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HIGHER EDUCATION AND ECONOMIC GROWTH: EVIDENCE FROM AFRICA

Abstract:

This paper assesses the economic contribution of tertiary education for a sample of 13 African economies over the time period 1990-2013. Using a Panel VAR framework to account for the dynamic and endogeneous relationship between tertiary education(TER) and growth, our findings show that TER is positively and significantly related to the economic growth of the sample of African countries under study. It is noteworthy that the magnitude of the TER coefficient remains relatively smaller as those obtained for developed country cases and samples. Interestingly the study also found the presence of a reverse causation as output appears to be also a determinant of TER. In other words, output level which proxies for the earning capacity of the economy play an important role in TER, which is mostly financed by the government in the countries under study. In addition to the national income, domestic investment, education attainment, foreign direct investment and openness level being other determinants of such TER for these countries. Moreover, there is evidence that TER encourages private investment suggesting some indirect effects of TER on output via the private capital channel. As such similar indirect effect through the FDI channel is observed.

Keywords:

Higher Education, Africa, Economic Growth

JEL Classification: A23

1. INTRODUCTION

Economic growth remains one of the most important macro-economic objectives of government given its direct impact on living standard and the general welfare of the population. Indeed the search for the ingredients of the economic growth is an ongoing research theme. Research has focused on a number of well known determinants such as capital stock, FDI, human capital, productivity, openness, financial development, and also education. The latter is widely accepted as being instrumental in promoting economic growth, particularly for the case of Africa if the continent is to gradually come out of poverty. It is a fact that African countries and their development partners have put their effort and resources on primary and secondary education since several decades now, with tertiary education being relatively neglected as an ingredient to foster economic growth and mitigate poverty. Higher education is an important form of investment in human capital development and can be considered as a high level or a specialised form of human capital with potentially significant growth contribution. Castells (1994) regarded higher education as the 'engine of development in the new world economy'. The author argued that it also provides more than educated workers and also knowledge workers who are critical for the growth of the economy. Higher education leads to the creation of attitude and also positive change in attitudes which remains essential for individuals in terms of socialisation and also for the modernisation and enhanced transformation of societies. Most importantly, higher education assists in the creation, absorption and dissemination of new knowledge through teaching and research. Indeed, the Organisation for Economic Co-operation and Development (OECD, 2009) pointed out that higher education is linked to social and economic development through four major channels namely i) the formation of human capital through teaching, ii) the creation of knowledge bases through research and knowledge development, iii) the dissemination and use of knowledge and iv) the maintenance of knowledge through 'inter-generational storage'. Moreover, Pillay (2011) argued that that higher education is both 'a result and a determinant of income, and can produce public and private benefits'. Higher education may enhance savings and investment, generate greater tax revenue, and also lead to a more entrepreneurial and civic population. As such improvement of a nation's health, reduced population growth, improved technology and strengthened governance are also linked as the benefits of such education.

Empirically speaking, while the overwhelming majority of the growth literature reported that human capital has a positive impact on the growth rate of income (See Barro, 1997, Seetanah 2009), however, it is less clear as to what level of education human capital is positively related, and to what extent, to the growth rate of countries. Some researchers have stressed on the importance of research and development and higher education as the source of growth (for example, Hall and Jones, 1999; Romer, 1990; Nelson and Phelps, 1966, Gyimah-Brempong, Paddison, and Mitiku, 2006), while others argue that

primary education is the major source of economic growth, at least in developing and less developed countries (Petrakis and Stamatakis, 2002; McMahon, 2002). One may also argue that higher education contributes more to economic growth as country's income level increases, since higher income countries can reasonably be assumed to reach universal primary education. LDCs, on the other hand would be increasing both higher and lower levels of education.

