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Impact of Higher Education on Economic Growth in Malawi: A Vector Error Correction Analysis

Gift Mbewe
PhD student, School of Public Administration, Dongbei University of Finance and Economics, China

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A B S T R A C T
This study examined the impact of higher education on economic growth in Malawi from 1995 to 2021. The study contributes to existing literature by providing more recent evidence and as well contributes to the debate on whether higher education has a positive or negative impact on economic growth in a developing country like Malawi. Empirical studies have so far yielded inconclusive results. The time series variables were tested to find out its order of integration using Dickey Fuller and the series were all non-stationary at level but became stationary after first difference. The study employed cointegration and evidence of cointegration of higher education and economic growth was established. However, Vector Error Correction Model estimates showed that there is negative long run relationship between higher education and economic growth. Thus, the government and other relevant education stakeholders should strive to increase enrollment in tertiary institutions so that it yields significant impact on economic output.

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Corresponding Author:
Gift Mbewe
PhD student, School of Public Administration, Dongbei University of Finance and Economics, China
Email: giftmbewe56@gmail.com

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1. INTRODUCTION

1.1 Background of the study

Since the inception of new growth theories, education has been widely regarded as one of significant contributors of economic growth. This follows the extension of Solow model by Mankiw, Romer and Weil (1992) who incorporated human capital in the Solow model. As such the relationship between education and economic growth has attracted the interest of many researchers and most studies have generally established that there is a positive relationship between education and economic growth (i.e., Isola & Alani, 2011, Brempong, 2006 & Cooray, 2009).

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In recognition of the significance of education, Malawi with the assistance of international stakeholders has been exerting more effort in the education sector by increasing its investments and improving quality and quantity aspects of education. Following earlier empirical evidence (i.e Psacharopoulos, 2004), more attention has been to basic and secondary school education while neglecting Higher education which has contributed to economic growth in other developed countries. As such higher education in Malawi remains underdeveloped (Mambo et al., 2016). Access to higher education remains a luxury as a small percentage of Malawian citizens have access to higher learning institutions. For instance, in 2018, only 3,2972 students were enrolled in higher education, which constituted 30% of all students who qualified for higher education (Ministry of Education, 2019). As of 2021, Malawi's tertiary gross enrolment rate was at 0.4 percent as compared to 8.2% of Sub-Saharan countries average enrolment (Kayange, 2021). Apart from low enrollment, World Bank reported that higher education system in Malawi lacks adequate qualified staff and there is lack of qualified graduates to meet the needs of the country (Mambo et al., 2016). The overall education system in Malawi beginning from primary to tertiary is not efficient and this is characterized by significant declining numbers of learners as they go up. Dwindling standards of education comes at a time when Malawi is striving to achieve Sustainable Development Goals and National Agenda of 2063.

Most previous studies on the impact of education on economic growth have focused on the impact of all levels of education on all economic growth and in more than one country. Less attention in the literature has been given to how higher education affects economic growth for single country and focusing higher education. Additionally, previous studies differ on the proxies used. Milanzi (2018) conducted a study on the impact of human capital in Malawi and the study used education expenditure as proxy for education. In this study, student enrollment in higher education is used instead as a proxy. Literature has shown that different results are yielded when different proxies are used to measure education. And ultimately, results on the impact of higher education on economic growth have been inconclusive, with others finding a positive relationship (Barro & Sala-i-Martin, 1995; Pimar, 2022; Bakare, 2006; Mudaki & Musaviru, 2012; Omondi, 2012 & Kotaskova et al., 2018) and others finding a negative relationship (Milanzi, 2018 & Omodero & Kalanechi, 2020 & Grabowski, 2004). This study makes a contribution to literature by studying the impact of higher education on education on Malawi.

1.2 Literature Review

Economists have over the years developed theories that attempt to explain factors that drive economic growth. There are three main views that have come up that attempt to explain growth and they are: classical growth theory, neo-classical growth theory and endogenous growth theory.

Classical growth theory is the traditional view of economic growth and it states that growth is a result of capital and labor. This view ignores the role of technical progress in promoting economic growth. Adam smith is one of the leading figures of this theory (Perkins, 2006). While, Neoclassical growth theory describes how a steady economic growth happen due to three factors namely labor, capital and technology. Robert Solow is one of the leading proponents of this theory. In the 1980s, Endogenous or new growth theory emerged and it states that economic growth is generated through endogenous factors. This view claims that external factors like technological progress are the main sources of economic growth. This was been developed by Romer and Lucas in the 1980s. This theory puts emphasis on the role of human capital and it is considered as a factor that has no diminishing returns (Cortright 2001).

