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## Anticipated effect of education on economic growth in Ethiopia: time series analysis

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### **Abstract**

*Financing in education has newly instituted vital social objectives for a rationally virtuous level of human capital raises a laborer's proficiency's, productivity and value of life. This research basically focused on the anticipated effect of education Ethiopian economic growth is verified empirically. The research planned at decomposing the relationship between education and economic growth using time series data from 1975/76 to 2015/16. All those independent variables were found to be stationary in first difference. Long-run association among variables, short run and long run dynamics were inveterate through Johnson co-integration analysis and VECM specification. The finding shows in the long run on government education expenditure, labour force, quality education, secondary enrolment rate and tertiary enrolment rate would affect the economic growth. Lastly, the Granger causality test was conducted and the results show that tertiary education and labour force can have a power on economic growth.*

**Keywords:** 1 Co-integration Analysis, 2 Vector Error Correction Model and Grange causality

## Introduction

Investing in education has just constituted significant social goals because a rationally virtuous level of human capital increases a laborer's skills, productivity and quality of life. In addition, through its effect on productivity, human capital buildup has been revealed to be a significant determinant of economic growth. Therefore, links between human capital buildup and economic growth through education can be established (Tarts 2003).

Most of African countries have poor performance in key development indicators like GDP per capita, education enrolment etc. as result education in the Millennium Development Goals (MDGs), were given significant preference. Continuous economic growth is contingent on the level of human capital whose stocks increase due to better education; education is usually regarded as the most direct avenue to rescue substantial number of people out of poverty owing to the tendency for employment opportunities especially for higher skilled workers to be created (Babatunde and Adefabi, 2005)

Currently the rise of Globalization has not only enlarged completion in world economics but also inside and between the education systems. Policies and strategies that drive educational reforms have been adjusted to the new realities by creating structures in education systems that allow assessing comparing and rank ordering national and regional education performances.

Ethiopia is a low income developing country. Education for the knowledge based economy has become a high phrase in education policy discourse throughout the developed world and the transition economies but also increasingly in developing countries. Typically, education improvement that is targeted on helping knowledge based economics emphasizes mathematics and science, information and communication technologies, basic knowledge and skills in literacy and development of interpersonal skills. The successful knowledge economy also requires advanced primary, secondary and tertiary education provision able to increase labour productivity, research and innovation. (UNSECO, 2015)

The Ethiopian Education and Training Policy of 1994 emanates from a national study conducted to identify the limitations to universal education in. The education sector is clearly aligned to provide the workforce with more advanced levels of education and technical skills to stimulate improvements in labour productivity. Efforts were made to make the content and the organization of education more relevant to the diversified needs of the population. (TGE, 1994) In Ethiopia the general education quality improvement project is at present in its second phase, assisting to improve the quality of teaching and learning conditions.

The project delivers annual school grants for school improvement programs and supports new policies on curriculum, teacher training, teacher licensing, school inspection and assessment of student learning. Until recently international attention has tended to focus on universal primary education, which is the second Millennium Development Goal. A shift in emphasis is now obvious towards quality and learning, which are likely to be more central to the 2015 global framework (UNSECO, 2015). Ethiopia has had development policy directions which are entirely dedicated to ensure equitable and inclusive socio-economic development to reduce poverty at all levels. Human resource development has been placed at the Centre of any development agenda of the country.

According to Lucas (1990) study the enrolment impact of education achievement on economic growth; in his summery those generate more growth by more educated people and the inclusion of education human capital c

continued in the work of Barro (2001) who inspected the effect of school enrolment on economic growth. Additionally, government spending on education to check its impact on economic growth, the impact was positive and statically significant.

An additional educated society translates into higher rates of economic growth and thus the ability of governments to improve poverty. However, past studies that find a weak link between education quantity and growth. Bils and Klenow (2000); and Prichett (2001) found that no relation at all between schooling and economic growth.

Some past evidence have tried to investigate the relationship between human capital development and economic growth in Ethiopia. The result of Teshome (2006) found a positive impact of human capital development on economic growth in Ethiopia. Nevertheless they have not shown the individual impact of education and health on economic growth. Consequently both education and health are important elements of human capital, using both better measures of human capital than using education or health indicators alone. In general the research done on the relationship between human capital in proxy education and economic growth attain at different decision. To see this effect new research is needed to analysis and examine.