Research particularly focusing on the growth effects of tertiary education on economic development is relatively scant, with relatively limited evidence from Developing economies and particularly Africa (except Bloom (2005) and Gyimah-Brempong, Paddison, and Mitiku (2006)). It is noteworthy that the tertiary enrolment rates in Sub Saharan Africa remain among the lowest in the world, with an estimated ratio of around only 6 percent (UNESCO Institute for Statistics, 2012). Indeed, until recently, the focus was on primary education, since same level of investment can reach more people, as least as argued by many development partners and governments in LDCs and Africa. Moreover, higher education has been often regarded to be for the wealthy and the elite as that it is very expensive. However, since the year 2000 there has been an increasing and much improved understanding of the role of higher education in economic development. Indeed, it is a fact that there is a marked improvement in higher education attainment and investment in Africa. Many more men and women are enrolling in university, with the number of students enrolled in tertiary education increasing from 6.1 million in 2000 to 12.2 million in 2013, and with some cases in Africa recording more than ten-fold increase since 2000 (Kruss, McGrath, Petersen and Gastrow,2015).

It is noteworthy that the gross enrolment ratio stood at just 1% in 1965 (The Task Force on Higher Education and Society, 2000). Moreover, this average masks wide disparities between countries with some countries (Central African Republic, Malawi, Chad, Niger, and Tanzania) registering enrolments of only 2% or less while few others (South Africa , Mauritius) reporting over 5%). Bloom et al (2014) argued that the relative neglect of higher education from the part of African government may be due largely to the belief that primary and secondary schooling are more crucial than tertiary education for poverty reduction. Such a belief was also shared by the development partners until recently, for example from 1985 to 1989, only 17 percent of the World Bank's global education-sector spending was on higher education and this proportion drop to just 7 percent from 1995 to 1999. Realizing the importance of higher education , the World Bank has mobilise increased funding for tertiary education in its agenda and Tertiary funding constituted to over 30% of all of the World Bank's education-sector commitments from 2004 to 2008 (World Bank, 2008a) with African counties benefiting a fair share, but not as the government would have wanted, between 2002 and 2006. Current public expenditure on higher education as a share of all public expenditure on all levels of education in Africa is approximately 20% (World Bank, 2014).

The study aims at providing an assessment of the economic contribution of Tertiary education for a sample of 13 African economies, countries over the time period 1990-2013. To account for the dynamic and endogeneous relationship between TER and growth, an issue often ignored by the literature, a Panel VAR is employed accordingly. This framework interesting allows us to investigate endogeneous and also important indirect relationship and it is believed that such an analysis will provide additional insights in the debate and supplement the relative dwarf literature on TER economic contribution.

The rest of the paper is structured as follows; section 2 reviews the literature briefly while section 3 dwells in the methodology and discusses the findings of the regression results from the panel data and section 4 concludes.

2. LITERATURE REVIEW

2.1 Theory on Higher Education and growth

The role of education in promoting economic progress and alleviating poverty has been acknowledged widely by economists and policy makers (Gilead, 2012). Most economists believe that investment on education or human capital increases a country's or region's output and also enhances labor productivity. Dickens et al.(2006) argued that human capital is an essential element in the future because the economy is turning into knowledge-based from post-industrial economy.

Bloom et al (2014) posited that higher education positively affects economic growth through private and public channels. The private benefits arguments at the individuals' level are well established and include better employment prospects, higher remuneration and a greater ability to save and invest. The author argued that the above benefits would result in better health and improved quality of life. Improved life expectancy subsequently enables individuals to work more productively over a longer time thus adding to lifetime earnings. Public benefits are less well documented and acknowledged and this explains why numerous governments have been underestimating and neglecting tertiary education as a means for public investment. However, individual gains are also beneficial to society as a whole. One can argue that higher earnings for well educated individuals adds to the tax revenues of governments and thus contributing to state finances which are often in a precarious state particularly in Africa. Individual benefits are also likely to lead to greater consumption which cascades into benefits for producers from all educational backgrounds. Tilak (2003) argued that one potential channel through which tertiary education can enhance economic development in low income economies is through technological catch-up. He posited that in a knowledge economy, higher education will support economies to catch up with more technologically advanced countries as graduates are likely to be more aware of, better able to adopt and use and even improve technologies. Graduates' knowledge is also likely to lead in improvements of skills and

understanding of nongraduate co-workers. Bloom et al (2014) further argued that enhanced confidence and know-how inculcated by higher education may promote entrepreneurship, with desirable effects on job creation.

