Role of Domestic Savings and Investment in Economic Growth for Developing Economies of East Africa

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***Abstract*: The objective of this research was to find out the role of gross domestic savings and investments on the economic growth of EAC region. The study used the explanatory research design. Annual panel data obtained from World Bank development database for Kenya, Uganda, Tanzania, Rwanda and Burundi from 2005 to 2021 were used. Levin, Lin and Chu (2002) methodology was used to test for stationarity and stabilize data. Pooled OLS regression model was used to estimate the parameters and conduct the inference. The results showed that Gross domestic investment was significant with a p-value of 0.012 at 0.05 significance level while domestic savings had insignificant effect on the GDP with a p-value of 0.069 at 0.05 level of significance. The resesearch concluded that Gross domestic investment has a significant role on economic growth while domestic savings is insignificant in determining growth for the EAC region.**

***Keywords*: Gross Domestic Investment, Domestic Savings, Economic Growth, Panel Data Estimation Technique, Explanatory Research design**

I. INTRODUCTION

Economic growth refers to the increase in a country's productivity which results in increase of the national income over a given period of years. This is shown by a continued increase in income of a country compared to previous years (Reserve Bank of Australia, 2022). An increase in gross domestic product (GDP) is used as a measure of economic growth and is usually expressed in terms of percentages from one year to another. Economic growth rates of East Africa countries are not high enough to achieve middle-income status by 2030 which is the ambition of governments in this region (Mureka, 2022).

Economic theory argues that domestic saving is a vital variable for economic growth of any economy because it enhances capital formation and increases public and private investments (Nwachukwu and Odigie, 2009). Domestic Savings entails the part of income that is not consumed but set aside for investment purposes (Prinsloo, 2000). For a country to achieve economic growth and sustained development, a strong saving performance has to be attained (Adewuyi, 2007). Empirical literature show that differences in the economic performance between developed, developing and undeveloped countries is brought about by disparities in their rates of domestic saving and investment.

Domestic investment increases economic activity of a country by creating new capacity of producing goods and services. Investment leads to increase in capital stock during a given period of time. Domestic investment on public infrastructures like roads, sewerage connections, electricity and power generation, education, health, and communication projects play a vital role to increase production of goods and services in the economic activity (Saleem, 2018). GDI is important because it provides an indicator of the future productive capacity of the economy. Capital investment today shows the potential to produce new goods and services based on those resources in the future.

According to World Bank (2019), Gross Domestic Saving is GDP less final total consumption expenditure in an economy expressed as a percentage of GDP. Gross domestic savings therefore entails the part of income that is not consumed but set aside for investment purposes by households, the private corporate sector and the public sector in a country. This study used aggregate deposits in fixed accounts in financial institutions ratio to GDP per year as a proxy of the level of domestic savings in the economy.

Gross domestic investment (GDI) is a measure of the amount of money that households, private corporate and the public sector invest within their own country. GDI consists of additional outlays to fixed assets such as land improvements, machinery, and equipment purchases, construction of roads, railways and buildings for both domestic and commercial use in the economy in the production of all goods and services. The study used annual expenditure on fixed assets by both the public and private sector as a ratio to the GDP.

Despite the respective governments in the region implementing policies that encourage domestic savings and investments to spur increased economic growth. Domestic savings has remained low; averaging at 10 percent annual growth leading to low capital formation and investments in fixed goods which are a prerequisite for production of goods and services in the economy.

II. EMPIRICAL LITERATURE

Anastassiou and Dritstaki (2005) did a study to establish the relationship between tax revenues and gross savings on economic growth on the Greek economy between 1965 and 2002 using Granger causality tests. The results of

the study showed that both tax revenue and gross saving have a significant influence on the economy. The study concluded that governments should reduce direct taxation so that to attract capital formation and technology development in the economy.

Lean (2008) analysed if there is a relationship between domestic savings and growth of the economy in China by employing Johansen cointegration and granger causality methodologies. The results from the study show that in the long-run growth granger cause savings growth. However there was no evidence to suggest that savings granger cause economic growth.

Budha (2014) examined the effects that domestic savings and investment has GDP on the growth of Nepal's economy using data from 1974 to 2010 for the study. Using autoregressive distribute lag (ARDL) method the empirical results of the study showed that both domestic savings and investment has positive significant impact on GDP of Nepal.