Under developing country economies has face educational challenge due to resource significance. Due to the renewed efforts made by these economies to increase enrolment rate, quality education and allocate resources efficiently in an effort to achieve the sustainable development program of 'quality education and promote lifelong learning opportunities for all' these also left unresolved anticipated effect of education on economic growth in Ethiopia. It implies that education policy that focuses on improving enrolment ratios and train labor force directed at the quality of education can optimize growth outcomes. The overall objective of the study is to analysis the anticipated effect of education on economic growth in Ethiopia using a time series data specifically to examine the long run relationship between education and economic growth, to examine the short run relationship between education and economic growth and to identify causal relationship between education and economic growth

## **Literature Review**

### **Theoretical Literature Review**

The development of human capital through education has long been accepted to be a significant factor in the development process of a nation. Education is thought to be beneficial because it reduces inequality, improves the quality of life, and in particular it is a factor in increasing the income level and facilitating economic growth. This section would be focused on the final effect and summarize some evidence on the relationship between education and growth. The existing literature contains a number of distinct conceptual rationales for the inclusion of human capital in models of economic growth. As Sianesi and van Reenen (2003) survey study they were showed the two main macro approaches are the augmented Solow model and the new growth theories.

Evidence showed by Benhabib and Spiegel (1994) influential study, propose an empirical growth model in which human capital externalities can be considered in subsequent advances in education and in new physical capital via technology import. The output indeed suggests that human capital impacts growth through two mechanisms. On the one side, human capital seems to influence the rate of domestically produced innovation, as proposed in the endogenous growth model of Romer (1990). However, Prichett (2001) argues credibly that the finding of only a level effect on growth is rather confusing. First, in the framework of endogenous growth, spillover effects of knowledge should be adding to rather instead of the production effects of human capital.

Studies using individual data on wages also emphasize the prominence of labour quality. Stimulatingly, a number of worldwide studies also suggest that, with regard to explaining the impact of education on growth, the quality of schooling is far more important than the quantity of schooling. Put simply, spending time at school is not enough; it is what you learn, how you learn it, and from whom that very much counts (Prosser and Trigwell, 1998; Kis, 2005). The direct positive effects of education, and more generally of human capital, on growth have been demonstrated by empirical analyses employing both macroeconomic and microeconomic data. Several empirical studies show that more affluent countries are also richer in human capital. This is that shows the relationship between the average years of schooling and the real per capita GDP in the year 2000.

### **Education during the Dergue Regime**

During the Dergue regime the structure and organization of educational activities were changed alongside the objectives of the socialist government. In the National Democratic Revolution Program of the Ethiopian Government (April, 1976), Educational Guideline was issued, which states, "There will be an educational program that will provide free education, step by step, to the broad masses". The government's newly stated goals for education were (1) education for political (2) education for scientific consciousness (3) education for production

The practice was critical to the design in 1979 of the National Literacy Campaign Coordinating Committee and a countrywide effort to raise literacy levels. The literacy rate, fewer than 10 percent throughout the Imperial regime, increased to about 63 percent by 1984, according to administration figures. The literacy drive established international praise when the United Nations Educational, Scientific, and Cultural Organization (UNESCO) awarded Ethiopia the International Reading Association Literacy Prize in 1980.

The Dergue regime unsuccessful to build on what was already achieved in the past; recommendations of the ESR were barely followed as claimed. Private sector development and the expansion of the market incentive structure both in the education part and in the labor market were highly discouraged. The Education system has been centralized in both the Imperial and the Derg regimes. And the red tape in a highly decentralized system of education might incur wastes and stifle growth.

### **Developments in Education (1992-2015)**

According to the Transitional Government of Ethiopia (1994), it was essential to substitute the educational structure that served the "old discarded order by the new one". The expansion of the education sector in Ethiopia has been at a premature stage. On the day before of the continuing educational improvement practice, which began in 1994 succeeding the endorsement of the New Training and Education Policy, enrollment in primary education stood at about 2.81 million. This includes over-age pupils that amount 34% of the school-age population. Likewise, enrolment ratio in secondary level stood at about 15% and in the third level at 1 %. Compared to African countries, Ethiopia's enrolment ratios fared among the lowest in primary education and somewhat better though below average in secondary education. Similarly, enrollment in all levels of education is male biased, the tertiary level being worse. (TGE, 1994)

