, a 10 years corporate tax holiday is granted with a 25 percent rate for the next 10 years. Rwanda charges a preferential corporate tax rate of 0 percent to international companies, which have headquarters in Rwanda, provide employment to Rwandans and have invested at least USD 10 million.

Suffice it to note that if the tax incentives in developing economies are not well coordinated, they will not necessarily translate to increased investments and improvement of the business environment as aspired (Chai and Goyal, 2008).Despite reforms that have been undertaken from the 1980s, most countries in the SSA region still have complex tax systems. Fjeldstad and Rakner (2003) show that in some countries, for example, tax laws are unclear and while there are no consulting mannuals, tax enforcers have also been granted too much discretionary powers to execute their duties. However, some countries have succeeded in formulating tax regimes that are investment friendly with Rwanda and Botswana providing promising examples. Botswana also boasts herself with the most comprehensive and simple tax regime in the world (Chai and Goyal, 2008). It has the lowest corporate tax rate (15 percent) in the SADC and EAC regions.

[4] The direct taxes include individual income taxes (for example, Pay as You Earn (PAYE)), corporate taxes, taxes on rental incomes, withholding taxes, taxes on interests charged in banks, and presumptive income taxes. The indirect taxes consist of consumer taxes on domestic goods and services (such as value added tax (VAT)), and excise duty on demerit goods (For example, on beer and cigarettes). Furthermore, indirect taxes also consist taxes on international transactions like import duties, VAT on imports, and excise duties on particular imported goods such as beer and cigarettes. Generally indirect taxes are the main sources of tax revenues in the SSA countries.

3. Methodology

3.1 The Estimation Model

Generally, there is no one accepted model of investment processes that fits all economies. On this account, a theory informed estimation model that suits the macroeconomic environment in SSA was developed. The basic model estimated builds on the Neo-classical model developed by Jorgenson (1963) as well as Hall and Jorgenson (1967) but modified to include relevant variables, which fit the scope and context of this study in EAC and SADC countries. The estimation model reads as follows:

$$PI_{i,t} = \alpha_j X_{i,t}^{j} + \alpha_l Z_{i,t}^{l} + \delta PI_{i,t-1} + \alpha_i + \mu_{i,t} \quad (1)$$

Notable, equation (1) is almost similar to that used in some previous studies, for example, Ndikumana (2000) in a study on SSA countries. In the model, private investment (PI) is explained by two vectors. One is$X_{i,t}^{j}$, which is a vector of fiscal policy factors, namely, corporate tax (cit), value added tax (vat) and income tax (yt). The other is $Z_{i,t}^{l}$, which is a vector of macroeconomic factors that in theory are considered to condition private investment and are also relevant to SSA countries. Among others, it includes real economic growth ($rgdpgr$), inflation rate ($infl$), real interest rate (rr), nominal exchange rate ($exch$), and credit to private sector ($cred$) over the period ($t: t = 1,2, \dots, T$) in each specific country ($i = 1, \dots N$). Other specifics in equation (11) include the following: $PI_{i,t-1}$ is a one period lagged log of private investment; α_i is a country specific intercept; which allows for fixed effects; δ is a stability coefficient in the range $0 < \delta < 1$; $\mu_{i,t}$is a stochastic error term of country $i$and $\mu_{i,t} = v_t + \varepsilon_{i,t}$; and, vtdenotes an unobserved time-specific effects; and $\varepsilon_{i,t}$ is an idiosyncratic error term.

The *a priori* expectations from the estimation of equation (1) are thus: a) negative effect of taxation on private investment; b) positive effects of economic growth and credit to the private investment; and c) negative effect of macroeconomic instability on private investment. Specifically, high inflation rates, real interest rates and unstable exchange rates are expected to bear negative effect on private investments in Tanzania during the sample period.

3.2 Data Type and Sources

The study is based on an annual panel dataset of 255 observations from seventeen EAC and SADC countries covering the period from 2003 to 2017.[5] Four countries from the two economic blocs (Burundi and South Sudan from EAC and Comoros and Zimbabwe from SADC) were

[5] This study estimates the impact of taxation and other macroeconomic factors on private investment in seventeen Eastern and Southern African countries (Tanzania, Kenya, Uganda, Rwanda, Malawi, Angola, Mozambique, Zambia, the Democratic Republic of Congo (DRC) and Botswana. Other countries under this study are Seychelles, Lesotho, South Africa, Madagascar, Mauritius, Namibia and the Eswatini Kingdom) for a period of 15 years from 2003 to 2017 using dynamic panel data analysis.

dropped due to unavailability of data for most of the years in the sample period. The dynamic panel data model used captures better the impact of taxation on private investment than cross-section and time series analysis (Federici and Parisi, 2015; Vergara, 2004; Bustos *et. al.*, 2004). This is because, according to Bond (2002), a single cross-section survey can not provide enough information on prior time periods in examining dynamic relationships; and panel data also offer to examine simulteneity in adjustment dynamics between different countries, individuals, firms or households. Another reason for applying panel data analysis is due to the fact that in most of the selected countries, statutory tax rates do not change over time. Thus, applying time series analysis would not capture effects of tax rates on private investment. The period covered in this study was chosen by considering data availability.

