The impact of education

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Every year the Mauritian Government devotes an increasingly large share of its budget to the development of the education sector. The reason for such an increase in government investment in education lies in the belief that education has a direct impact on the economic growth of the country. In most developing countries, like Mauritius for example, education is regarded as a powerful instrument for reducing poverty and removing social and income inequalities, improving economic growth and standards of living, and helping the country to reinforce its autonomy. Appiah and McMahon (2002), Burneth et al. (1995) and others suggest that education also has some positive indirect effects such as increasing longevity, improving democratization and political stability, and reducing poverty and crimes.

Education is considered as an investment in human capital. Human capital can be described as the knowledge, abilities and skills of an individual, acquired through education, training and experience, which help the latter to be more productive and thus improve his potential income earning. Ismael (1998), Becker (1964) and Mincer (1974) have emphasized on the fact that, by investing in human beings, we will gain from some forms of benefits in

the future. However, Blankneau and Simpson (2004) find no clear evidence on the link between government spending on education and economic growth.

Human capital is one of the most important components of sustainable economic development of a country as illustrated by Lucas (1988) and Romer (1990) in their " new growth" literature. The expanded neoclassical growth model developed by Mankiw, Romer and Weil (MRW) (1992) and the endogenous growth models developed by Lucas (1988), Romer (1990), Barro (1990) and others have only recently stressed on the importance of human capital in growth theories. Even though human capital incorporates health, experience, skills, education and other social factors, in this paper we will concentrate only on the role of education and its effects on the economic development of Mauritius. One problem that arises is when dealing with the measurement of human capital. In fact, there is no agreed definition of which proxy should be used to represent human capital. Generally, the average number of years of schooling has long been seen as a convenient proxy. Some researchers, for example, Mankiw et al. (1992) use secondary enrollment as proxy for education and Barro (1998) uses enrollment in different levels of education, i. e. primary, secondary and tertiary, and also enrollment by gender as proxies. In our study we will be using the average number of years of different schooling levels as proxies for education. Petrakis and Stamatakis (2002) have stressed on the fact that each different level of education has different impact on growth. For example, they find that the effect of primary and secondary education on the economic growth

of developing countries is more significant than that of tertiary education, and for developed countries it is the reverse situation that takes place.

Since it improves human capital, we could say that education does affect economic growth predominantly, but actually, the impact of education on the economic development is quite ambiguous. There were countless debates over the years by researchers over whether education has a positive, negative or no relationship at all with the economic growth of a country. Barro (1991) finds that education has a positive and significant impact on economic growth. He observes that any rise in enrollment rate, raises GDP too. De Meulmester and Rochet (1995) provide evidence that this relationship may not always be true. Devarajan et al. (1996) find that education has a negative impact on economic growth for some developing countries. They deduce that developing countries are not productive at the margin because these countries do not fairly allocate their public capital expenditure and this explains the opposing relationship between education and economic growth. Some other researchers, such as Hanushek and Woessmann (2007), find that it is in fact the quality of education that promotes economic development and not the quantity of schooling or schooling attainment. They observe that the skills of the population directly affect the distribution of income and economic growth. The purpose of this paper is to determine the impact of education on the economic growth of Mauritius.

2. 1 Effects of Education

Education is a never ending process and as said in a famous diction, " Education starts from the womb and ends in the tomb". Education benefits

the society by helping to increase economic growth, reducing poverty, reducing crimes, increasing employment etc and also helps the individual to earn higher income and therefore improves the latter's living standard.

The figure below gives a résumé of the effects of education at the micro and macro levels.

Source: Michaelowa, Katharina. (2000) " Returns to Education in Low Income Countries: Evidence for Africa."

The above diagram shows the micro and macro effects of education. There are irrefutable evidences that connect education to economic growth and education in form of human capital boosting productivity. Education is in fact " productivity-enhancing". It is said that a person without basic literacy and numeracy skills have many difficulties in completing basic tasks of everyday life, which therefore shows the importance of education.

Education affects the growth of the economy in various ways. We here discuss the direct effects of education. Education is said to be connected to the notion of empowerment. Individuals with a certain level of higher education not only have good job with interesting wages but also augment productivity of the economy. Some studies have shown that GDP per capita rises by 1 to 3 percentage points following a 1 percentage point increase in school enrollment rates. Therefore, education is said to increase individuals' wages along with the augmentation of productivity and finally GDP per capita.

