# Innovations

## Expenditure on Education Nexus Economic Growth: Panel Analysis from East African Countries

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*Abstract:* Human capital is a key element in providing a means for creating stable and long-lasting economic growth. East Africa is characterized by low return from education and underdeveloped economy. Hence, it needs further investigation into the role of human capital in building the strong economy of the region. The objective of the study was to examine the role of human capital on economic growth in East Africa. This study examines the effect of human capital on economic growth in East Africa by employing annual panel data obtained from the World Bank and IMF database for the selected countries in the region over the period 1990 to 2017. The recently accepted methods of panel error correction and panel co-integration regression analysis that helps to recognize the dynamic causality in short and long-time horizons were used. Accordingly in the econometric analysis, the long-run estimated coefficients of the fully modified ordinary least square co-integration regression result founds that human capital have positive and significant long run effect on economic growth while it has negative effect in short run in the panel of six East African countries. The different effects of human capital in different time horizons may be due to short-term crowding out effect on domestic investment and long run technical and knowledge transfer (spillover effect). Therefore, policy makers should consider special treatment to promote domestic investors while they design policy that attracts human capital.

*Keywords:* human capital, economic growth, panel data analysis, fully modified OLS, East Africa

## 1. Introduction

Education is widely accepted as a leading instrument for promoting economic growth. For Africa, where growth is essential if the continent is to climb out of poverty, education is particularly important.

In contrast to this early view, recent evidence suggests higher education is a determinant as well because ofincome and can produce public and private benefits.Higher education may create greater tax revenue, increase savings and

investment, and lead to a more entrepreneurial and civic society. It can also improve a nation's health, contribute to reduced population growth, improve technology, and strengthen governance. Regarding the benefits of higher education for a country's economy, many observers attribute India's leap onto the world economic stage as stemming from its decades-long successful efforts to provide high-quality, technically oriented tertiary education to a significant number of its citizens.

The study focusses only on the role of expenditure on education on economic growth of east Africa by using panel data from 1990 to 2017 on the basic variables expected to have significant effect on economic growth of the region. Based on the availability of data from secondary sources, sample countries were selected for the study. The role of expenditure on education to economic growth is to be determined using methods of panel data analysis including other determinants like labor, domestic investment, and public investment on infrastructure and trade openness.

Currently African countries are emphasizing the role of expenditure on education as a way forward to achieve economic growth(OECD, 2013). Consequently, policies have been formulated and lots of resources have been sacrificed to create educated human capital as of Asian tigers do. Currently, there is heavy expenditure on education by most African countries, unfortunately its effect on economic growth have not been assessed for policy purpose. Therefore, the findings from this study may give a clear picture of the relationship between expenditure on education and economic growth with the view of providing in-depth information relevant enough for policy design and implementation to maximize the positive benefits from education.

In addition, for the existing conflicting result among literature from different schools of thoughts, as regards to the effects of educational expenditure some indicating positive while others showing negative spillovers, the study may shade more light by providing new empirical evidence on the effects of educational expenditure on east African economic growth. Furthermore, it can motivate other researchers to conduct further study in this area and it will provide vital information which serves as a guide for policymakers to deal with.

To sum up, empirical studies of growth effect concerning education and health are quite mixed and the literature results depend not only on proxy variables used for education and health, but also on the empirical methodology. Furthermore, only a few studies have been conducted on education and economic growth relationships in Africa. This paper attempts to fill this gap and aims to compare the relative impact of human capital indicators and their interaction with growth. The main objective of the study is to investigate the role expenditure on educationon economic growth of east African countries. While the Specific Objectives of the Study aims:

• To analyze the trends of expenditure on education over the region and across countries in east African countries.

• To analyze the response of economic growth for the change in expenditure on education in the time span of the study.

• To investigate the effect of educational expenditure on economic growth both in short run and long run periods

## 2. Literature Review

### 2.1 Arguments on Relationships between Expenditure on Education and Economic Growth

Growth promotion factors have been considered successively saving and investment (classical models), technical progress (neoclassical models), R and D, human capital, capital accumulation and externalities (in the new growth theory)(Argiro, 2006).Among the pioneers who have developed this kind of models, (Domar, 1966)and (Harrod, 1939)keep attention. They underline the difference between the natural growth rate based on labor rise, and the guaranteed growth rate based on savings and investments increase (Muhammad Arshad Khan, 2007). The prevailing hypothesis here concerns the savings gap that limits the long-term growth rate. The standard neoclassical model developed by (Heckscher-Ohlin)supposes the absence of technical differences at international level and the immobility of production factors.

In change, the Solow neoclassical model allows capital mobility and its accumulation(Solow, 1956). Still, capital accumulation can explain only the short run economic growth because the physical capital has decreasedturnover in the long run. The apparent solution is to accept the existence of technological differences and that isSolow's main contribution. He introduces the technology and knowledge among the production inputs, because both contribute to the factor's productivity increase susceptible to economic growth promotion. But technological changes are supposed exogenous and that implies the inexistence of technological transfers between the nations, and consequently, the long-run economic growth is limited.