Data were collected from different sources. Data on real interest rate, inflation rates and credit to private sector as a percentage of GDP were collected from the World Bank Database (World Development Indicators).The data on exchange rate and GFCF were extracted from the International Financial Statistics (IFS); and data on real GDP growth rate were obtained from the United Nations Conference on Trade and Development Statistics (UNCTADSTAT). The data on statutory tax rates were drawn from the KPMG tax tables and from EY Global Tax Guide reports. Where data on tax were missing, gaps were filled by extracting data from the tax statistics published by respective revenue authorities and other publications obtained from the sampled countries. The data sources used were singled out due to their credibility, reliability and accessibility.

3.3 The Definition and Measurement of Variables

The choice of dependent and independent variables used in this study took into account underlying economic theories and available empirical literatures on the impact of taxation on private investment in developing countries. Following IMF, Gross Fixed Capital Formation (GFCF) was used as a proxy for private investment (Lautier and Moreaub, 2012). Personal income tax was defined and measured conventionally because all taxes are charged on incomes earned in the sample countries. The value added tax (VAT), also known as consumption tax was defined and measured by relevant rates applied in the sample countries. Corporate taxes were defined as taxes charged by governments on business profits. Accordingly, statutory corporate tax rates as per revenue authorities and governments of the countries under study were used. Inflation, was measured as the first difference of the consumer price index (CPI). Exchange rate was measured as the nominal exchange rate of domestic currency of each country for a unit of the US dollar. Real interest rate was defined as the nominal lending rate adjusted for inflation. Credit to private sector was measured by commercial bank credit to the private sector in each country covered by the study. Real economic growth was measured by the rate of change of real GDP of each sample country.

3.4 Methods of Data Analysis

STATA (Vers. 14) and Microsoft Excel were used to analyse data. Analysis started with descriptive statistics, which give summary description of the data. In addition, LLC approach was used in stationarity test; and Shapiro Wilk and Shapiro Francia tests for normality were performed. Homoscedasticity of residuals were tested by using the White's test, while tests for autocorrelation of error terms and multicollinearity among variables were investigated by the Pearson and VIF tests, respectively. As long as the study used panel data with few time periods

and many individuals (countries) in estimating a single equation with autoregressive dynamics and endogenous independent variables, the Arellano-Bond Generalized Method of Moments (GMM) estimator was adopted. Use of GMM and not two-stage least squares (2SLS) or three-stage least squares (3SLS) is justified by the fact that 2SLS and 3SLS methods are particular cases of GMM (Roodman, 2009). GMM also takes care of simultaneity bias that may arise from existence of endogenous explanatory variables (Sevestre, 2002 as explained by Gui-Diby, 2014).[6]

However, GMM has two estimators, which are Difference GMM (Arellano and Bond, 1991) and System GMM (Arellano and Bover, 1995; Blundell and Bond, 1998). In deciding on whether to use either difference or system GMM, the study applied procedures developed by Bond (2002).[7]

To allow for delays between decisions to invest and actual implementation, and to avoid the possibility of simultaneity bias, the study included the first lags rather than contemporaneous values of the explanatory variables as discussed by Klemm and Van Parys (2009) as well as Ndikumana (2000).Post-estimation tests for serial correlation and validity of instruments used in the model were also carried out.

4. Estimation Results

4.1 Diagnostic Tests

A battery of tests was used to establish reliability of data for variables used in the analysis to produce efficient parameter estimates for reliable policy inference. To begin with, Pearson correlation test was used to establish existence or non-existence of a linear relationship between variables of the estimation model.

[6] The Generalized Method of Moments (GMM) estimation produces unbiased estimates. This is because GMM controls for endogeneity, omitted variable bias, and unobserved panel heterogeneity (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998; and Roodman, 2009).