### **Empirical Literature Review**

Many authors articulated the importance of quality educational processes for the transformation of the economy. Barnett (1992), for example, argued that the quality of teaching, the quality of examination process, the quality of courses and the quality of staff development are core educational activities that directly and immediately affect the quality of student's development. Similarly, Horsburgh (1999) pointed out that the curriculum, the actual teaching and learning practices, assessment and examination, learning resources, and internal monitoring systems influence the learning experience of students in universities

Gemmell (1996) for OECD countries concluded that primary education most affects the less developed countries, while secondary and higher education the developed ones. Mc Mahon (1998) examined the effect of the three levels of education on economic growth for a sample of Asian countries and concluded that primary and secondary level have a significantly positive effect on economic growth, while higher is negative.

In the Petrakis Stamatakis (2002) investigation the growth effects of education are subject to on the level of development low income countries advantage from primary and secondary education whereas developed countries benefit from tertiary education. According to Gyimah, et al (2006) examine that entirely levels of education have a positive and significant effect on the growth of per capita income in African countries.

The Developed and under developing countries put pressures on a further human capital development in the direction of fast-tracking the economic growth by offering required efforts and time. Industries performance is observed in standings on both financial and non-financial performance. The finding advances a model which describes the relationship between firm performance and human capital. (Maranet *al*, 2009)

Furthermore, another investigator examined that the role human capital plays on economic growth in 1985-2011 for 17 developed and developing countries. The study examined the relationship between economic growth and human capital used the endogenous growth model. Results of the panel cointegration tests support a long-run positive relationship between economic growth and human capital in both developed and developing countries, however, in this results show that human capital is more effective in developed countries than in developing countries. (Mine and Serkan, 2015).

Another study in Kenya by Mudaki and Masaviru (2012) indicated that public expenditure on education was a highly significant and positive factor on economic growth which is a 14 opposite result with Ditimi (2011). On the other hand, expenditure on agriculture was also found to be a significant albeit negative determinant of economic growth. A similar study in Nigeria by Barisua and Lezaasi (2010) using OLS method of estimation found the short run government expenditure on education had positive and insignificant impact on economic growth while government expenditure on agriculture has a negative and insignificant relationship with GDP.

The other study by Teshome (2006) tried to see the effect of several components of government expenditure on (investment, consumption and human capital) on economic growth and found that only human capital (education and health) has long run significant positive impact on economic growth. Similarly Siraj (2012) using Ram's (1986) framework revealed that public spending on physical investment and human capital development have positive contributions to economic growth while spending on consumption affects growth negatively.

Education is one of the important factors that determine the quality of human capital. Moreover, Hartshorne (1985) advises formal education shows a significant positive role in economic growth. Consequently, human capital with physical capital, are key elements of the nation's

wealth. The former is considered to be an independent factor of production that is indispensable to achieve high and sustainable economic growth rates.

We find a few studies in the Ethiopian context. Another study by Wendwesen (2012) and Fitsum(2013) using vector error correction mechanism found that expenditure on education and road construction have a positive short- run significant impact on economic growth while expenditure on health, agriculture and non-poverty sectors are found to have negative and insignificant effect on GDP growth.

### **Data and Methodology**

#### **Data Source and Description**

This research has measured the empirical relationship analysis of anticipated effect of education on economic growth in Ethiopia. In order to achieve the above objectives, the types of data that would be used for the study are quantitative secondary data. For this study time series data were taken from Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), Central Statistical Agency of Ethiopia (CSA), World Bank(WB) and international labour organization(ILO) from 1975-2015.

#### **Data Analysis**

The Econometric analyses were also used to investigate the role of education on economic growth and determine the reliability of the statistical criteria. The justification for used econometric criterion in the study is; when there was a need to determine the effect of an event on the economy in a specified area and when there is public concern about the potential impacts of a proposed policy, econometric criterion is a paramount method to investigate impact (Glen and Burton, 1997).

#### **Unit Root Tests.**

It is fundamental to test for the statistical properties of variables when dealing with time series data. Time series data are rarely stationary in level forms. Regression involving non-stationary (I.e., variables that have there is no clear trend to return to a constant value or linear trend) time series often lead to the problem of spurious regression. This happens when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Broadly discourse, a stochastic process is said to be stationary if both its variance and mean are constant over time and the value of the covariance between the two time periods be contingent only on the remoteness, gap or lag among the two time periods and not the actual time at that is the covariance is compute. (Gujarati 2004) Therefore, it is necessary to test for time series variables before running any sort of regression analysis. Non-stationarity can be test using Augmented Dickey-Fuller (ADF) test, Phillips Perron (PP) test and Kwiatkowski- Phillips-Schmidt-Shin (KPSS) test.