Tertiary education can also have less direct benefits for nations (Baum and Payea, 2004). For instance, by producing and grooming well trained teachers from Universities, it can improve the overall quality of primary and secondary education which is beneficial for growth. Moreover, by training doctors and other health workers, higher education can improve the nation's health and resulting in higher productivity at work. The authors argued that such type of education is also expected to nurture good governance and leadership skills, and to result in talented individuals required to establish growth-conducive policy environment. Baum and Payea (2004, pp 13) further posited that higher education can contribute in the 'setting up robust and fair legal and political institutions and making them a part of a country's fabric'. They additionally discussed the fact that advanced education will contribute in the mitigation of environmental problems and also towards the improvement of a country's security.

2.2 Empirical Review

Adam Smith first discussed the relationship between education and economic growth, followed by Marshall, Schultz, Bowman and others (see Pradhan, 2009). Empirical analysis of the education-growth relationship can be traced back to 1957 with Solow estimating the effect of labor, capital and technological change on economic progress for the case of United States over the period 1909-1949 (Chaudhary et al., 2009). Since then numerous theoretical models have used to examine the hypothesized relationship. Most of them focused on human capital accumulation as an ingredient of economic progress (Mankiw, Romer and Weil,1992; Appiah and McMahon, 2002; Artadi and Sala-i-Martin, 2003; Seetanah, 2009) while others used human capital as an input to technological change and subsequently triggering growth (Romer, 1990, 1993; Benhabib and Spiegel, 1994; Barro, 1997, 1999; Barro and Sala-i-Martin, 1995; Sala-i-Martin, 1999; Schiff and Wang, 2004). Romer (1986) and Lucas (1988) posited that, in the endogenous growth literature, education is considered to be a factor that would increase returns and particularly to mitigate the growth reducing effect from diminishing returns to physical capital. There is an overwhelming amount of empirical literature that supports the fact that education has a positive effect on the growth rate of income. However, Azariadis and Drazen, (1990) and Rebelo (1991) also argued that there is the possibility that a minimum level of education is required in order for education to have any significant growth impact. Although there is an overwhelming amount of empirical evidence investigating the effect of education on growth across countries (refer to Temple, 1998 and Sianesi, 2003 for a survey of literature), relatively few papers explicitly analysed the role of tertiary education.

Among the pioneering work features McMahon (1987) who reported that higher education has a positive effect on income growth, although reporting a lagged effect (of about 7

years). The author (McMahon,1998) in a another study however found that an early increase of higher education enrollments in East Asia was not growth conducive. Wolff and Gittleman (1993) subsequently showed that University enrolment rates were correlated with enhanced labour productivity and that the number of engineers and scientists per capita were associated with economic progress. In a cross-sectional study, Barro and Sala-i-Martin (1995) found that secondary and tertiary male educational attainment particularly showed significant positive growth effects. In a time series analysis of the UK, Jenkins (1995) analysed the relationship between an index of total factor productivity and different levels of educational attainment. The author reported that a 1% increase in higher education qualifications increased was accompanied by an annual increase in output of between 0.42% and 0.63%. Gemmell (1996) in a cross sectional analysis of 98 countries highlighted that the primary level education 'appears to be important in the poorest low developed countries; secondary level effects dominate in 'intermediate' LDCs, while tertiary effects are strongest in OECD countries'. Petrakis and Stamatakis (2002) and Sianesi & Reenan (2002) confirmed similar results. Agiomirgianaskis, Asteriou and Monasitiriotis (2002) used panel data to assess the contribution of all levels of education on the economic growth in 93 countries. The authors found that education had a positive and significant effect on the growth rate of income, with higher education having stronger the growth impact. Voon (2002) found similar results for the case study of Hong Kong. On the other hand, Petrakis and Stamatakis (2002) reported that the growth effects of education depend on the level of development. They interestingly observed less developed countries benefited from primary and secondary education but not tertiary education, while the opposite was true for high income countries. Tilak (2003) used the gross enrolment ratio and higher educational attainment to show that both have a positive effect on the level of economic progress for the case of 49 countries of the Asia Pacific region. Lin (2004) confirmed that fact with evidence from Taiwan. Using U.S. domestic data, Baum and Payea (2004) results are also in line with the above. Another study from US showed that University graduates in the USA had higher productivity and incomes than non-graduates (Bloom et al.,2004). More recently Barro and Lee (2010), for the case of developed countries, found that the estimated rate-of-return of an additional year of secondary and tertiary schooling is higher than that of primary schooling. Keller (2006) earlier reported a positive relationship between tertiary enrolment ratio and economic growth, while Hanushek and Woessmann (2010) found that the role of hi schooling in OECD countries was enhanced after controlling for cognitive skills.