[7] Bond (2002) says in deciding whether to use difference or system GMM, a study has to start by first estimating Pooled Ordinary Least Squares (POLS), followed by fixed effects and then first difference GMM. Furthermore, The Bond (2002) procedure says that, if the value of the coefficient estimate of the lagged dependent variable from the first difference GMM lies between the values of the coefficient estimates by POLS and within effects, then the study has to use Difference GMM, otherwise, System GMM has to be applied.

Table 2: Correlation Matrix for the Studied Countries

	gfcf	Cit	vat	yt	Exch	infl	rgdpgr	rr	cred
gfcf	1.000								
cit	0.182*	1.000							
vat	-0.259*	-0.145*	1.000						
yt	0.201*	0.394*	0.199*	1.000					
exch	-0.108	-0.179*	0.620*	-0.002	1.000				
infl	-0.025	0.180*	-0.123*	-0.181*	-0.023	1.000			
rgdpgr	-0.163*	0.188*	0.124*	-0.020	0.045	-0.066	1.000		
rr	-0.152*	-0.153*	0.288*	-0.193*	0.447*	-0.074	0.088	1.000	
cred	0.703*	-0.171*	-0.184*	0.154*	-0.275*	-0.226*	-0.264*	-0.227*	1.000

Source: Own estimations using STATA 14.
Notes: * significant at 5% level of significance.

Pearson's correlation test method suggests absence of strong multicollinearity problem: the highest correlation between paired regressors was 62 percent, that is, below the threshold level conventionally set at 80 percent. Absence of multicollinearity problem was confirmed by value of Variance Inflating Factor (VIF) test for multicollinearity, which was below 10, the conventional threshold size (Babu, 2019).

Table 3: Overall Descriptive Summary Statistics (EAC and SADC)

	GFCF (mill.)	**cit**	**vat**	**yt**	**exch**	**infl**	**rgdpgr**	**rr**	**cred**
Mean	8,130	30.350	15.373	29.65	450.446	9.058	5.087	9.719	29.867
Max	79,600	40	21	40	3611.224	98.224	15.029	51.286	160.125
Min	77	15	10	15	3.603	-2.405	-7.652	-17.158	0.796
Std. Dev.	15,300	5.420	2.634	7.099	794.515	8.861	3.125	10.597	34.902
Median	2,500	30	15	30	31.956	7.110	5.360	7.815	18.049
Skewness	3.104	-0.770	-0.267	-0.735	1.995	5.157	-0.485	1.376	2.336
Kurtosis	12.314	3.927	2.763	2.896	6.084	45.243	4.750	6.566	7.731
Obs.	255	255	255	255	255	255	255	255	255

Table 4: Descriptive Summary Statistics – SADC Countries

	GFCF (mill.)	**cit**	**vat**	**yt**	**exch**	**infl**	**rgdpgr**	**rr**	**cred**
Mean	8,790	30.407	14.662	29.235	237.423	9.278	4.689	10.343	33.794
Max	79,600	40	21	40	3176.539	98.224	15.029	51.286	160.125
Min	77	15	10	15	3.603	-2.405	-7.652	-17.158	0.796
Std. Dev.	17,200	6.180	2.547	7.904	599.035	9.841	3.297	11.490	38.889
Median	2,110	32	15	30	13.334	6.978	4.733	7.889	19.911
Skewness	2.706	-0.713	0.053	-0.610	3.258	4.846	-0.307	1.332	1.927
Kurtosis	9.462	3.066	3.124	2.235	12.971	38.491	4.554	5.767	5.724
Obs.	195	195	195	195	195	195	195	195	195

Table 5: Descriptive Summary Statistics – EAC Countries

	GFCF (mill.)	cit	vat	yt	exch	infl	rgdpgr	rr	cred
Mean	5,980	30.167	17.683	31	1142.769	8.341	6.380	7.690	17.105
Max	15,700	35	20	40	3611.224	26.240	11.159	21.766	34.245
Min	257	30	16	30	67.318	-0.250	0.232	-9.750	8.056
Std. Dev.	4,260	0.905	1.200	3.025	948.821	4.352	2.020	6.625	7.413
Median	5,250	30	18	30	934.975	7.380	6.285	7.804	14.301
Skewness	0.547	5.199	0.155	2.667	0.685	1.267	-0.322	-0.446	0.872
Kurtosis	2.202	28.034	2.684	8.111	2.675	6.236	3.720	3.465	2.578
Obs.	60	60	60	60	60	60	60	60	60

Source: Own estimations using STATA 14.