In Solow's short-run economic growth, the final good is produced with two production factors (capital and labor):$Y = F(K,L)$(Solow, 1956). Thecapital stock increase is the result of that part of the revenue saved andinvested $\acute{K} = sY$. Consequently $\acute{K} = sF(K,L)$As the population increasingis exogenous; it is supposed that labor force rise with a constant rate $n$:$L(t) = loe^{nt}$ The fundamental equation is obtained $\acute{K} = sF(K,loe^{nt})$and it allows for the identification of capital accumulation trend, under the hypothesis of total available labor force involved. The saving propensityindicates how much of the net revenue is saved and invested. From here results the capital net accumulation during the current period. Added to the already

existing stock, it led to the total available capital in the next period and the whole process repeated. This is a model which does not offer the long-run economic growth equation, but it allows production level identification, at a certain moment dependingon the level registered in the previous period. The capital stock and flow (capital accumulation) have a significant role while explaining the production level.In this model, the human capital role is to contribute to capital accumulation, which is an idea defended also by (Muhammad Arshad Khan, 2007), and later by (Mello De. and Luiz R., 1999) who bound human capital transferring supplementary capital from human capital transferring know-how.

Generally, the theoretical demarches which have as a result an endogenousgrowth theory are based on:the condition of optimal consumption offinal product obtained from capital goods, profitability rateequation under the nulls profits constraint, and Equalityatequilibrium between the consumption growth rate and production growth rate(Borensztein E., Gregorio De. J and Lee J., 1998). The (P.M., Romer, 1986) and (Aghion and Peter Howitt, 1992) endogenous growth theoretical model underlay the role of technological progress, innovation,research and development in enhancing the economic growth.

In the Romer long-run economic growth model (1986), knowledge is present as a production input, and technological changes are considered endogenous.In contrast with models based on diminishing returns like Solow, inRoomer's model the economic growth rates are increasing over time.Romer considers a discrete growth model with two periods. The model hypothesis concerning the dependence of consumption good production on twocategories: the knowledge level k accumulated as a result of previousconsumption and processed with a research technology, and theadditional factor set as physical capital and labor force are (x vector).The supplier makes an option between insuring a great consumption today and accumulating the necessarily knowledge for a greater consumption tomorrow.

The production function F of firm i, depends on specifically inputs (k and) and on knowledge aggregate level in the economy $K=\sum_{(i=1)}^N k_i$ .where N is the number of firms. The two major hypothesis of the model concern the function concavity for any fix K, and respectively the increasing marginal productivity of knowledge. The model equilibrium is a standard competitive equilibrium with externalities. Maximizing the utility function resulting from the good consumption in two successive periods, under setoff restrictions, the equilibrium points are obtained (k values that maximize the utility). Consequently, the available knowledge for a firm (depending on the knowledge stock in the economy) determines production and long-run economic growth. A nation suffers from an idea gap if the necessarily knowledge for value creation is missing. In theRomer P M, (1993), human capital facilitates the gapovertaking through the know-how transfer and increases all firms'

productivity. Romerintroduces human capital in an endogenous economic growth model, where the growth results directly from physical capital investments whichat their turn are the result of R and D investments. Those goods, used as production inputs at others economical levels, have the capacity to perpetuate the knowledge accumulation. Romer considers that the creation of goods incorporating advanced technology depends on human capital stock and its growth. In that way, the firms operating in countries with an importanthuman capital can innovate more rapidly and enjoy technical progress and increase productivity.

The know-how from Romer model is present in Sala-i-Martin & Robert, (1991) modelthrough the fixed cost imposed by the technological adaptation process. In bothmodels, the foreign firms are those who facilitate the knowledge diffusion(Sala-i-Martin and Robert Barro J, 1991).De Mello supportsthe dual approach of human capitalcontribution to economic growth, bounding human capitaltransferring supplementarycapital from human capital transferring know-how. Indeed, the superiorknowledge accumulation reduces the innovation cost, and technologicalprogress produces more rapidly. Whereas, according to the economic growth model of Solow (1956), the effect of human capitalon the growth rate is restricted by the existence of diminishing returns on the physical capital. As a result, the human capital effect is only verified at the level of production per capita and not in terms of growth rate(Calvo M. B. and Sanchez-Robles B., 2003).

### 3. Methodology of Study
### 3.1 Data Type and Source
The most recent paneldata on 6 selected east African countries was used over the period 1990 to 2017 from secondary sources like International Monetary Fund (IMF), and World Bank (WB). The selection of six countries is mainly based on the availability ofdata for variables included in the growth model.
### 3.2 Methods of Data Analysis
In the study both descriptive and econometric analysis were employed. The descriptive method was used for the analysis of trends of expenditure on education and its relationship with growthin east African region using both panel data set for the analysis of trends and relationships of expenditure on education and economic growth for within and between cross-section units.
The analysis comprises three steps. Firstly, do the panel unit root test (Dickey and Fuller, 1979) to check whether the variables are stationary or non-stationary. Secondly, if the variables are non-stationary, the co-integration test can be used for testing whether the variables have a long-term relationship or not. Finally, if all

variables are co-integrated or have a long-term relationship, a long-run equation can then be estimated using FMOLS.