Studies focusing on the African context have been particularly scant and the few research analyzing the hypothesized link are summarized below. Following earlier works from McMahahon (1987), Bloom et al. (2004) was among the first one to study the continent after the millennium. The authors studied the effects of higher education on labour productivity and per capita output as levels of tertiary education increase. They reported

that a one-year increase in the total education stock would increase GDP by 0.24 percentage points per year for the African countries under study. Interestingly, a one year increase in higher education stock would result in an increase of 0.39 percentage points per year, highlighting the relatively higher growth impact of such education. Using time series analysis for the case of sample of African economies over the period 1960 to 2000, Gyimah-Brempong, Paddison, and Mitiku (2006) found evidence that education in general had positive and significant effects on the growth rate. Moreover, the authors reported that the impact of higher education on economic growth was almost twice that of the physical capital investment in African countries. Later on Van Heerden et al. (2007) studied the impact of Universities on the South African economy using a 'general equilibrium' model. They simulated various scenarios in their impact analysis and reported positive results with respect to the relationship between higher education and the economy. Subsequently a World Bank study (2008) found that that countries in Sub-Saharan Africa that are able to increase the level and quality of education may benefit from innovation, diversification of products and services and also from maximum returns from capital assets, all of which ultimately having growth potential impacts. More recently Kruss,McGrath, Petersen, Gastrow,(2015) confirmed the relationship between higher education and economic development based on evolutionary economics and the national innovation systems approach. They showed the economic benefits of South Africa Higher Education through the consideration of two case studies from automotives and astronomy. The importance of the 'intersection between global, national, sectoral and spatial dimensions of the education-economic development relationship' (Kruss et al, 2015) was highlighted.

It is noteworthy that there are few studies who could not establish a significant causal link between higher education and growth. For instance Barro & Sala-i-Martin (2004); McMahon (1998) argued that this may be due to the fact the authors dealt with the average mean of education attainment among countries which were not at the same development levels. In a study of a sample of six developed countries, Meulemeester and Rochat (1995) found that higher education had a significant impact on economic growth in Japan, the UK, France and Sweden. However, the authors could not observe any impact in Italy and Australia. They concluded that higher education is necessary but not sufficient for growth. Subsequently, Pissarides (2000) showed that the economic effect of higher education rested on the quality of education as well as the efficiency with which labour markets allocate skilled labour to productive activities. Keller (2006) analyzed the effects of all the levels of education on economic growth in a cross-country panel data from 1960. Segregating the countries into two groups namely developing and developed, the author could not find any significant economic effect of higher education enrollment. More recently, Holmes (2013) used a cross sectional sample and reported a significant relationship between secondary education and growth, however he could not find any evidence for the case of tertiary education and growth.