Moreover, tests for normality among residuals by using Kernel density estimate and the Qnorm and Pnorm graphs suggested, however, that the residuals were not normally distributed (Babu, 2019). Non-normality distribution of residuals was supported by Shapiro - Wilk test and Shapiro – Francia test. Skewness/Kurtosis test also suggested that residuals were not normally distributed. Non-normality of residuals could be attributed to the fact that countries under study had different economy sizes with different economic performances during the study period. Thatmay have created outliers, leading to non-normality of the residuals. Notable, non-normally distributed residuals are bound to lead to inefficient parameter estimates if pooled ordinary squares (POLS) or Maximum Likelihood Estimation (MLE) methods are put to use but not when GMM is used like itis the case in this paper. Estimation results reported here under are thus considered very efficient.

A priori, first, White's test for heteroscedasticity of residuals was also carried out. The results failed to reject the null hypothesis of homoscedasticity in favour of the alternative hypothesis of heteroscedasticity of residuals (Babu, 2019).[8] Second, Levin, Lin, and Chu (LLC) unit root test, which assumes there is a common unit root process across cross-sections was used. Results in Table 6 reject the null hypothesis (at 1 percent level of significance test) that variables were not I(0) in the case of lngfcf, infl, rgdpgr, rr and cred; and failed to reject at 1 percent significance test of the null hypothesis of I(0) in the case of cit, vat, yt and lnexch. In theory, given use of large panel with large N than T and applied GMM, the unit root problem was non-consequential such that the parameter estimates are expected to be robust.

[8] The heteroscedasticity problem was not corrected because the GMM put to use in the analysis produces Heteroskedastic and Autocorrelation Consistent (HAC) estimators.

Table 6: Panel Unit Root Tests - Levin, Lin, and Chu (LLC)

	lngfcf	cit	vat	yt	lnexch	infl	rgdpgr	rr	cred
LLC	-5.904	1.247	0.966	0.642	2.522	-3.955	-4.679	-3.681	-3.926
t*	(0.000)	(0.894)	(0.833)	(0.740)	(0.994)	(0.000)	(0.000)	(0.000)	(0.000)

Not the least, residual plot tests suggested presence of autocorrelation. Notable, nonetheless, given use of the lagged dependent variable as one of the explanatory variables, existence of autocorrelation problem was pre-expected.

4.2 Pre Regressions by Pooled Ordinary Least Squares (POLS) and Fixed Effects Regressions

Following Bond (2002), the first difference GMM estimation was preceded by POLS and Fixed effects regressions in order to obtain the range between upper and lower bound estimates of coefficient of the lagged dependent variable from which the true value of the estimate lies.

Table 7: POLS and Fixed Effects Estimation Results

	(1) POLS	(2) Within Effects
Dependent Variable	lngfcf	lngfcf
$lngfcf_{t-1}$	0.963***	0. 836 ***
	(0.01)	(0. 03)
cit_{t-1}	0.008***	0.001
	(0.00)	(0.01)
vat_{t-1}	-0.012	-0.030 **
	(0.01)	(0.02)
yt_{t-1}	0.002	0.002
	(0.00)	(0.00)
$lnexch_{t-1}$	0.026**	-0.038
	(0.01)	(0.05)
$infl_{t-1}$	0.004**	-0.0002
	(0.00)	(0.00)
$rgdpgr_{t-1}$	0. 004	-0.001
	(0.01)	(0.01)
rr_{t-1}	-0.002	-0.004***
	(0.00)	(0.00)
$cred_{t-1}$	0. 001	-0.003
	(0.00)	(0.00)
Observations	238	238
Number of countries	17	17
R-squared	0.982	0.970
F-statistic	Prob > F = 0.000	Prob > F = 0.000

***, **, * denotes level of significance at 1%, 5% and 10% respectively and Robust standard errors are in brackets

The POLS results in Table 7 in theory, are overestimate of coefficient of the lagged dependent variable; and within estimate (fixed effect) results are an underestimate (Nickel, 1981). Therefore, following Bond (2002),the results from the two regressions are necessarily biased, the true value of the coefficient of the lagged private investment lies in the range between 0.836 estimated in FE regression and 0.963 estimated POLS regression. The results suggest that the true value of the coefficient estimate of one-period lagged private investment should necessarily be obtained by the GMM technique known to give highly consistent and efficient estimates.

4.3One-Step Difference GMM Estimation

The study applied one step difference presented by Arellano and Bond (1991) with robust standard errors and finite sample corrections. Lagged gross fixed capital formation ($gfcf_{t-1}$),which is the proxy for private investment and tax rates were treated as potentially endogenous because they are theoretically chosen simultaneously with investment level (Federici and Parisi, 2015).