### 3.3 Model Specification

Specifying that educational expenditureaffects growth through the spillover effects, the total productivity variable A must be endogenized as a function of educational expenditure. An example can be found in (Zhang K. H., 2003)who applied the endogenous growth model to formulate the effect of educational expenditure on the output growth through enhancing the total factor productivity. In this respect, the model can be presented as follows:

$$Y_{it} = A_{it} \llbracket L_{it} \rrbracket ^{\beta 1} \llbracket K_{it} \rrbracket ^{\beta 2} \dots\dots\dots\dots\dots 1$$

$$A_{it} = B^* \llbracket HK_{it} \rrbracket ^{\beta 3} \dots\dots\dots\dots\dots 2$$

Where $Y_{it}$ is denoted as country's output, $L_{it}$ as the labor, $K_{it}$ as capital stocks, $A_{it}$ as the total productivity factor, B as a constant term, and$HK_{it}$ as human capital measured as educational expenditure.

The subscript i = 1... N stands for country i to country N and subscript t = 1... T represents time t, starting from 1 to T. After substituting technologies (A) into the production function and taking logarithm, the production function became:

$$\ln Y_{it} = \beta 0 + \beta 1 \ln(L_{it}) + \beta 2 \ln(K_{it}) + \beta 3 \ln(HK_{it}) \dots\dots\dots\dots\dots 3$$

In this study the researcher applied thateducational expenditureto the growth function based on the assumption that educational expenditure can stimulate economic growth through the technology transfer and spillover effect (Wei Y. and Liu X., 2006). Infrastructure development does lead to economic growth and affects the output significantly (Fedderke J. W., Perkins P. and Luiz J. M., 2006).According to their results, it has also an enormous influence on the productivity of the factors of production and performance of different sectors of the economy. Therefore, in this study, it is to be postulated that the level of human capital (HK), the level of infrastructure (IFR), and international trade policy (ITP) would influence technological capability or total factor productivity.

Public investment is used as a proxy for the level of infrastructure (IFR). Trade openness is used as a proxy for the degree of international trade policy (TRO). Public investment and trade openness reflect host economies' macroeconomic discipline. The production and technology function in this study are shown in Equation 4 and 5, respectively.

$$Y_{it} = A_{it} \llbracket L_{it} \rrbracket ^{\beta 1} \llbracket K_{it} \rrbracket ^{\beta 2} \dots\dots\dots\dots\dots\dots\dots\dots\dots 4$$

$$\text{where } A_{it} = \llbracket \beta i \rrbracket ^* ( \llbracket FDI_{it} \rrbracket ^{\beta 3} \llbracket HK_{it} \rrbracket ^{\beta 4} \llbracket IFR_{it} \rrbracket ^{\beta 5} \llbracket Tro_{it} \rrbracket ^{\beta 6}) \dots\dots\dots\dots 5$$

Substitute the technology function into the production function and then take logarithm for the purpose of linear transformation of nonlinear cob Douglas function, then it became:

$lnYit=\beta0+\beta1 \ ln_{70}(Lit)+\beta2 \ ln_{70}(Kit)+\beta3 \ ln_{70}(FDIit)+\beta4 \ ln_{70}(HKit)+\beta5 \ ln_{70}(IFRit)+\beta6$
$ln_{70}(TROit)+Uit$…………………………………….6

WhereY is denoted as country's GDP, L as labor, K as domestic investment, FDI as human capital, HK as public expenditure on education, IFR as public investment in infrastructure and TRO as trade openness.

## 4. Results and Discussions

This section of the study presents the two major parts of econometric results such as descriptive analysis and econometric analysis with post estimation diagnostic test results.

### 4.1 Descriptive Results

The results of descriptive statistics in this study explain the flows of human capital in East Africa, the relationship between human capital and economic growth as well as the central tendency of all variables.

### 4.1.1 Trends of expenditure on education in East Africa (overall)

Recently east Africa is attracting the most from expenditure on education of Africa. Expenditure on education in east Africa is increasing overtimeas depicted bellow.