Ribaj and Mexhuani, (2021) did a study to establish what exists relationship exists between savings level and growth for Kosovo between 2010 and 2017 employing the Ganger Causuality tests. The results showed that savings significantly stimulate investment, production and employment hence impacts the economy positively.

Dhanya, (2015) did a study which was to establish what effects savings had on economic growth in Botswana by employing Harrod –Domar growth model from 1980 to 2013. Using DOLS approach the study identified that there exist along run co integration between economic output and savings. The study concluded that savings had a significant relationship with GDP for Botswana.

Rabnawaz et al. (2015) examined the Impact of Public Investment on Economic Growth in Pakistan. Using time series data during the period of 1980-2009. The study found a positive connection between public investment and gross domestic product and indentified bi-causal Granger causality relationship between GDP and public investment.

Swaby studied the relationship between public investment and growth in Jamaica. Public investment is associated with capital expenditure by Central Government. VECM is employed to seek the relationship between investment and growth. The study found that domestic public investment was not significant to economic growth and also Public investment crowed-out net private investment as it resulted in higher domestic private investment but lower foreign domestic investment, with the latter effect being much more substantial.

III. METHODOLOGY

3.1 Research Design

This research used explanatory research design. Explanatory research design is a method of research used to understand the relationship and association between independent and dependent variables (Maxwell, 2008). This design is used to determine the causes of the current status of the phenomena under study. It seeks to discover the effect that a variable(s) has on another (others) or why certain outcomes are obtained.

Explanatory research design characteristically seeks to recognize and clarify causal associations which are substantively significant and meaningful. The concept of causality is grounded in the logic of hypothesis testing which in turn produces inductive conclusions. This research aimed at establishing the role of domestic savings and investment on economic growth for the East Africa countries.

3.2 Area of Study

The East Africa Community is made up of Kenya, Uganda Tanzania, Rwanda and Burundi with its headquarters in Arusha, Tanzania. The region is located on the equator between latitude 23º North and 12º South and longitude 22 º E and 51 º E with a population of 177 million citizens on a land mass of 2.5 million square kilometres (UN, 2020).

3.3 Data Collection

Secondary data from the yearly economic abstracts from the relevant countries' statistic Bureaus and the World Bank database for the five selected countries from 2005 to 2021 was used in the study. The research therefore considered eighty observations for the sixteen year period under study.

3.4 Specification of the Study Model

The study adopted and modified the aggregated Solow growth model to determine the role of domestic savings and gross investments have on economic growth for EAC. Therefore the functional model estimated by this study was specified as:

$$Y_{it} = GDI^{B1}{}_{it} GDS^{\beta 2}{}_{it} F\, \gamma_i\, e_{it} \quad .....(i)$$

This model can be linearised to become

$$Ln\, Y_{it} = \alpha + \beta_1 Ln\, GDI_{it} + \beta_2 Ln\, GDS_{it} + \gamma_i + ...(ii)$$

Y represents annual GDP percentage growth rate. GDI represents rate of gross domestic investment. GDS represents level of domestic savings rate, Ln represents natural logarithm, γ_i represents country unobserved heterogonous variables, μ_t represents the error term, β_i - Slope Coefficients and t Represents the index of time.

3.5 Test for Panel Unit Roots

When non stationary panel data is used for analysis it will result into invalid parameter estimates because the obtained estimates from this type of data shall have non constant mean and variance. To find out for stationarity in the data unit root tests are used. A process is said to be stationary if its probability distribution remains unchanged as time proceeds since the data generation process does not change. If the series are intergrated of the same order and cointergrated, then estimate results and statistical inferences would be non spurious (Granger, 1988).

The Levin and Lin (1992) tests as proposed by Chen (2013) model test shall be used in testing these variables for presence of unit roots. This model will is preferred because Levin and Lin developed the model to allow fixed effects, individual determinant trends and heterogeneous correlation errors in series. Their model assumed that both the number of horizontal sections (N) and the length of time (T) in the panel data series are infinite. However, when the ratio of N/T goes to zero, T goes to infinite in higher ratio when compared to N. The Levin, Lin and Chu model is unique since it considers the asymptotic features of the estimators. This study adopted Levin and Lin (1992) tests as proposed by Chen (2013) which is given by;

$$Y_{it} = P_i Y_{it-1} + \zeta_{it}\gamma + \varepsilon_{it} \quad .....(iii)$$

ζ is the deterministic component

ε = stationary process

i =1…..N, and t =1…….T

Levin and Lin assumed that $P = P_i$ for all i and are to test the hypothesis such that when