Table 8: One-Step Difference GMM Results

Dependent variable: Private Investment (lngfcf)

VARIABLE	COEF.	Robust S.E	t	P > |t|
$lngfcf_{t-1}$	0.857***	0.152	5.65	0.000
cit_{t-1}	-0.098*	0.051	-1.93	0.071
vat_{t-1}	-0.361*	0.194	-1.86	0.081
yt_{t-1}	0.025	0.034	0.73	0.473
$lnexch_{t-1}$	0.044	0.186	0.24	0.814
$infl_{t-1}$	-0.007	0.007	-0.97	0.344
$rgdpgr_{t-1}$	0.008	0.028	0.30	0.770
rr_{t-1}	-0.025*	0.014	-1.77	0.095
$cred_{t-1}$	-0.025**	0.010	-2.44	0.026

N = 221 F (9,17) = 57.55 Prob > F = 0.000

***, ** , * denotes level of significance at 1%, 5% and 10% respectively

The number of lags used as instruments for endogenous variables was set at two (2) because it yielded highly consistent estimates. Furthermore, the study included the log of exchange rate, inflation, real interest rate, real GDP growth rate and credit to private sector (% of GDP) as instrumental variables in the iv-style. The results to the one step difference GMM are presented in Table 8.

From Table8, the study found that lagged private investment is very informative about future investment levels. The coefficient of the lagged dependent variable (0.857) was positive and statistically significant at 1 percent significance level. This indicates that 85.7 percent of private investment in the countries under study was explained by previous year investment levels. Otherwise, it can be said that the speed at which previous investment level of the countries adjusted to their future values, other variables held constant, was 85.7 percent.

Regarding tax variables, corporate income tax was found to have a negative significant effect on private investment. This result was in line with the underlying economic theory and empirical evidence from previous studies *inter alia* Djakov *et al*. (2010); Dwenger (2009);Bustos *et al*. (2004); and Vergara (2004). The results indicated that a 10 percent point increase in statutory corporate income tax would lead to a decrease in private investment level by 0.98 unit points.

VAT was also found to have a significant negative impact on private investment at 10 percent significance level. The negative relation is consistent with economic theory and it is supported by findings from studies by Njuru *et al*. (2013) and Djankov *et al*. (2010). Results in Table 8 indicate that a 10 percent point increase in VAT could lower private investment levels in the SADC and EAC countries by 3.6 units points.

Inregard toother macroeconomic factors, it is notable that real interest rate is inversely relatedto private investment and it entered the equation significantly at 10 percent significance level. Resuslt showed that a percent increase in real interest rate would lead to a 0.02 unit decraese in private investmentlevels in the countries under study. The negative relationship between private investment and real interest rate is supported by Combey (2016), Kilindo (2016) and Vergara (2004).

Credit to private sector was observed to be statistically significant at 5 percent significance level but had an unexpected negative sign. The negative sign is unexpected because growth of credit to private sector means increased access to finances by the private sector, which leads to increased investment levels. Thus, the effect is economically insignificant and is contrary to findings by Greene and Villanueva (1991), Oshikoya (1994), Vergara (2004), Aikaeli and Michael (2014), and Kilindo (2016) who found that credit to private sector had a positive impact on private investment.

Conclusively, the one step difference GMM yielded an estimated coefficient of the lagged dependent variable of 0.857,which was within the expected range between 0. 836and 0.963and so, the study only applied the one step difference GMM estimator.

4.3 Comparison of Estimation Results

Estimation results of POLS, Fixed Effects and One-Step Difference GMM are presented for comparison in Table9.Overall, the study found the lagged dependent variable to have a strong positive and significant impact on current private investment levels regardless of the estimation technique. With regard to corporate income tax, the study found a different picture. Under POLS, it was found to have a positive significant impact on private investment but under difference GMM, it had a negative effect. The tax was not significant under within effects. The positive relationship under POLS is inconsistent with economic theory but was supported by findings from some studies. For example, Nwokoye and Rolle (2015) found CIT to impact private investment positively in Nigeria. The positive relationship could be due to the fact that the corporate sector in developing countries is small compared to the non-corporate sector. However, the negative relationship between CIT and private investment found under difference GMM is in line with established economic theories and it is supported by different empirical studies like

Djakov*et al*. (2010), Dwenger (2009), Bustos *et al*. (2004) and Vergara (2004). Thetax was not significant under within effects.