#### **Optimal Lag Length Selection**

Before go deep into the test of cointegration, there was need for appropriated selection of the optimal lag length used. Estimated the lag length in many econometric analyses is very crucial exercise. The lag length in this study was would be selected had be use explicit statistical information criteria obtained through unrestricted VAR estimate. These statistical information

criteria included, Akaike Information Criterion, Schwartz Information Criterion and Final Prediction Error (FPE). The study for small sample size (60 or less) AIC and FPE has highest probability of correct estimation and for large sample (greater than 60) HQC has the best performance. The study would be used the lag selection criteria, Thus in this study AIC and FPE are used on the ground.

### **Cointegration Test.**

Co-integration is a statistical property that describes long-run relationship of economic time series. Johansen (1988) proposed an approach to investigate long-run relationship among non-stationary variables. This study used Johansen and Juselius (1990) co integration approach for explored long-run relationship between economic growth and education. To analyze the relationship between GDP and education proxy variable, the study used vector auto regression (VAR) and vector error correction models (VECM). The reasoning for these methodologies was as follows: first, this allows the possibility for both GDP and education to be endogenous, as suggested by endogenous growth models. Second VAR and VEC models are useful for forecasting systems of interrelated time series variables and testing causality.

### **Short Run Cointegration-VECM**

A vector error correction model (VECM) is a modeling technique which added error correction features to a multi-factor model such as a vector auto regression model. When the variables are co-integrated, the corresponding error correction representations must be included in the system. By doing so, one can avoid misspecification and omission of the important constraints. Thus, the VAR in can be re-parameterized as a Vector Error Correction Model (VECM) (Hamilton, 1994).

### **Causality Analysis**

A Granger Causality Test is a statistical hypothesis test would be used to find out whether a given time series can be used to forecast or predict another. According to Granger (1988), If variable X Granger causes another variable Y, then the past value of X should contain information that are useful in predicting Y, over and above the information contain in the past value of Y alone.

### **Diagnostic Test and Model Stability test**

In time series data beyond the bound test procedures it is very mandatory to make a diagnostic and model stability tests in order to confirm the robustness of the model under the study. Therefore, this study employed the serial correlation test, functionality form test, normality test and heteroscedasticity test

To test the autocorrelation in a regression mode we used the Breusch-Godfrey serial correlation LM test. It used residuals from the model being considered in a regression analysis and a test statistic is derived from these.

The normality test (Jarque-Bera) under the study conducted based on a test of Skewness and Kurtosis of residuals. The JB test helps to check whether the residuals are normally distributed or not. The null hypothesis is that the joint of the Skewness being zero and the excess Kurtosis being zero (H0: Normality distributed) while the alternative is non-normal distribution (H1)

## Estimation Results and Interpretation

### The Vector Error Correction Model

A vector error correction model is a restricted VAR model that has cointegration restrictions built in to the specification. It is designed for use with non-stationary series that are known to be cointegrated. The vector error correction specification restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing a wide range of short-run dynamics.

### Long-Run Relationships

The cointegration rank test in the previous section suggests two cointegrating equations that define GDP and Labour force as dependent variables. This investigation considers only the first cointegrating equation that relates GDP to other variables the focus is to examine the impact of other variables on GDP growth. After imposing this normalization restriction by the Johansen method, the cointegrating equation for LGDP growth is estimated. The result of the estimation is given by table 5.7.

All the variables which are expected to explain [LGDP] growth are insignificant except log of government expenditure on education [DLGEE] and quality education index (DQUALI). The adjusted R-square shows that 99.45% of the variation in LGDP growth is explained by the combined effects of all the determinants of LGDP in the long-run.

With the evidence from the co-integration test, it can be interpreted that economic growth in Ethiopia positive and significantly depends on government expenditure on education and quality index in the long run.

In Ethiopia government expenditure on education has a positive and statistically significant impact on economic growth. This is in line with the results found by (Wendwesen 2012; Fitsum 2013). Thus, government investment on education sector in Ethiopia helps promote economic growth in the long-run.