**Figure 4.1. Heterogeneity of expenditure on education over a time Period (1990 to 2017)**
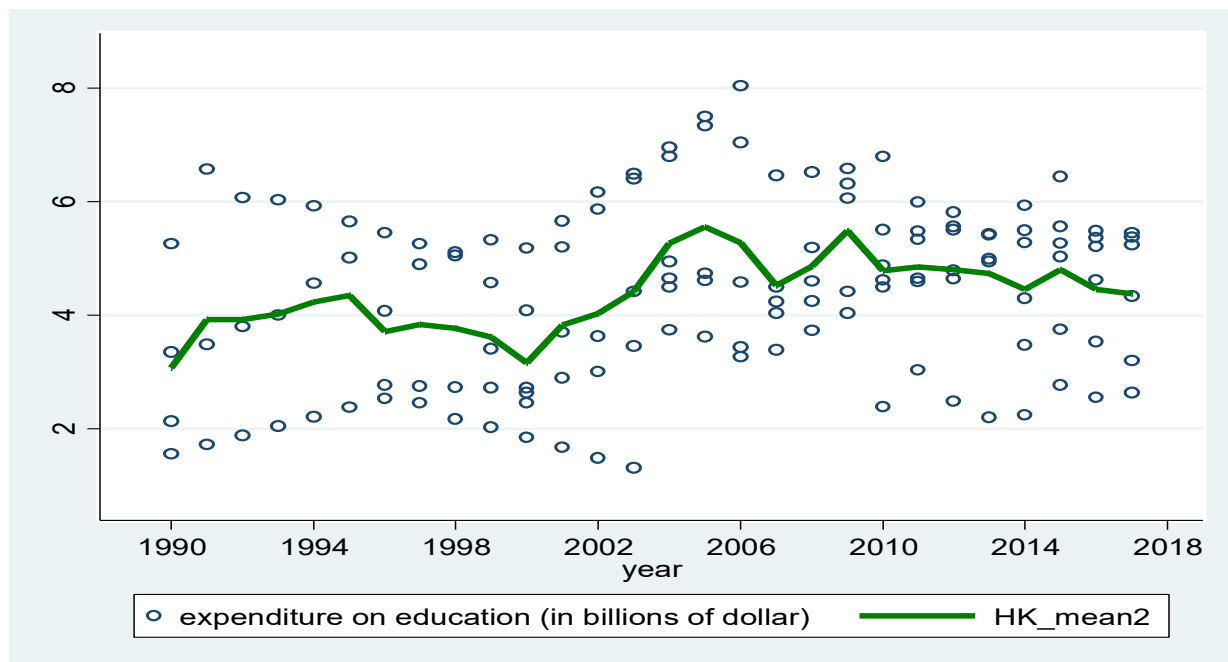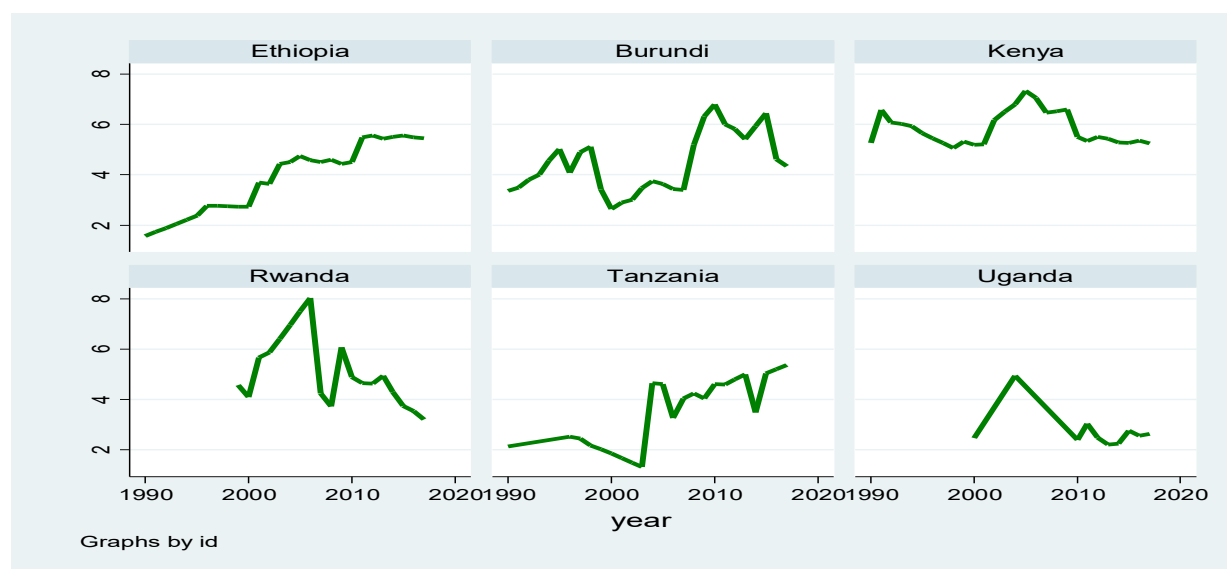


*Source: own computation using STATA*

Figure 4.1 shows that the inflow of expenditure on education into East Africainitially decreases for the 4 year period in 1990 up to 1993 despite the continual up and down between 1993 and 2002 which may be due to political instability and low

infrastructure in the region(Zerayehu Sime Eshete, 2014). Beyond 2002 expenditure on education exhibits a considerable and sustained increase until 2005 then starts to decline in the remaining two periods, which is similar to the global trends of expenditure on education in 2006 and 2007.

**Figure 4.2 trends of expenditure on education in East Africa by Country Over 1990 to 2017**



Graphs by id

*Source; own computation using STATA*

The figure shows that Ethiopia has got remarkable increase in expenditure on education after 2010 from its lowest flow before 2010. Burundi has recorded almost constant inflows of expenditure on education over the period of 1990 to 2010 and slight shock beyond 2010 while Kenya had higher shock after 2010. Expenditure on education in Rwanda was stable between the year 1990 to 2010 and slight shock after 2010 but Tanzania had experienced a greater variability over the period. Expenditure on education in Uganda had increased starting since 2002 but had a kin reduction in 2010 and starts to decrease beyond 2014.

Generally,expenditure on education in each country had a relatively stable inflow between 1990 and 2010, thenshows an increment with relatively high variability between 2010 and 2015 on average, finally starts to decline beyond 2015 as seen from the above figure4.2like the global expenditure on education because of fall in price of exportable commodities.

It is also possible to depict the above figure in an overlaid manner which trends of expenditure on education can be easily comparable among different entities for countries under the study. Below is the result of this expression.