Many empirical studies have been conducted on the relationship between higher education and economic growth and their results have been inconclusive. while other studies have established that higher education is positively related to economic growth while others have found the opposite.

Studies have established that there is a positive relationship between higher education and economic growth in Africa and other countries. The studies have used various methodologies, proxies of variables and some have been cross-country while others have focused on a single country. Using panel data from 1960 to 2000 and dynamic panel estimator to investigate the effect of higher education on economic growth in African countries, it was established that all levels of education including higher education, have positive and statistically significant effect on the growth rate of per capita income in African counties (Gyimah-Brempong, Paddison & Mitiku, 2006). This evidence of positive relationship was in contrast to earlier and popular findings that there is no significant relationship between higher education and economic growth in developing countries. Similarly, a study in Pakistan, found that education has a long-run relationship with economic growth. The paper investigated the impact of government expenditure on education on economic growth in Pakistan for the period 1980-2009 by using co-integration and vector error correction techniques. More evidence on the positive relationship between higher education and economic growth has been provided by Bloom et al. (2014) who argued in their study involving 108 countries that increasing tertiary education may be essential in enhancing faster technological catch-up and increasing economic output. He argued against the belief that tertiary education plays little role in promoting economic growth in developing countries. Recent Study by Mabroker, Haifa & Rania (2018) in both developed and developing countries has also found that higher education is cointegrated with economic growth. The study examined the relationship between innovation, higher education and economic growth during the 1996-2014 period.

Furthermore, the study by Khorasgani (2008) using Autoregression Distributed Lag Approach showed that higher education played an important role in the economic growth of Iran both in the short and long run during the period 1959–2005. This study showed that increasing investment in higher education in Iran by one percent was likely to contribute to improving GDP 0.198 percent in the short term and 0.314 percent in the long term. Another recent study by Serifoglu & Guney (2022) studying the contribution of tertiary education by field on economic growth for 29 developed and 25 developing countries from 1998 to 2012 revealed that graduates from education, humanities and social sciences contributed most to economic growth in developing countries unlike in developed countries where science graduates contribute more to economic growth. Further study investigating the link between higher education, innovation and economic growth in 42 countries over the 1996-2014 period using Dynamic Ordinary Least Square method revealed an existence of long run relationship between the higher education and economic growth (Mabrouka Mefteh & Ben Ammar, 2018). Other country level studies in Libya (Alsanousi, 2017) and in Cameroon (Fonkeng & Ntembe, 2009) have also showed that higher education and economic growth have a strong positive relationship. There is overwhelming evidence in recent studies that higher education leads to economic growth.

Despite that a number of studies have established a positive relationship between higher education and economic growth, other studies have found negative and no significant relationship between higher education and economic growth. Using co-integration and ordinary least square method, a study in Uganda by Pimar (2022) showed that there was a negative and insignificant long-term relationship between higher education and economic growth. Similarly, a study in Nepal by Dahl (2013) using autoregressive distributed lag method of cointegration and data from 1975 to 2011 found that higher education has no impact on economic growth.

The recent results by Nanyanzi (2020) have also shown that there is an insignificant long-term relationship between higher education and economic growth for both time series and panel analysis. Time series analysis showed that higher education enrollment and GDP have a positive insignificant long-run relationship while panel analysis results indicate a negative insignificant long-run relationship.

Furthermore, study by Charowe (2021) investigating the role of higher education in economic growth for Botswana between 1981 and 2016 using Auto Regressive Distributed Lag Model and Toda & Yamamoto (1995) Causality approaches showed that there was no evidence of long run relationship between economic growth and higher education. Glewwe et al. (2014) examined the impact of education on economic growth in sub-Saharan African countries and their results showed that the effect of education on economic growth in sub-Saharan Africa is lower than that in other countries due to lower school quality and the effects of secondary school and tertiary institutions were diminishing growth.