To conclude, a brief review of the literature[1] tends to confirm that empirical evidences are rather mixed on the higher education- growth link. It also highlights the fact that this link had been relatively under researched with respect to the African continent.

3. METHODOLOGY AND ANALYSIS

The conceptual model adopted in this study draws from earlier empirical works economic growth modeling in Africa (refer to Tilak, 2003, Gyimah-Brempong et al, 2006, and Seetanah, 2009 among others) whereby an extended Solow growth model was used. The following functional form is thus specified:

$$GDP = f(IVT, OPENNESS, FDI, PRI, SER, TER)$$

The dependent variable *GDP* is a measure of countries' national output and was proxied by the real per capita gross domestic product (GDP). IVT represents the countries' investment ratio, OPENNESS, the total of export and an import divided by the GDP, is a measure of openness level. FDI which proxies the level of Foreign Direct Investment is also included in our specification and is measured as the ratio of inward FDI to GDP. On interest to us are the proxies for education which for the sake of this study has been disaggregated into primary, secondary and tertiary education. As discussed earlier such decomposition will allow us to measure the respective impact of each level of education on growth, while allowing us to disentangle the effect of higher education. Thus interesting comparative insights will be possible. PRI is a measure of the level of primary education, proxied by the Primary Enrolment ratio. Similarly SER is the secondary enrolment ratio and TER is the tertiary enrolment ratio.

The econometric specification of our model is illustrated below.

$$gdp_{it} = \beta_0 + \beta_1 ivt_{it} + \beta_2 openness_{it} + \beta_3 fdi_{it} + \beta_4 pri_{it} + \beta_5 ser_{it} + \beta_6 ter_{it} + \varepsilon_{it}$$

where *i* represents the respective countries in our sample and *t* denotes the time series dimension. The small letters above denote the natural logarithm of the variables. We thus employ a double log-linear specification for ease of interpretation, with the value of the estimates to be discussed in percentage terms. The sample comprises of 13 African economies for the period 1990–2013 (as per data availability).Data were available from the WDI (http://data.worldbank.org/indicator) and Penn World Tables (8.1).

Often ignored in the literature, a panel unit root test is performed on the variables under considerations using Im, Pesaran, and Shin (1995) panel unit root tests. Im, Pesaran and Shin (1995) devised a panel unit root test for the joint null hypothesis that every time series in the panel is non-stationary. The results from such a test on the data used in this study validate a rejection of the existence of a unit root in favour of stationarity. It is

[1] Oketch et al. (2014) provides a good review of the literature

noteworthy that such results were also validated by the Fisher-ADF and Fisher-PP panel unit root tests at the 5 per cent significance level.

Endogeneity issues and the Panel Vector Autoregressive Model (PVAR)

As discussed earlier, it is also likely that there may be the existence of bi-causal and indirect effects while modelling the education-growth link. Levine, Loayza, and Beck (2000) argued that the possibility of loss of dynamic information even in panel data framework still exists as the explained variable may have something to do in explaining itself as well. As such the possibility of a reverse causation also theoretically exists as higher GDP may imply that a country is more able to invest in higher education (and the other level of education as well), being economically better. Moreover, higher education may also have some growth indirect effects through the variable in the model, for instance through FDI (as foreign investors may be more attracted in countries with quality human capital). Including the above issues in the modelling approach remain important and this has been critically ignored in the literature. To account for the possibility of endogeneous and reverse causal links, the study employs a Vector Autoregressive framework on panel data (the Panel Vector Autoregressive framework (PVAR)) and this takes into account the complex relationship between the various growth determinants and ouput level, with particular emphasis on higher education. This is in addition to the fact that PVARs allow for a country-specific unobserved heterogeneity. Panel data VAR thus interestingly merges the traditional VAR approach in a time series, which treats all the variables in the system as endogenous, with the traditional panel data approach, which allows for unobserved individual heterogeneity. The following first order VAR model is specified

$$Z_{it} = \Gamma_0 + \Gamma_1 Z_{it-1} + \mu_i + \varepsilon_t$$

where z_t is a seven variable vector *(gdp, ivt, openness, fdi, pri,ser, ter)* and the variables are as defined previously. T0 is the constant term and T1 is the parameter, while μ_i are fixed effects[2], ε is the error term.