Table 9: Model Estimation Results

	(1) OLS	(2) Within Effects	(3) Difference GMM
Dependent Variable	lngfcf	lngfcf	lngfcf
lngfcft-1	0.963***	0. 836 ***	0.857***
	(0.01)	(0. 03)	(0.152)
cit_{t-1}	0.008***	0.001	-0.098*
	(0.00)	(0.01)	(0.051)
vat_{t-1}	-0.012	-0.030 **	-0.361*
	(0.01)	(0.02)	(0.194)
yt_{t-1}	0.002	0.002	0.025
	(0.00)	(0.00)	(0.034)
$lnexch_{t-1}$	0.026**	-0.038	0.044
	(0.01)	(0.05)	(0.186)
$infl_{t-1}$	0.004**	-0.0002	-0.007
	(0.00)	(0.00)	(0.007)
$rgdpgr_{t-1}$	0. 004	-0.001	0.008
	(0.01)	(0.01)	(0.028)
rr_{t-1}	-0.002	-0.004***	-0.025*
	(0.00)	(0.00)	(0.014)
$cred_{t-1}$	0. 001	-0.003	-0.025**
	(0.00)	(0.00)	(0.01)
Observations	238	238	221
Number of countries	17	17	17
R-squared	0.982	0.970	
Hansen J test			2.97
P-value			0.562

Notes: ***, **, * denotes significance level at 1%, 5% and 10%, respectively.
+ Figures in parentheses are standard errors..

Unlike CIT, VAT had negative significant effect on both fixed effects and difference GMM estimations. This is in line with theory that taxes impact negatively on private investment. The inverse relationship between VAT and private investment was also obtained by Njuru*et al*. (2013) and Djankov*et al*. (2010).

With respect to macroeconomic factors, using POLS, inflation and exchange rate had positive and significant effect on private investment. The positive relationship between exchange rate and private investment could be due to the fact that a decrease in value of domestic currency with respect to the US dollar, could lead to an increase in exports, a pattern, which leads to higher investments. The positive relationship between inflation and private investment, though against basic economic theory, is in line with findings by Acosta and Loza (2005) and Frimpong and Marbuah (2010) who found that inflation had positive effect on private investment in Argentina and Ghana, respectively. Such positive relationship could be attributed to the fact that sometimes in the short run, enterprises respond to higher prices by increasing output thereby attracting other potential investors to benefit from the rising prices and profitability in the economy. These variables were not robust across the other estimation techniques.

Real interest rate was found to have negative significant effect on private investment when using within effects and difference GMM. This is in line with economic theories and has been supported by several empirical studies on developing countries such as Combey (2016), Kilindo (2016) and Vergara (2004). Under the difference GMM, credit to private sector was found to be statistically significant but had an unexpected negative relationship with private investment.

Comparison of results across estimation techniques used suggests that the one step difference GMM was the best estimation technique for the analysis because it produced highly efficient and robust estimates. Accordingly, it is concluded that levels of private investment in the sampled countries covered by the study was positively determined by their prior levels investment levels; and like in theory, it was negatively determined by corporate income tax and VAT. Real interest rate also had adverse effect(s)on private investment in the sampled countries. However, the effect of credit on private sector was significant but unexplainably negative.

5. Conclusion

The study aimed at examining the impact of taxation and other macroeconomic factors on private investment in selected SSA countries. The study estimated a neoclassical investment model and used annual panel data covering the period from 2003 to 2017 with a total of 255 observations. The study covered countries of the EAC and SADC only, of which 4 were dropped from the analysis due to unavailability of data in most of the years under study. A One-Step Difference GMM for dynamic panel model was applied to produce robust as well as efficient estimates and to account for presence of endogenous variables.

By using difference GMM, the study findings supported relevance of corporate income tax and VAT in affecting private investment. The taxes were found to have negative effect on private investment. However, personal income tax was not significant. Real interest rate was also found to be negative and statistically significant in explaining private investment. Credit to private sector (% of GDP) was statistically significant but its sign was negative and therefore, of no

economic meaning in explaining private investment in countries under study. Other macroeconomic variables like nominal exchange rate, inflation rate and real GDP growth rate were not found to be significant.

Policy-wise, first, the negative effect of high tax rates (corporate and VAT) on private investment in the EAC and SADC countries established by the study points to need for investment friendly tax regime and one that ensures stable flow of revenue for public service delivery to enhance their economies' attractiveness to private investors. One likely option is to widen the tax bases by formalizing the large informal sector that exists in the sampled countries because that would help to reduce the business and individual tax burdens and thus, making the economies highly attractive to potential investors. Governments also need to reduce the tax rates, provide tax incentives, simplify their tax regimes, address any tax administrative issues and plug all loopholes for tax evasion with the aim of promoting compliance. These efforts, if well administered will help in restoring tax revenues that have been lost in the past, while leaving the governments with enough resources for financing development projects and day-to-day operations. In due regard, they will give room for the private sector to spur. Second, the negative effect of real interest rate on private investment in the EAC and SADC countries suggests importance of price stability and importance of policy measures directed to reduce lending rates by legal measures that attend to asymmetric information as well as enhance competition in the banking system.