**Figure 4.3 Trends of expenditure on education in an Overlaid Manner over a Time Periods**
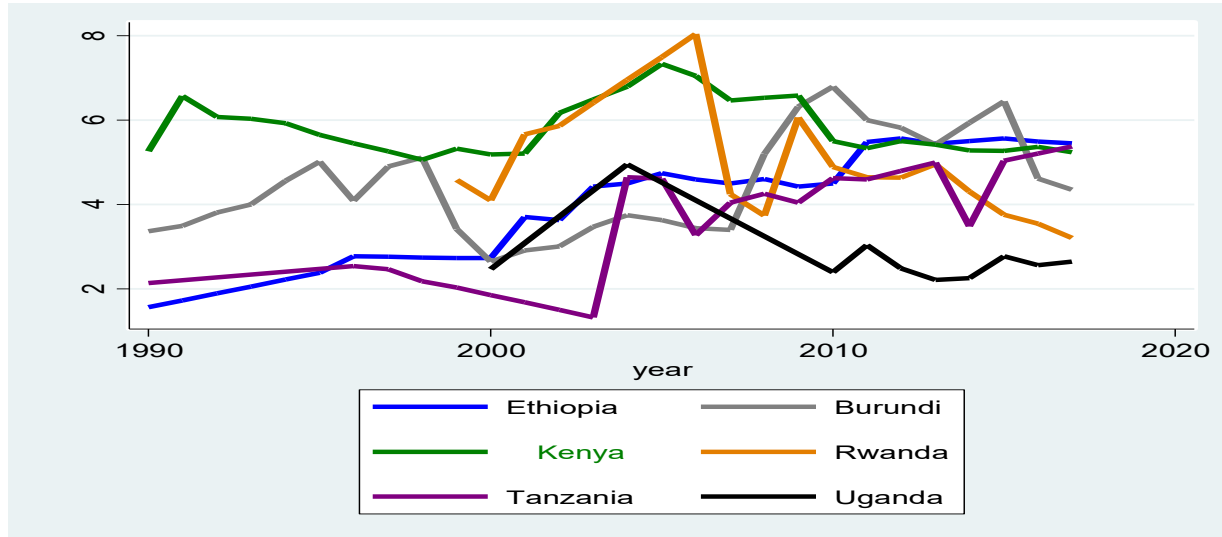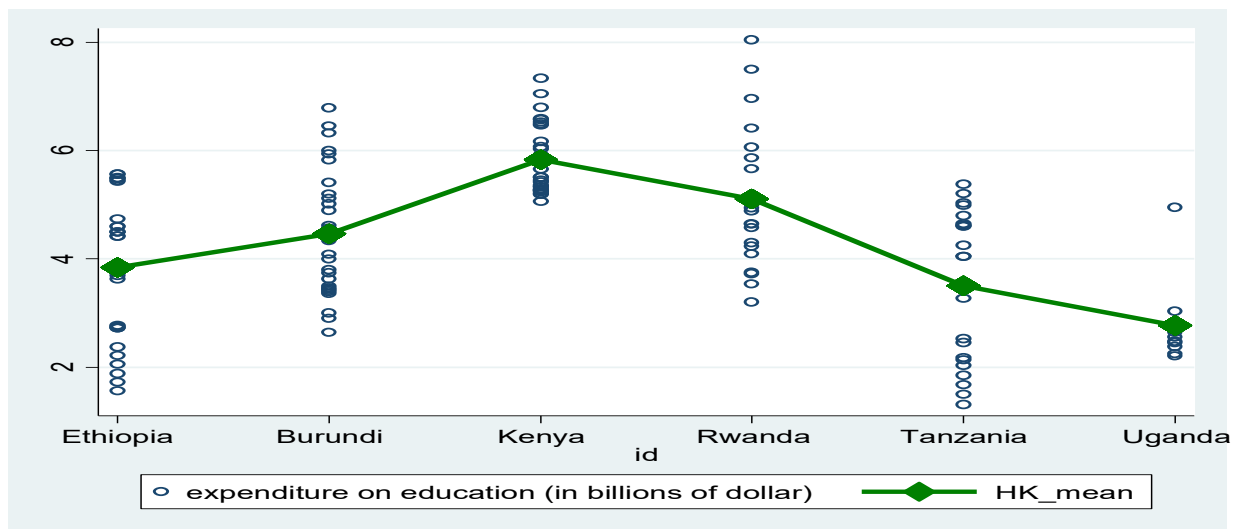