The above result can be shown in equation form as below:

This equation is the long-run equation for economic growth which is explained by logarithm of gross domestic product, government expenditure on education, Secondary enrollment rate, Tertiary enrollment rate and quality index and finally the error term  $U_t$  that the long-run analysis.

From the above long run equation economic growth with respect to government expenditure on education sector leading 1 percent increase to an increase in economic growth by 0.05 percent on average. The finding of this study shows that decrease in government education expenditure [depreciation] does not promote economic growth in the long run. The positive sign of government educational expenditure shows that the impact works through the human capital in the long-run. Governments play major roles in the investment in education. The positive relationship between economic growth and expenditure on education supports the Keynesian theory that government investments on social sectors are means of economic growth.

The relationship between change of Quality index [DQUALI] and LGDP growth is found to be positive and significant. The change of educational quality index raise by 1 unit the log of GDP increase by 4.35% the educational quality index increase when other thing remain constant means increase teacher to pupil ratio, decrease reputation rate and increase gender parity index

in all level so government expenditure is relevant for integrate educational quality this entire proxy variable needed budget. This in line result with (Amparo and Ana, 2010) the quality of education proves to be an vital determinant of economic growth. The relationship between tertiary enrolment rate [DTER] and LGDP growth is found to be positive and significant. Increase in tertiary enrolment rate by 1% may increase economic growth by 2.32% in Ethiopia on average. This is in line with (Khalafalla and suleiman, 2013), the result shows the quality of the education has a determinant role in the economic growth; the highly educated people are influencing more the economic output than the secondary educated ones.

#### Short Run Relationship

The model estimates that the short run dynamics which is mainly driven by lagged GDP, total government expenditure on education, Secondary enrollment rate, Tertiary enrollment rate, quality index and Labour force.

The short run coefficient of individual variables should be examined to determine the relative contribution of each component of education to economic growth in Ethiopia. As shown in table 5.8 the co-efficient of the first lagged value of log gross domestic product was positive and insignificant. This indicates, in the short run, gross domestic product in the current period is not sensitive to what it was in the previous period. Similarly, the coefficient of first lagged value of index of quality education was observed to be positive and insignificant and also the first lagged value of tertiary enrollment rate, logarithm of secondary enrollment rate and government expenditure on education were observed to be negative and insignificant.

As to the active labour force, the coefficient is statistically significant and negative implying that 1% increase in labour force leading to a decline in economic growth on average by 1.67% in the short run. This may be due to the fact that Ethiopia is without capacity building or integrate technology.

The co-efficient of the lagged values of government expenditure on education, secondary enrollment rate and tertiary enrollment rate and also index of quality education were observed to be negative and positive respectively and insignificant; this is consistent with a priori expectation. Because, investment on education and integrate has no a significant effect on economic growth in the short run. However, the long-run relationship shows government expenditure on education, tertiary enrollment and index of quality education has positive and significant effect on economic growth except secondary enrollment rate that can be interpreted by the fact that investment on human capital has a long run return.

The coefficient of the error correction term (ECTt-1) for the economic growth equation is significant and negative that is correctly signed and indicating the existence of long-run relationship amongst the growth model variables.

The error correction term has important implication in linking the short-run periods to the long run period. It represents the adjustment of the short-run disequilibrium to achieve a long-run equilibrium. Its coefficient is negative and statistically less than one in absolute value. This is the expected sign for the stability of a long-run relationship. A stable cointegrating relationship adjusts the short-run deviations by the extent of the error correcting term. The finding in table 5.8 shows that the lag of GDP growth adjusts itself by 43.96% each year to its equilibrium value and is expected to achieve equilibrium after 2.3 years. The adjusted R-square shows that 33.98% of the variation in LGDP growth is explained by the combined effects of all the determinants of LGDP in the short-run.

## Diagnostic tests on the residual of the vector error correction model

The diagnostic tests from annex 1 including Breusch-Godfrey serial correlation LM test, Jacque Bera-normality test and Heteroscedasticity test are failed to reject the entire above null hypothesis at 5% significant level. All the tests show that the model has the desired econometric properties; therefore, the results reported are valid and reliable for interpretation.

## Granger Causality Test

Granger causality test is used to examine the relationship between the variables included in and the relevance of using a VAR model. If the variables are endogenously related to each other in the system, the use of a VAR model is valid.