Estimation and analysis

The coefficients of the system of equations as specified above are estimated after the fixed effects have been removed. Table 1 report the results of the model.

[2]This is used to overcome the restriction on parameters and to allow for 'individual heterogeneity' (see Love and Zicchino 2006)

Table 1: Results from the PVAR model (1990–2013)

Response to →								
Response of ↓	Constant	gdp_{t-1}	ivt_{t-1}	$openness_{t-1}$	fdit-1	pri_{t-1}	sert-1	tert-1
Gdp	-0.51	0.39	0.52	0.21	0.19	0.18	0.17	0.11
	(-1.45)	(2.25)**	(2.35)**	(2.25)**	(1.88)*	(1.97)*	(2.01)*	(1.89)*
Ivt	0.54	0.28	0.59	0.12	0.15	0.17	0.21	0.16
	(1.89)*	(2.06)*	(2.17)**	(1.81)*	(1.94)*	(1.78)*	(1.99)*	(1.87)*
openness	0.59	0.155	0.14	0.66	0.24	0.11	0.09	0.06
	(1.61)	(2.44)***	(1.83)*	(2.49)**	(1.78)*	(1.88)*	(1.43)	(1.01)
Fdi	0.14	0.19	0.27	0.23	0.54	0.08	0.14	0.21
	(1.29)	(1.88)*	(2.10)*	(1.84)*	(1.96)*	(2.01)*	(1.97)*	(2.01)*
Pri	2.21	0.45	0.17	(0.12)	0.13	0.54	0.09	0.02
	(1.89)*	(1.89)*	(1.82)*	(1.34)	(1.87)*	(2.22)**	(1.34)	(1.12)
Ser	1.45	0.57	0.21	(0.15)	0.17	0.65	0.67	0.07
	(1.69)*	(2.11)**	(2.03)*	(1.89)*	(1.97)*	(2.43)***	(2.02)*	(0.34)
Ter	0.89	0.46	0.14	0.16	0.21	0.56	0.64	0.69
	(1.86)*	(1.91)*	(1.96)*	(1.88)*	(2.05)*	(2.19)**	(1.78)*	(2.34)***
No. of obs	13 x 24= 312							

Note: The VAR model is estimated by GMM and fixed effects are removed prior to estimation.

*Heteroskedasticity adjusted t-statistics are in parentheses. *** Significant at the 1% level, ** at 5%, and *** at 10%, respectively. The t-values are in parentheses*.

Analysis

Referring to the economic griwth equation (gdp), it is observed that TER, as proxied by the Tertiary enrolment ratio, has a positive and significant contribution to economic growth of the sample of African countries under study. In fact, the coefficient of 0.11, a measure of output elasticity, denotes that a 10 per cent increase in TER contributed to a 1.1 per cent increase in the GDP of African economies and this is the direct effect. Barro and Sala-i-Martin (1995), Jenkins (1995), Tilak (2003), Lin (2004) and Keller (2006) among others also identified a positive and significant relationship between enrolment in tertiary education rates and economic growth. More interestingly, our results are consistent with Bloom et al. (2005) and Gyimah-Brempong, Paddison, and Mitiku (2006) who reported positive and significant effects of higher education for the African case.

However, although a positive and significant coefficient is reported for higher education (ter), such coefficient remains relatively smaller as those obtained for developed country cases and samples and also as compared to primary and secondary education (which are also positive and significant). Such a result is hardly surprising in view of the developmental level at which most African nations are at present. Indeed Gemmell (1996) highlighted that the primary level education appears to be important in low developed countries, with secondary level effects dominating in 'intermediate' LDCs, while tertiary effects are strongest in OECD countries .Petrakis and Stamatakis (2002) and Sianesi & Reenan, 2002 and more recently Barro and Lee (2010) confirmed similar results. It is noteworthy that McMahon (1998) confirmed that, for the case of East Asia, early increase of higher education enrollments was not observed to be growth conducive. This ineffectiveness was because higher education was usually related to growth later on. The rest of the growth explanatory variables turned out to be also significant and have the expected signs in general, with private investment remaining as the major growth driver in Africa.