**Figure 4.4 Heterogeneity of expenditure on education across Countries (Entities)**
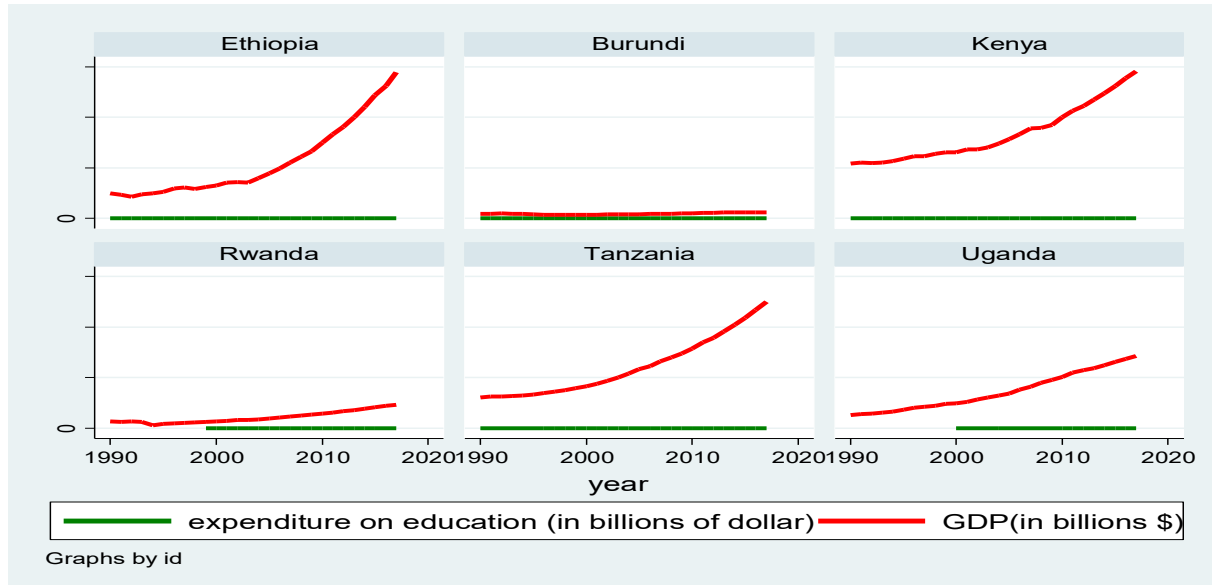


Source: own computation using STATA

The above graph shows the average difference in expenditure on education across countries

4.1.2 The Relationship between expenditure on education and GDP over time

Figure 4.5Relationship between expenditure on education and GDP overtime and across cross-sections

Graphs by id

Source: own computation using STATA

From the above graph 4.6 we can observe the relationship between government expenditure on education and economic growth within each cross-section over the period of 1990 to 20017. Relatively in Ethiopia and Burundi, government expenditure on education and economic growth have positive relationship, while government expenditure on education and economic growth in Tanzania, Uganda and Kenya have negative relationships but in Rwanda government expenditure on education and economic growth have no relationship. For most countries, the relationship between government expenditure on education and economic growth experience's negative relationship in the first periods and promotes a positive relationship in the last periods in the span of the study.

## 4.2 Econometrics Results

Methods for non-stationary time series panels, including unit root and co-integration tests, have been gaining increased acceptance in recent empirical research(Pedroni P., 1996). The extension of conventional non-stationary methods to panels with both cross section and time series dimensions holds considerable promise for empirical research considering the abundance of data which is available in this form. Non-stationary panel methods provide an opportunity for researchers to exploit some of the attractive theoretical properties of non-stationary regressions while addressing in a natural and obvious manner small sample problems that have in the past often hindered the practical success of these methods. Attracted by this fact, the researcher conducted unit root test, co-integration test, panel vector error correction and finally the fully modified ordinary least square estimation technique following the test results.

## 4.2.1 Diagnostic Test Results

No research can conclude the results of regression analysis without considering a range of diagnostic tests for heteroskedasticity, autocorrelation, normality, goodness of fit(Zerayehu Sime Eshete, 2014).Accordingly, the researcher starts with the parameter reliability test. Thescale reliability coefficient result was found 84.43% which shows the consistency of parameters in the model. The time fixed effect test shows that the P>(F) is below the level of significance meaning the null of all year's coefficients are jointly equal to zero can be rejected therefore time fixed-effects are needed.The Breusch and Pagan Lagrangian multiplier test for random effects which used for deciding between random effect and OLS models was tested. If the P> (Chi2) is above the level of significance, Here the null is rejectedand concludes that random effects are not appropriate.

On the other hand,the cross-sectional independence test, based on Pesaran's test of cross-sectional independence, also indicates that the null hypothesis is accepted because; LM test probability is above the level of significance meaning that there is no cross- sectional dependence.The result of the endogeneity test using Wu-Hausman test shows that the P> (F) is below the level of significance meaning that the null of all variables is exogenous, is rejected therefore there is endogeneity problem.The Im, Pesaran, & Shin unit root test results all variables are unit root or non-stationary at level but are stationary at first difference or all are I (1) variables. This result of the unit root test is used as the basis for the panel co-integration test.

### 4.2.2 Regression Results

Based on the diagnostic test results, the researcher used different regression methods that can account for the diagnostic test problems obtained. This part of regression result identifies the best and efficient method of regression that could overcome the data problem like the problem of heteroskedasticity and endogeneity. Using fully modified OLS principles, methods are developed for estimating and testing hypotheses for co-integrating vectors in heterogeneous panels which lead to asymptotically unbiased and nuisance parameter free standard distributions in the presence of idiosyncratic dynamics and fixed effectswith endogeneity and simultaneity problems. Finally, after testing the panel unit root and panel co-integration tests, the researcher used the panel vector error correction to estimate the short run effect and the fully modified OLS co-integration regression techniques for long run coefficients.