Annex 2 shows that Government educational expenditure [LGEE] granger causes of all variables in the VAR system except with quality index while tertiary enrolment rate [TER] grange cause can affect all variables except active labour force. The primary enrolment rate [SEP] and log of secondary enrolment rate [LSER], while tertiary enrolment rate [TER] and quality index has been bidirectional causality. The Government educational expenditure [LGEE], log of gross domestic product [LGDP], quality index [QUALITY], log of secondary enrolment rate [LSER] and primary enrolment rate [PER] may be caused by tertiary enrolment rate [TER]. Active labour force growth [LF] also grange causes by tertiary enrollment rate [TER]. The Granger-causality test shows that LGDP is not exogenous. The LGDP can be grange caused by only two variables in the system; active labour force and tertiary enrollment rate.

The above table 5.9 result implies the F statistics of the first equation proved the causality between GDP and government expenditure on education is unidirectional indicating the government expenditure on education as the cause for economic growth during the study period. These results suggest that the direction of causality is from government expenditure on education to GDP since the estimated F is significant at the 5 % level of significant; Reject the null hypothesis that LGEE does not Granger Cause to LGDP. On the other hand, there is no reverse causation from LGDP growth to government expenditure on education, because the F value is statistically insignificant, the result is concistance with (*B.Omojimite, 2010*).

The F statistics of the second equation proved the causality between GDP and active labour force is unidirectional indicating the economic growth as the cause for active labour force during the study period. These results suggest that the direction of causality is from GDP growth to active labour force since the estimated F is significant at the 5 % level of significant; Reject the null hypothesis that LGDP does not Granger Cause to LF.

The F statistics of the third equation proved the causality between GDP and primary enrollment rate are no any directional indicating the economic growth as the not cause for primary enrollment during the study period. These results suggest that the direction is not any causality from neither GDP growth to primary enrollment rate nor from primary enrollment rate to LGDP growth, because since the estimated F are insignificant at the 5 % level of significant Similarly the F statistics of the fourth equation proved the causality between GDP and tertiary enrollment rate is unidirectional indicating the economic growth as the cause for tertiary enrollment rate during the study period. These results suggest that the direction of causality is from GDP growth to tertiary enrollment rate since the estimated F is significant at the 5 % level of significant; Reject the null hypothesis that LGDP does not Granger Cause to TER.

The F statistics of the fifth equation proved the causality between GDP and log of secondary enrollment rate are no any directional indicating the economic growth as the not cause for log of secondary enrollment rate during the study period. These results suggest that the direction is

not any causality from neither GDP growth to log of secondary enrollment rate nor from log of secondary enrollment rate to LGDP growth, because since the estimated F are insignificant at the 5 % level of significant; not reject the null hypothesis that LGDP does not Granger Cause to LSER and reverse causation from LSER to LGDP growth, because the F value is statistically insignificant. The same is true the index of quality education.

## **Conclusion and Recommendation**

### **Conclusion**

The findings of the study suggest that, excluding enrolments in secondary education, all other components of education in terms of quantity and quality have favorable impacts on economic growth in long run. The study also found that the short run relationship is the negative relationship between in the labour force and economic growth in Ethiopia. The contribution of secondary enrolments to economic growth has been shown in this study to be negative. This is not surprising as secondary students are increasingly choosing schooling instead of entering the labour market.

The findings on labour force also show contradictor results in the short run and in the long run. In the long run, increase in labour force promotes economic growth and the reverse is true in the short run. In short run labour force market access almost the same categories of unskilled man power with technology as it is. Consequently, developing economies faced commonly owing to absence of social security systems, low wages and income (ILO, 2011). The significant determinants of long run economic growth in Ethiopia are government expenditure, active labour force, secondary enrollment rate, tertiary enrollment rate and quality education.

The quality of education measured in this study by the index of reputation rate, pupil to teacher ratio in primary, pupil to teacher ratio in secondary, pupil to teacher ratio in tertiary and gender parity index in GDP. Further work is required on developing this measure and isolating the true improvements in educational outcomes from increases resulting from structural change in the sector. About 4.3541 percent of annual growth in GDP per capita is contributed by the quality education.

Finally, Cointegration among economic growth and education has been found. The findings of this study also indicate the existence of the feedback causality between education and all levels of education with economic growth. Among all levels of education, general higher education causes economic growth highly and most significantly while the level of confidence of causing economic growth to school education is found to be the highest. Labour force as compare to key factor in understanding the relationship between education and economic growth. The Granger causality test was conducted and the results show that tertiary education and labour force can have an impact on economic growth. In this implies that economic growth has got impact on both tertiary enrollment rate and labour force, whereas government expenditure on education is cause of economic growth it implies that government expenditure on education has got impact on economic growth.