Furthermore, Hamdan et al. (2020) econometric study aimed at investigating the relationship between expenditure on higher education and economic development in Saudi Arabia. from 1978 until 2017 revealed that there was no relationship between investment in higher education and economic development in Saudi Arabia. Other earlier studies that have studied the impact of all levels of education on the economic growth have shown that there is no a link between higher education and economic growth, especially in developing countries where primary education is more important than higher education (Psacharopoulos and Patrinos, 2004). In Malawi, Milanzi & Mongale (2018) studying how human capital investment affects economic growth using autoregressive distributed lag approach, supported the view that human capital and economic growth have a negative relationship.

Inconclusion, the studies on the relationship between higher education and economic growth have been inconclusive. Some have argued there is positive link between higher education and economic growth while others argued against this. It is based on such raging and inconclusive debate that this study seeks to provide more evidence from Malawi by investigating if there is a relationship between higher education and economic growth using Vector Error Correction Model and to determine the type of relationship that exist using enrollment as a proxy for education.

1.3 Research Questions

The following questions will be answered to achieve the aim of the research:

- Does higher education contribute to economic growth in Malawi?
- Is there a long run relationship between higher education and economic growth?

1.4 Research Objectives

- To analyze the impact of higher education in economic growth
- To determine the long-run relationship between higher education and economic growth

2. METHOD

2.1 Model specification: Theoretical and econometric model

We use Solow growth model to estimate the impact of higher education on economic growth. The basic Solow is as follows:

$$Y_t = A\,(\mathrm{K}, \mathrm{L}) \ldots (1)$$

Note: Y = the total output at time t, K = the stock of capital formation, L = the total labor force, A = the level of technology

The above growth model is extended to estimate impact of higher education on economic growth and it becomes in logarithm form as follows:

$$lnGDP_T = a + \beta_1 lnhe + \beta_2 lnpop + \beta_3 lnk + E \ldots (2)$$

Note: GDP = the Gross domestic product that measurers economic growth at time t, he= higher education enrollment, pop= the total population, k= the gross capital formation, $\beta_1\beta_2\beta_3$ = the parameters to be estimated, E = the error term

The econometric model utilized in the empirical analysis is log linear form as follows.

$$lngdp_t = \alpha + +\beta_1 lnhe_t + \beta_2 lnK_t + \beta_3 lnL_t + \epsilon_t \ldots (3)$$

The assumption for the purposes of modeling is that education causes economic growth.

2.2 Data sources

Data was obtained from World Bank website and it covers the period from 1995 to 2021. This period was selected because its data was readily available and all the variables are expressed in logarithmic form.

2.3 Empirical analysis

This section focuses on empirically determining the impact of higher education on economic growth. This study has used both descriptive and inferential ways of analysis data. Before econometric analysis was conducted, stationarity test was conducted followed by cointegration test to check the existence of long run relationship between the variables and Vector Error Correction Model was run. Finally, diagnostics tests were conducted.

2.4 Unit root test

Unit root test was carried out to avoid getting spurious results and the method used to determine if the time series data was stationary or not is Augmented Dickey Fuller test (Dickey and Fuller, 1981). The null hypothesis is that there is no unit root against the alternative hypothesis is that there is unit root problem.

2.5 Cointegration-test

After unit root test, Johannsen cointegration test (1991) was conducted to determine the number of cointegrating equations. This is carried out if the time series data is integrated of the same order 1(1) (Gonzalo, 1994). The null hypothesis is that there is no cointegration equation while alternative hypothesis is that there is cointegration.

2.6 Vector Error Correctional Model

Having verified that the variables were cointegrated, Vector Error Correction Model was applied. Vector Error Correction Model is an extension of Vector Autoregression and the necessarily condition for Vector Error Correction Model to be estimated is when the variables are cointegrated.

2.7 Empirical Results

This section presents results from the empirical analysis. This section will present the results of all the test as carried out in Stata.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1. Descriptive statistics

Table 1 below shows descriptively the summary statistic of the variables from 1995 to 2021. These include the mean, standard deviation, maximum and minimum. Overall, there were 27 observations.

Table 1. Descriptive statistics

Variable	Obs	mean	Std. Dev	Min	Max
lnGDP	27	22.22269	.6492752	21.057792	23.25908
lnhe	27	-4102214	.43372105	-1.13728	.54443
lnpop	27	16.44065	.214733	16.10242	16.79347
lnk	27	6.244762	1.014034	4.865224	7.361185

Source: author

3.1.2. Unit root test results

Augmented Dickey Fuller test was conducted and the test results are presented in table 2. The results showed that all the variables were non stationary at level but became stationary at first difference.