Suffice it to note that results from this study and inferences made thereof are not foolproof but indicative, mainly due to data limitations. Besides, there remains several intervening issues in links between taxation and private investment in specific sampled countries and all not covered in this study. For instance, it remains of interest to examine whether cross-country differences in tax structures have an effect on the way taxes may impact or stimulate private investment. Further research is called for on links between fiscal policy actions and private investment, a universally accepted engine of economic growth in the SSA countries.

REFERENCES

Acosta, P. and A. Loza(2005), 'Short and Long Run Determinants of Private Investment in Argentina',*Journal of Applied Economics*, Vol. VIII, No. 2, pp. 389-406.

Ade, M., J. Rossouw and T. Gwatidzo (2017), 'The effect of tax harmonisation in the Southern African Development Community on Foreign Direct Investment', *ERSA* Working Paper 694.

Ahuja, H. L., and S. Chand (2007), *Macroeconomic Theory & Policy: Advance Analysis.*Thand, New Delhi.

Aikaeli, J. and I. M. Michael (2014), 'Determinants of Private Investment in Tanzania', *African Journal of Economic Review*, Vol. 2, No. 2, pp. 39-52.

Anderson, T. W. and C. Hsiao (1981), 'Estimation of Dynamic Models with Error Components', *Journal of the American Statistical Association*, Vol. 76, No. 375, pp. 598-606.

Anderson, T. W.and C. Hsiao (1982), 'Formulation and Estimation of Dynamic Models using Panel Data,' *Journal of Econometrics*, Vol. 18, pp. 83-114.

Arellano, M. and S. Bond (1991), 'Some Tests Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, Vol. 58, pp. 277-297.

Arellano, M. and M. Bover (1995), 'Another Look at the Instrumental-Variable Estmation of Error-Components Models,' *Journal of Econometrics*, Vol. 68, pp. 29-52.

Asante, Y. (2000), 'Determinants of Private Investment Behaviour in Ghana', *AERC Research Paper No.100.*

Asiedu, E. (2002), 'On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?', *World Development*, Vol 30, No. 1, pp. 107-119.

Babu, W. A. (2019), *Taxation and Private Investment in Sub-Sahara Africa: The Case of EAC and SADC Countries.* MA Disertation, University of Dar es Salaam, Dar es Salaam: Unpublished.

Bhattacharya, R. and D. Ghura (2006), 'Oil and Growth in the Republic of Congo', *IMF Working Paper* WP/06/185 .

Blundell, R., and S. Bond (1998), 'Initial Conditions and Moment Restrictions in Dynamic Panel Data Models', *Journal of Econometrics*, Vol. 87, pp. 11-143.

Bond, S. R. (2002), 'Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice', *Portuguese Economic Journal*, Vol. 1, No. 2,pp. 141-162.

Bustos, A., E. M. R. A. Engel and A. Gletovic (2004), 'Could Higher Taxes Increase the Long-run Demand for Capital? Theory and Evidence for Chile', *Journal of Development Economics*, Vol. 73, pp. 675-697.

Chai, J. and R. Goyal (2008), 'Tax Concessions and Foreign Direct Investment in the Eastern Caribbean Currency Union', *IMF Working Paper* WP/08/257.

Combey, A. M. (2016), 'The Main Determinants of Private Investments in the WAEMU Zone: The Dynamic Approach', *Economics and Political Economy*, Vol. 3, No. 4, pp. 731-743.

Djankov, S., T. Ganser, C. McLiesh, R. Ramalhoand A. Shleifer (2010), 'The Effect of Corporate Taxes on Investment', *American Economic Journal: Macroeconomics*, Vol. 2, No. 3, pp. 31-64.

Dwenger, N. (2009), 'Corporate Taxation and Investment: Explaining Investment Dynamics with Frm-level Panel Data', *DIW Berlin Discussion Papers No. 924.*

Federici, D. and V. Parisi (2015), 'Do Corporate Taxes Reduce Investments? Evidence from Italian Firm-level Panel Data', *Cogent Economics and Finance*, Vol. 3, No. 1, pp 1 - 14.