### **Recommendation**

The policy implications that stem from these results are important. This study recommends more investment in tertiary education. So that economic growth can be further accelerated, that in turn, leads to further education and hence economic growth. The government should increase the investment on education to have an increase in the economic growth. Increase government expenditure on education has desirable impact on the tertiary enrollment rate, secondary enrollment rate, labour force and economic growth thought the year. Increase government expenditure on education has desirable impact on the tertiary enrollment rate, secondary enrollment rate, labour force and economic growth.

Whereas, should increase government expenditure on education with a view to increasing education quality. Education policy that focuses on the provision of facilities aimed at improving the number of tertiary enrollment rate, reducing pupil-teacher ratios, increase gender parity index and reduce drop out. The researcher strongly recommends that to ensure sustainability of economic growth need to emphasis on Improve of labour force toward skill development.

This research focus on the major limitation of the study is that it does not include other quality variables of education as a repressor in the model. It is left on the interested readers to analyze the relationship between education and economic growth by including the international test score, survival rate along with quality index by using panel data analysis.

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**Long run coefficient Coefficients**

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.587144	0.138250	4.246975	0.0002
C(2)	0.009574	0.005799	1.651011	0.1082
C(3)	0.048917	0.018186	2.689733	0.0111
C(4)	-0.074851	0.039840	-1.878759	0.0691
C(5)	0.043541	0.015235	2.857871	0.0073
C(6)	0.023179	0.011661	1.987739	0.0552
C(7)	4.732732	1.562588	3.028778	0.0047
R-squared	0.995403	Mean dependent var		12.24352
Adjusted R-squared	0.994568	S.D. dependent var		0.621822
S.E. of regression	0.045831	Akaike info criterion		-3.170063
Sum squared resid	0.069317	Schwarz criterion		-2.874509
Log likelihood	70.40127	Hannan-Quinn criter.		-3.063200
F-statistic	1191.013	Durbin-Watson stat		2.070997
Prob(F-statistic)	0.000000			

Source: Author's own calculation using Eviews 8

**Short-Run coefficients**

	Coefficient	Std. Error	t-Statistic	Prob.
*C(1)	-0.439587	0.110538	-3.976777	0.0004
C(2)	0.124366	0.151688	0.819882	0.4185
C(3)	-0.020188	0.024918	-0.810162	0.4240
C(4)	-0.025800	0.113271	-0.227770	0.8213
C(5)	-0.016720	0.009153	-1.826747	0.0774
C(6)	0.011717	0.026660	0.439487	0.6634
C(7)	-0.026383	0.025019	-1.054522	0.2998
C(8)	0.070954	0.016272	4.360470	0.0001
R-squared	0.461496	Mean dependent var		0.052546
Adjusted R-squared	0.339899	S.D. dependent var		0.058924
S.E. of regression	0.047874	Akaike info criterion		-3.059802
Sum squared resid	0.071050	Schwarz criterion		-2.718559
Log likelihood	67.66614	Hannan-Quinn criter.		-2.937367
F-statistic	3.795275	Durbin-Watson stat		2.025916
Prob(F-statistic)	0.004373			

Source: Author's own calculation using Eviews 8

**Chi-square statistics and respective p-value for Granger Causality test**

Pairwise Granger Causality Tests			
Null hypothesis	Obs	F-statistics	Prob.
LGEE does not Granger Cause LGDP	40	4.51**	0.0405
LGDP does not Granger Cause LGEE		1.27	0.2667
LF does not Granger Cause LGDP	40	1.30	0.2615
LGDP does not Granger Cause LF		12.029*	0.0013
PER does not Granger Cause LGDP	40	0.485	0.4905
LGDP does not Granger Cause PER		2.13058	0.1528
LSER does not Granger Cause LGDP	40	0.27	0.6048
LGDP does not Granger Cause LSER		2.6	0.1588
TER does not Granger Cause LGDP	40	0.2184	0.6430
LGDP does not Granger Cause TER		6.85**	0.0128
QUAL does not Granger Cause LGDP	40	2.1303	0.1528
LGDP does not Granger Cause QUAL		0.39505	0.5335

Source: Author's own calculation using Eviews 8