The VAR framework, as discussed before, enables us to derive further insights on endogeneity issues and indirect effects as well. While it has been evidenced that TER influences growth, referring to the ‘TER’ equation, it is observed that a reverse causation exists as well as output appears to be also an important determinant of TER investment, thus supporting a bi-causal and reinforcing relationship. In other words, output level which proxies for the earning capacity of the economy play an important role in TER investment, which is mostly financed by the government in these countries. Such a result is consistent with those obtained from Narayan and Smyth (2006). The latter discussed the fact that the level of GDP (and economic growth) indicates the global performance of the economy and therefore how families can cope with the costs of higher education. In other words, an economy's macroeconomic conditions are believed to also affect the aggregate demand for higher education.

The ‘TER’ equation can also be viewed as a ‘determinant of TER’ equation with, domestic investment, education attainment, foreign direct investment and openness level being other determinants (together with national income) of tertiary education for these countries.

Primary and secondary educational attainment or the academic success in pre-tertiary schooling are important factors in determining tertiary education and may be viewed as a sign of effectiveness of the educational system in bringing students to the universities' doors. It is noteworthy primary and secondary education is becoming compulsory in more and more Africa economies and that much has been done in terms of educational reforms aiming at reducing dropout and improving success rates in secondary education in such countries.

FDI is reported to have a noticeable impact on tertiary education, greater than primary and secondary education.FDI and MNCs probably provide attractive employment opportunities to highly skilled graduates, which may be an incentive for students to complete tertiary. Moreover, governments are encouraged to invest in higher education as MNCs demand more skilled labor. Indeed one may argue that there are also more direct links between FDI and higher education. For instance, in addition to granting scholarships and sponsoring the formal education of individual employees, 'MNCs are also active in supporting the development of Universities and related institutions in several ways' (UNCTAD (1994:218)[3]. Te Velde and Xenogiani (2005) provide econometric evidence which confirmed that FDI enhances skill development (particularly secondary and tertiary enrolment). As such the fact that domestic private investment is positively related to tertiary education can be explained by the fact that higher investment levels create more opportunities for high skills employment while increasing return for skills (given the relatively low level of level of tertiary education). Kopcke (2003) provide evidence on such a link.

Openness is also reported to an ingredient in explaining tertiary education. Indeed an emerging literature dealing with the relationship between trade openness and the demand for higher education and skills exists. Increased openness to trade is likely to increase the demand for skilled workers which in turn may lead to increased wages relative to those of unskilled workers. Such higher returns to education and skill may in turn provide higher incentives to invest in human capital. Empirical work from Chuang (2000) shows there exist a close relationship between trade and higher education as trade opening could bring along a rise in wage rates and returns to skill which in turn accelerates of human capital accumulation.

Referring to the 'investment equation', there is evidence that TER is positively related to the investment level (with a coefficient of 0.14) for our sample set. Higher level of human capital connotes with higher level of skills and efficiency (and higher returns) thus encouraging more investment. Given that investment is a major driver of growth (with an estimated output elasticity of 0.52), one can infer that TER also have an indirect effect on growth through the investment channel, estimated to be around 0.08 (0.16 x 0.52) and this is quite an interesting result.

As such TER is also found to have a significantly positive effect on FDI. The reported coefficient of 0.21 is higher than the PRI and SER, suggesting that higher level of human capital and education are required to attract FDI (See Noorbakhsh, Paloni, and Youssef, 2001 and Meyer and Sinani, 2008). FDI being a growth ingredient lends to the fact that TER also have indirect effects on growth as well thru this channel.