Fjeldstad, O. and L. Rakner (2003), *Taxation and Tax Reforms in Developing Countries: Illustrations from Sub-Saharan Africa*. Chr. Michelsen Institute.

Frimpong, J. M. and G. Marbuah (2010), 'The Determinants of Private Sector Investment in Ghana: An ARDL Approach', *European Journal of Social Sciences*, Vol. 15, No. 2, pp. 250-261.

Gillis, M., H. D. Perkin, H. D., M. Roemer, and D. R. Snodgrass (1996), *Economics of Development*. Norton & Company Inc.

Greene, J. and D. Villanueva (1991), 'Private Investment in Developing Countries: An Empirical Analysis', *IMF Staff Papers*, Vo. 38, No. 1, pp. 33-58.

Gui-Diby, S. L. (2014), 'Impact of Foreign Direct Investments on Economic Growth in Africa: Evidence from three Decades of panel data Analyses', *Research in Economics*, Vol. 68, No. 3, pp. 248-256.

Hall, R. E. and D. W. Jorgenson (1967), 'Tax Policy and Investment Behaviour', *The American Economic Review*, Vol. 57, No. 3, pp. 391-414.

Hansen, H. and J. Rand (2006), 'On the Causal Links between FDI and Growth in Developing Countries', *World Economy*, Vol. 29, No. 1, pp. 21-41.

Hsiao, C. 1986. *Analysis of Panel Data*. Cambridge University Press, New York.

Jorgenson, D. W. (1963), 'Capital Theory and Investment Behavior', *The American Economic Review Papers and Proceedings*, Vol. 53, No. 2, pp. 247-259.

Jorgenson, D. W. (1967), 'The Theory of Investment Behavior', in *Determinants of Investment Behavior*, edited by R. Ferber. Colombia University Press, New York.

Keynes, J. M. (1936), *The General Theory of Employment, Interest and Money*. Palgrave Macmillan.

Kilindo, A. L. (2016), 'Determinants of Private Investment in Tanzania: 1970 - 2015', *Tanzania Economic Review*, Vo. 5, No. 1, pp. 22-35.

Kim, N. (2018), 'Prospects of Least Developed Countries meeting the graduation criteria by 2030', *CDP Policy Review*, Vo. 8.

Klemm, A. and S. Van Parys (2009), 'Empirical Evidence on the Effects of Tax Incentives', *IMF Working Paper* WP/09/136.

Lautier, M.and F. Moreaub (2012), 'Domestic Investment and FDI in Developing Countries: The Missing Link', *Journal of Economic Development*, Vol. 34, No. 3, pp. 1-23.

Ndikumana, L. and S. Verick (2008), 'The Linkages between FDI and Domestic Investment: Unravelling the Developmental Impact of Foreign Investment in Sub-Saharan Africa', *Development Policy Review*, Vol. 26, No. 6, pp. 713-726.

Ndikumana, L. (2000), 'Financial Determinants of Domestic Investment in Sub-Saharan Africa: Evidence from Panel Data', *World Development*, Vol. 28, No. 2, pp. 381 - 400.

Nickell, S. (1981), 'Biases in Dynamic Models with Fixed Effects', *Econometrica*, Vol. 49, No. 6, pp. 1417–26.

Njuru, S. G.,C. Ombuki, N. Wawire and S. Okeri (2013), 'Taxation and Private Investment: Evidence for Kenya', *International Journal of Economics and Management Sciences*, Vol. 2, No. 11, pp. 78-93.

Nwokoye G. A. and R. A. Rolle (2015), 'Tax Reforms and Investment in Nigeria: an Empirical Examination', *International Journal of Development and Management Review*, Vol. 10, No. 1, pp. 39-51.

Oshikoya, T. W. (1994), 'Macroeconomic Determinants of Domestic Private Investment in Africa: An Empirical Analysis', *Economic Development and Cultural Change*, Vol 42, No. 3, pp. 573 - 596.

Roodman, D. (2009), 'How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata', *The Stata Journal*, Vol. 9, No. 1, pp. 86-136.

Sevestre, P. (2002), *Économétrie des Données de Panel.* Dunod, Paris.

UN (2015), 'Sustainable Development Goals', United Nations.

UNCTAD (2017), *Global Investment Trends Monitor.*UNCTAD, New York. Accessed March 4, 2019.

Vergara, R. (2004), 'Taxation and Private Investment: Evidence for Chile',*Documento de Trabajo*, Vol. 268, pp. 1-27.

World Bank (1991), *World Development Report 1991: The Challenge of Development.* Oxford University Press.