H_0: $P = 1$ There exists a unit root

Stationary was determined by testing the significance of *P*, non-stationarity is to be accepted when *P* is significantly equal to 1 hence the variables are further to be differenced until existence of unit root is no longer accepted

3.6 Panel Data Estimation Technique

For each country there are usually some omitted variables which are time invariant and panel estimation techniques are used to control for such unobserved time invariant variables every year (Ghazi, 2014). This estimation technique therefore leads to more efficient estimates than when cross-section or time-series data are used for analysing variables in research. Panel data estimation technique has greater flexibility when coming up with a model because it takes care of the differences in behaviour among countries to be studied thereby enabling the researcher to control for unobserved heterogeneity of these time invariant variables (Manyinsa, 2014; Baltagi, 2008; Hsiao, 2003). The correlations of these variables with error terms cause either fixed effects or random effects.

3.7 Panel-Fixed Effects Model

The FEM assumes that the unobserved heterogonous variables called individual fixed effects variables are correlated with the independent variables. The individual fixed effects dummy variables are important since they represent the unique economic behaviour of individual countries and can therefore be used in controlling one country from the other since they are constant over time. If these unobserved heterogonous variables are omitted then the coefficients of explanatory variables will be biased. The unobserved time invariant variables in this study are; presence of sea port, devolution rate in governance and demographic characteristics of individual countries (Ghazi, 2014; Manyinsa, 2014). The empirical fixed effect model that was used in this study is of the form:

$$Y_{it}=\alpha_i + \beta x_{it} + (\gamma_{it} + V_{it}). \quad ..... \text{(iv)}$$

Y_{it} is the explanatory variable observed over time and is represented by economic growth in this study.

X_t represents the observable individual independent variables that vary over time. In this study these are the fiscal factors.

i represents individual countries

t stands for the number of observations,

γ_i represents each individual fixed effects (dummy variables)

These individual fixed effect variables are unobservable, heterogeneous and vary from country to country. For this study they include presence of sea port, devolution rate in governance and demographic characteristics that influence the economy and may a have strong correlation with the independent variables.

If the OLS have to be unbiased and inconsistent then, $E(X_{it}, \varepsilon_{it}) \neq 0$ and this residual (ε_{it}) has to be split into two components represented by V_t and γ_i.

$$(\varepsilon_{it}) = (\gamma_i + V_t) \quad ..... \text{(v)}$$

Then this OLS cannot be used to estimate these dummy variables.

Fixed effects can either be one-way or two-way fixed effects. The Chow Test was employed to determine if one-way or two-way fixed effects specification is appropriate for the study.

3.8 Random Effects Model

The REM model assumes that individual unobserved heterogonous variables (dummy variables) are not correlated with the independent variables. Because of this the dummy variables that are meant to control for the differences among countries are omitted. There omission in the analysis will not therefore lead to any biasness in the coefficients estimated of the independent variables (Baltagi, 2008). For empirical random effect model for unobserved heterogeneous variables, the following equation is used;

$$Y_{it}= \beta x_{it} + (\alpha_{it} + \varepsilon_{it}) \quad ..... \text{(vi)}$$

Where α_i represents the unobserved heterogeneous variables.

Also for all individual observations then:

$$E(X_{it}\, \varepsilon_{it}) = 0 \quad ..... \text{(vii)}$$

The individual fixed effects (α_i) become part of the error term, therefore the error terms are no longer independent (Woodridge, 2002). The assumption is that these unobserved heterogeneous variables in the model, which vary among the countries, are not related to the independent variables considered. In order to choose whether to use the random

effects model or fixed effects model, the Hausman test will be employed.

3.9 Hausman Test

The Hausman tests checks if the unique errors are related with independent variables or not (Greene, 2008). This test is therefore applied to determine whether the research should adopt fixed effect models or random effect models. The model to be tested is;

$$Y_{it}=\alpha_i+ \beta x_t + \gamma_i+ v_t \ ,\ldots\ldots \text{ (viii)}$$

The null hypothesis of Hausman test is that there is no correlation between γ_i and variables in x_{it}, which is as follows:

$$H_0: E\ (u_{it}/x_{it}) =0\ldots\ldots\ldots\ldots \text{ (ix)}$$

If Chi-Sq. df is less than Chi-Sq Statistic, then the null hypothesis (random effect) is rejected.