### 4.2.2.1 Panel Vector Error Correction Estimation Result

The fact that the variables in the model are co-integrated provides support for the use of an error correction model mechanism (ECM) representation to investigate the short run dynamics. More importantly, the error correction coefficient has the expected negative sign and is significant atthe 10% level. This helps reinforce the finding of a long run relationship among the variables in the model and it implies

that there is convergence speed of adjustment towards equilibrium.Moreover, the error correction term which is denoted by ECM for panel countries aspresented in Table 4.2 Results of Panel Vector Error Correction Model Adjusted For P-Value

| Variables | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| (ECM) | -0.004218 | 0.002520 | -1.674149 | 0.0964 |
| (LNGDP (-1)) | 0.288941 | 0.139535 | 2.070746 | 0.0403 |
| (LNGDP (-2)) | -0.412619 | 0.142788 | -2.889726 | 0.0045 |
| (LNFDI (-1)) | -0.006891 | 0.003126 | -2.204034 | 0.0292 |
| (LNFDI (-2)) | 0.000708 | 0.002910 | 0.243465 | 0.8080 |
| (LNL (-1)) | 4.934289 | 1.001856 | 4.925151 | 0.0000 |
| (LNL (-2)) | -2.100480 | 1.001248 | -2.097861 | 0.0378 |
| (LNK (-1)) | 0.014336 | 0.039197 | 0.365742 | 0.7151 |
| (LNK (-2)) | 0.039843 | 0.038767 | 1.027735 | 0.3059 |
| (LNHK (-1)) | -0.001721 | 0.001998 | -0.861430 | 0.3905 |
| (LNHK (-2)) | -0.001035 | 0.001962 | -0.527637 | 0.5986 |
| (LNIFR (-1)) | 0.002196 | 0.004782 | 0.459197 | 0.6468 |
| (LNIFR (-2)) | 0.000492 | 0.004694 | 0.104768 | 0.9167 |
| (TRO (-1)) | 7.595281 | 1.814990 | 4.184752 | 0.0001 |
| (TRO (-2)) | 0.297020 | 1.659818 | 0.178948 | 0.8582 |
| Constant | -0.028222 | 0.014013 | -2.013963 | 0.0460 |

Table 4.2 shows that (D (LNGDP (-1), D (LNFDI (-1)), D (LNL (-1) and D (TRO (-1))found to have positive and significant at 5% level of significance effect on economic growth in the short run. The size of the coefficient of the error correction term (-0.0042) suggests a relatively low speed of adjustment from the short run deviation to the long run equilibrium of economic growth. More precisely, it indicates that around 0.42 per cent of the deviation from long run growth is corrected every year.

**4.2.2.2 Long-run co-integration regression output using FMOLS**

After conducting various diagnostic tests, the researcher used a Fully Modified Ordinary Least Square method which is adjusted for the problem of heteroscedasticity andautocorrelations by using serial correlation free of any nuisance parameters associated with the idiosyncratic serial correlation pattern in the data. Fully Modified Ordinary Least Square method also considers panel heterogeneityintercepts and can tackle the problem of endogeneity and simultaneity bias.

Because the data has problems listed above and variables are found to have long run relationships, this model is obtained appropriately to estimate the heterogeneous panel co-integrated regression. Moreover, the result of fully modified ordinary least square is here in the table below.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LNFDI | 0.004904 | 0.001407 | 3.484500 | 0.0007 |
| LNL | 1.776690 | 0.093693 | 18.96287 | 0.0000 |
| LNK | 0.229913 | 0.013120 | 17.52397 | 0.0000 |
| LNHK | -0.009272 | 0.000806 | -11.49843 | 0.0000 |
| LNIFR | 0.013472 | 0.002160 | 6.235865 | 0.0000 |
| TRO | -7.155963 | 0.758523 | -9.434078 | 0.0000 |
| R-squared | 0.996318 | Mean dependent var | | 23.06153 |
| AdjustedR-squared | 0.995883 | S.D. dependent var | | 1.130952 |
| S.E. of regression | 0.072564 | squared resid | | 0.758242 |
| Long-run variance | 0.002010 | | | |

**Source: own computation using EViews**

As shown in the above co-integration regression result of fully modified ordinary least square, all variables used in the model are found to have significant long-run effect at 1% level of significance on economic growth of east Africa.

**4.2.2.3 Interpretation of Results**

Human Capital (Government Expenditure on Education);in the short run human capital (LNHK) has no significant effect on GDP growth but has negative and significant impact in the long run. A 1% increase in government expenditure on education leads to a 0.93% decrease in economic growth at a 1% level of significance. In the short run educational expenditure have no return to economic growth which in fact education have no immediate effect on economic growth, But in the long run it has resulted unexpected negative impact which may be because of either educated individuals are mismatched with their skill and job available in a given economy of a country or they are drained to developed countries for better life. The other possible reason is the lack of physical capital to be complemented with educated human capitalto have the fruit of these individuals.

Educated human      capital without accesses to physical capital have no return to economic growth was concluded by the article conducted on Central Asian countries. The article recommends that Central Asian countries must invest in both physical and human capital because both are important for one another as well as for achieving the higher level of economic development. This article also confirms that human capital measured as government expenditure on education has no short run effect on economic growth(Zia Ur Rehman,Muhammad Tariq and Muhammad Azam khan, 2015).