[3] UNCTAD (1994) reported that "MNCs demand for highly trained graduates manifests itself in the form of financial support, particularly to business schools and science facilities, the provision of assistance and advice through membership of advisory boards, curriculum review committees, councils and senates".

4.CONCLUSION

This research investigated the economic contribution of Tertiary education for a sample of 13 African economies, countries over the time period 1990-2013. To account for the dynamic and endogeneous relationship between TER and growth, an issue often ignored by the literature, a Panel VAR is employed accordingly. TER is reported to be positively and significantly related to the economic growth of the sample of African countries under study. It is noteworthy that the magnitude of the TER coefficient remains relatively smaller as those obtained for developed country cases and samples.

Interestingly the study also found the presence of a reverse causation as output is also observed to be also a determinant of TER. In other words, output level which proxies for the earning capacity of the economy play an important role in TER, which is mostly financed by the government in the countries under study. In addition to the national income, domestic investment, education attainment, foreign direct investment and openness level being other determinants of such TER for these countries. Moreover, we found evidence that TER encourages private investment suggesting some indirect effects of TER on output via the private capital channel. As such similar indirect effect through the FDI channel can be observed.

Results of the study are encouraging for research institutions and government. Findings suggest that investment in tertiary education in Africa economies is an economically worthwhile endeavor. The bidirectional causal link between GDP and Tertiary education indicates interesting feedback effect implying that more efforts and policies may be needed in order to boost Tertiary education in Africa if the latter intends to register more growth.

It is a fact that most African countries face difficult budget constraints and encouraging investment in higher education from the private sector appears to be a necessity. Government should provide the necessary institutional and legal framework together with a set of incentives to encourage such investment. The ‘attraction’ of some foreign Universities branches/campuses of repute is also very important as such Universities will not only enhance the capacity of the country but also in gearing up the level tertiary education and bring along opportunities for internationalizing higher education in the region. Moreover, such University may entail interesting spillovers and synergy effects on local tertiary education institutions in terms of efficiency, University Management, teaching and research.

Given the severe resource constraints from national government, improving the efficiency of providing higher education remains another avenue in attempting to increase the supply of higher education. Searching for lower-cost delivery alternatives for tertiary education is a viable solution for instance.

Moreover, an inherent problem for African countries is that of emigration, especially from highly trained and high calibre workforce (those who would impact more on growth and productivity), may due to some malfunctioning of economic and social institutions It is believed that higher education human capital contributes significantly to income growth in Africa if it does not leak out through emigration. Graduates are plays a significant role to help in the development process. African countries should take steps to curb such sizeable brain drain and for instance policies such as tying university funding, forgiving or reducing student loans for graduates who do not emigrate, and ensuring meritocracy in a transparent way in job markets

Finally, given the fact that private rates of return to higher education in African countries are relatively high, government should design effective loan schemes for students to finance their education, as is the case for many developed countries. This is also expected to be beneficial in the context of emigration problem discussed above.

Appendix 1

Gross enrolment ratio, tertiary, both sexes (%)

Total enrollment in tertiary education (ISCED 5 to 8), regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving.

UNESCO Institute for Statistics

Country Name (African countries in Sample)	**2000**	**2005**	**2013**
Burundi	1	2	4
Burkina Faso	1	2	5
Ethiopia	1	3	5
Gabon	8	9	12
Ghana	4	6	14
Kenya	3	3	7
Lesotho	3	4	10
Madagascar	2	3	4
Mozambique	1	3	5
Mauritius	17	21	41
Uganda	3	4	5
South Africa	7	10	20
Congo, Dem. Rep.	3	4	10
Some comparative countries			
India	10	11	30
China	10	18	25
USA	69	81	89

Australia	65	71	89
UK	59	59	60
Sweden	70	82	65
Japan	50	55	61
Malaysia	25	28	37
Argentina	58	65	80

http://data.worldbank.org/indicator/SE.TER.ENRR?page=6

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