Table 2. Dickey fuller test results with a trend and constant

Variable	ADF statistics	95% Critical value	Order of integration	Results
Log of GDP	-4.489	-3.600	(1)	Stationary
Log of Higher education	-3.882	-3.600	(1)	Stationary
Log of capital formation	-4.489	-3.600	(1)	Stationary
Log of Population	-3.983	-3.600	(1)	Stationary

Source: author

3.1.3. Johansen cointegration test

All the variables were non stationary at level and became stationary after first difference and therefore appropriate cointegration method is by Johansen (1991). Following the test, trace static and a max statistic evidence of cointegrating equation at rank two was found. The null hypothesis of no cointegration equation was rejected.

Table 4: Johansen cointegration test results

Maximum Rank	Parms	LL	Eigen value	Trace statistics	5% critical value
0	20	153.76965		102.0313	47.21
1	27	187.67988	0.53365	34.2109	29.68
2	32	198.25764	057097	13.553	15.41
3	35	204.67627	0.40260	0.2181	3.76
4	36	204.78531	0.00868		

Source: author

3.1.4. Vector Error Correction Model

The log of higher education has a negative impact on the log of GDP in the long run and the coefficient is statistically significant at 1%. While the log of capital and log of population have a positive impact on the log of GDP and the coefficients are statistically significant at 1%

Table 5. Vector Error Correction Model estimation results

Variable	Coef.	Std. Err.	Z	p>lzl	[95% conf. interval]	
LnGdp				1		
Lnhe	2.35618	.2890681	8.15	0.000	1.789617	2.922743
Lnpop	-14.7776	.8873053	-16.5	0.000	-16.5166	-13.03851
Lnk	1.662632	.1713958	9.70	0.000	1.326707	1.998561
Cons	207.8901					

Source: author

3.1.5. Diagnostics

To ensure that the model is robust post estimation diagnosis was conducted and these include autocorrelation test, heteroscedastic test and Jacque-bera normality test. The model showed that it was stable, had no autocorrelation and heteroscedasticity. All the probability values were insignificant thereby providing evidence to reject the null hypothesis of instability, heteroscedasticity and autocorrelation.

Table 6. Autocorrelation test: Langager-multiplier test results

Lag	Chi2	Df	Prob>chi2
1	17.6378	16	0.34553
2	9.1582	16	0.90675

Source: author

Table 7. Normality test: Jarque bera test results

Equation	**Chi2**	**Df**	**Prob>chi2**
LnGdp	0.529	2	0.76765
Lnhe	1.268	2	0.53056
Lnpop	2.401	2	0.301107
Lnk	2.438	2	0.29546
ALL	6.636	8	0.57639

Source: author

Table 8. Stability test results

Eigenvalue	**Modulus**
1	1
1	1
1	1
.5324975 + .26092i	.592986
. 5324975 - .26092i	.592986
-.4565235	.456524
.07495971 + .1035841i	.127862
.07495971 - .1035841i	.127862

Source: Author

3.2 Discussion

The study has established that there is a long run negative relationship between higher education and economic growth. The existence of negative impact of higher education on economic growth is consistent with previous studies, such as by Milanzi & Molenge (2018) in Malawi, Hamdam et al. (2020) in Saudi Arabia and Omodero & Kalanechi (2020) in Nigeria.

4. CONCLUSION

The major objective of this study was to analyze the impact of higher education on economic growth during the period 1995-2021. To estimate the impact of higher education on economic growth, the study used cointegration and error correction model. Before estimation, unit root test showed that the variables were non-stationary at level and integrated of the same order. The empirical results revealed that higher education has a negative impact on economic growth confirming earlier findings by other scholars. To begin with, the results indicate negative relationship between higher education and economic growth. Based on that finding, the government should invest more in university education so that it has positive impact on economic growth. The policy makers should focus on increasing investments and enrolment in higher education so that it can have a positive contribution to economic growth. Higher enrollment can be achieved through promoting private tertiary institutions and adoption of off campus learning modes. Higher education should produce relevant graduates who can spearhead economic development. Much as higher quantity of graduates from universities is needed, quality of the graduates is of paramount. The focus should be on imparting on them hands on experience to be producers and not consumers.

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