**Foreign direct investment:** the fully modified ordinary least square co-integration regression result found that FDI have positive and significant long run effect on economic growth while it has negative and significant effect in short run at 1% level of significance. In the short run 1% increase in human capital leads to a 0.7% dollar decrease in GDP growth. But in the long run a 1% increase in foreign direct investment can bring a 0.5% dollar increase in economic growth to a 1% level of significance. This result confirms the finding by Aitken B. J. and Harrison A. E., (1997) expressed as in the long run domestic firms could beneficiate from the foreign firms' presence through many channels: foreign direct investment accumulates knowledge inside foreign firms and valorizes them inside local firms, contributing to productivity rise; Domestic firms beneficiate of externalities being in touch with foreign firms' new products and marketing techniques, or receiving technical support from it; and Domestic firms being inputs suppliers for foreign firms, beneficiate from employees experience in the foreign firm.(spillover effect)

**Labor:** the result of short run and long run estimates shows that labor has the expected positive and relevant effect on both short run and long run economic growth at 1% level of significance. In the short run 1% increase in labor leads to 49.34% increase in economic growth and 1% increase in labor increases economic growth by 177.7% in the long run.

Domestic Investment (Capital Stock);capital stock has an insignificant effect on GDP growth in the short run which may depend on the types of investment. If investors are engaged on long term investment projects, then its effect on economic growth in the short run period will be negligible and vice versa for human capital targeted on short term investment projects. But domestic investment has a positive and significant impact in the long run. According to the FMOLS long run regression result, a 1% increase in domestic investment leads to 22.99% increase in GDP growth.

Level of Infrastructure (Government Expenditure on Infrastructure);the effect of level of infrastructure has met the expected result that it has no significant effect in the short run and has the expected positive and significant long run effect with a coefficient value of0.0135 meaning that a percentage increment in government expenditure on infrastructure can bring 1.35% increment for GDP growth.This is because it has no direct effect on economic growth in the short run, but its long run economic effect is indirectly through increasing the productivity of factors of production or through enhancing technical efficiency.

**Trade Openness:** TRO, which is measured as an index of total trade to the GDP, have both positive and significant effects in the short run with a coefficient of 7.6 and have negative and significanteffect with coefficient value of -7.16 in the long run. This phenomenon could occur when the openness index is mainly due to the

number of imports. Sinceimports motivate the economy in the short run whileit demotivates the economy in the long run, which may be due to foreign dependency theory.

## 5. Conclusion, Policy Implication

### 5.1Conclusion and Policy Implication

Human capital measured as government expenditure on education needs special attention why it has violated the generally accepted theory of human capital and growth in east Africa which was proved in East Asian tigers. Its negative effect in the long run may be due to lack of physical capital. More educated labor needs more technology to produce than less educated labor which east Africa lacks it. Labor has the expected outcome while trade openness negatively influences economic growth, which may be due to foreign dependency in the long run. Domestic investment may not be significant for growth in the short run if an investment is engaged inlong-term investment projects; rather it will have positive effects in the long run economic growth.Infrastructural expenditure promotes economic activity there by increasing productivity which increases economic growth in the long run.

### 5.2 Limitation of the Study and Suggestions for Further Studies

Limitations are the boundaries that restrict the research scope and may cause difficulty in completing the research. I am interested to state doubts and obstacles based on the rational that "All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention" Hudson Maxim

In this study the following some inflexible problems were faced.Obtaining data for most East African countries were difficult which limits the numbers of countries to be included in the study. For example, obtaining adequate data for Eritrea, Djibouti, Somalia and the like is inaccessible. The central bank website for each country seems to experience perennial problems that make it inaccessible most of the time. Some bias in research occurs when the researcher fails to considerall the possible variables. Even though the researcher was interested in including corruption as explanatory variable, due to lack of data for 28 years, corruption was excluded from the model.

Research by its nature does not end up rather it needs continuous quest for new knowledge. It is a voyage of discovery. We all possess the vital instinct of inquisitiveness for, when the unknown confronts us, we wonder, and our inquisitiveness makes us probe and attain full and fuller understanding of the unknown. Increased amounts of research make progress possible. Research inculcatesscientific and inductive thinking and promotes the development of logical habits of thinkingand organization(C.R. Kothari, 1990). In addition, an increasingly

complexnature of business and government has focused attention on the use of research in solving operationalproblems. Research, as an aid to economic policy, has gained added importance, both for governmentand business.Therefore, the Researcher would like to suggest whatshould be considered for further study on this area.

Since factors are dynamic in nature, updating not only the data but also the variables or factors that influence growth may be necessary. For example, there may be strong institutional variables that will determine growth like the level of strength of judiciary organs which could control the level of peace and security as well as the level of corruption in each economy. The other suggestion of the researcher goes to the methodology part. Because the roles of educational expenditure to economic growth will be enhanced by other complementary factors, the interaction between expenditure on educationand each initial condition variable could affect growth. For example, if the interaction term between expenditure on educationand level ofphysical capital is positive and statistically significant, it will indicate that the countries that have high level of infrastructure would receive higher benefits from expenditure on educationin encouraging economic growth.

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