3.10 Lagrange Multiplier (LM) Test

The langrage multiplier (LM) test is usually carried out on the panel data to determine whether to use the individual effects regression or a pooled OLS regression model. The Breusch–Pagan LM statistic test was used to test the null hypothesis that the pooled OLS estimator is adequate against the individual effects alternative. The specific hypothesis under investigation is the following.

$H_0: \delta_T = 0$
$H_0: \delta_T \neq 0$

The LM Statistics to be tested is of the form

$$LM = \frac{nT}{L(T-1)}\left[\frac{\sum_t(\sum \hat{e_{it}})2}{\sum_i\sum_t \hat{e_{it}^2}} - 1\right]^2 \sim x_i^2 \ldots\ldots\ldots \text{ (ix)}$$

IV. DATA ANALYSIS AND DISCUSSION

4.1 Panel Unit Root Properties Test

Levin, Lin and Chu (2002) was used to test for stationarity for the variables and the findings shown in table 4.1below

Table 4.1 Results for panel unit root test

Variable	Form of test	Test statistics	P-Value	Conclusion
GDP	Unadjausted t	-7.4193	0.0025	1st Difference
	Adjusted t	-2.8017		
GDI	Unadjusted t	-8.3361		1st Difference
	Adjusted t	-5.551		
GDS	Unadjusted t	-6.2994	0.0002	Level
	Adjusted t	-3.5033		

Source: Constructed from the study data

The findings show that gross domestic savings was stationary at level or integrated of order zero I (0) while Economic growth and gross domestic investment were non-stationary at level but became stationary at first difference, hence integrated of order one, I(1). All variables were to be regressed at first difference for uniformity.

4.2 Hausman Test Results

To determine whether to use either Fixed Effects Model (FEM) or Random Effects Model (REM) the Hausman test was done to find out whether the unobserved countries effects are correlated with the regressors or not. The results shown are shown in table 4.2

Table 4.2 Results of Hausman Test

Var	Fixed	random	Difference	S.E.
GDP	.1086666	.1086666	-7.67e-15	.0182706
GDI	.2771757	.2771757	-2.44e-15	.0197568
GDS	-.4208779	-.4208779	4.44e-16	.0087074

Source: Constructed from the study data

From this results Hausman statistic was statistically insignificance with a p -value 0f 1.000. This leads to rejection of fixed effect in the panel data and accept use of the random effects method.

4.3 Pooled OLS Regression Model

The OLS regression analysis results for the model are as shown in table 4.3

Table 4.3 Results of OLS Regression Model Output

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
Cons	-.115898	.3061467	-0.38	0.706	-.7266441 .4948479
GDI	.3093714	.1195704	2.59	0.012	.0708349 .5479079
GDS	.0108481	.0058666	1.85	0.069	-.0008555 .0225518
R-squared	0.6188	Adj R-squared	0.5912	Prob>F	0.0000

Source: Constructed from the study data

From the pooled OLS Regression Model results in the table above. Gross domestic investment was significant with a p-value of 0.012 at 0.05 significance level. The variable has a positive effect on GDP with a coefficient of 0.3094. This means unit percentage change in gross domestic investment causes a positive significant change of 0.3094 rate of change on economic growth in EA countries. This is in line with the priori expectation that increased investments in an economy create more goods and services hence leading to high economic growth rate.

The results also show that domestic savings has an insignificant effect on the GDP with a p-value of 0.069 at 0.05 level of significance and a coefficient of 0.01084.

The results show that adjusted R-squared which looks at goodness of fit is 0.591262. This means that about 59% of the variation in economic growth is explained by domestic savings and investments which were considered in the model.

V. CONCLUSION AND RECOMMENDATION

Based on the empirical results, Gross domestic investment has a positive and significant influence on economic growth. The study concluded that Gross domestic investment is therefore an important variable in determining economic growth in the EAC region. The research also concludes that domestic savings has an insignificant effect on economic growth in EAC region. This may be because the levels of savings in the region are so low to make any significant influence to the economy.

The study recommends that governments in this region should formulate policies that promote gross domestic savings and investments by creating a conducive and enabling economic and legal environment that will encourage domestic savings and investments in their economies to spur the much needed economic growth.

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