Here we discuss indirect effects of education. According to Glewwe (1999), Schultz (1993), Hobcraft (1993), and Thomas, Strauss and Henriques (1991) mother's schooling have indirect positive effects on the economy. It is said that an additional year of mother's schooling will induce the child to be in a better health and encourage them to learn which will eventually increase their chances to be a productive person in the future and affect the economy positively.

Furthermore, educated individuals are more likely to be aware about family planning and this will ultimately reduce childbirth. This results in families having more or less 1 to 2 children, that is, a smaller family where more time is dedicated to the children's education. This attention in return motivates the children to be more motivated at school and have better results. These children are thus encouraged to pursue their education to higher levels.

Moreover, educated workers are more likely to adapt to new technology and new working techniques easier than illiterate workers. It is also said that an educated workforce is more productive than an uneducated workforce, that is, the return of an educated worker is higher compared to that of an uneducated one. Higher returns have a positive impact on the economic growth.

Michaelowa (2000) uses the example of an educated farmer who uses " new agricultural techniques" to produce goods. Through education, the farmer will acquire the knowledge and skills required to use these new agricultural techniques and therefore he will be more productive compared to other farmers who are still using traditional techniques. The other farmers in the

neighborhoods will tend to do the same in order to achieve higher profits, so this causes both the farmer and the neighbors to have higher returns and in turn increases GDP per capita.

Mincer (1974) says that there is a relationship between education and individual earnings which in turn produce private returns. The Mincerian equation helps to differentiate between the different levels of education and distinguish their effects on the economy. He also claims that an additional year of schooling will lead to higher private returns.

2. 2 Theoretical Framework

Ramsey (1928), Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965) among others developed the neoclassical model of economic growth. In his model, Solow (1956) claimed that two important factors determined growth, namely the quantity of labor and the capital stock. The neoclassical model assumes diminishing returns to capital and labour independently, and the input-output ratio is determined by exogenous technological factors. This model does not take into account the effects of factors such as human capital, health etc on the economic development. In fact, Schulz (1961) proved that labor and capital did not explain completely the increase in output and Lucas (1988) pointed out that investment in human capital is one of the main determinants of economic development. Moreover, in order to offset the adverse effects of diminishing returns, thus allowing the economy to grow, the neoclassical model suggests that the country must invest heavily in technology. In theory, this is one of the reasons why low-income countries with low ratios of capital to labor are likely to grow faster than rich

countries. But empirical results have shown some inconsistencies with this hypothesis as demonstrated by Summers and Heston (1988).

Later, Lucas (1988), Romer (1990), Barro (1991) and others developed the endogenous growth models in order to overcome the shortcomings of the neoclassical growth models. In the endogenous growth model, exogenous technological progress does not affect steady growth. This model introduces human capital as an input in the form of effective labor and implies that the accumulation of human capital directly affects labour productivity. The main difference between effective labour and physical labour lies in the fact that the former is calculated by taking into account labour quality such as educational level, training and skills. Both Lucas (1998) and Romer (1990) have used agents to represent the effects of human capital in their models respectively. According to Romer (1990), human capital is the decisive input that generates new products and technology in the Research & Development sector and therefore this implies that countries with high levels of human capital stocks will grow faster due to the more rapid development of new products and technology generated by them. Lucas (1988) incorporates human capital in his model and claims that the accumulation of human capital will enhance productivity of other factors and thus will boost economic growth. He also affirms that never-ending increases in human capital will result in never-ending economic growth. In his model, human capital is a measure of abilities and skills used in production by a worker. However, Grossman and Helpman (1994) state that it is some form of knowledge which can eventually cause never-ending growth, not human capital.

Schultz (1999) outlines the importance of human capital through education and health in determining economic growth. He insists that education increases both people's awareness and their investments on health services, and also healthy people tend to be more efficient and therefore more productive.

2. 3 Empirical Evidence

Barro (1991) finds that education and economic growth are highly correlated. He uses enrollment rate as a proxy for education and per capita GDP as a proxy for economic growth. Data are collected across more than 100 countries during the years 1960 to 1990 and Barro finds that each additional year of enrollment increases per capita GDP. Bils and Klenow (2000) also come across similar results in their research. They find that variation in schooling explains approximately one third of the variation in economic growth. Although Bils and Klenow (2000) provide evidence of the positive relationship between education and economic development, they also claim that more growth could result in more education and not the opposite, i. e. there is a reverse causation effect.

Barro and Sala-i-Martin (1995) use cross-country data made up of 90 countries over the time span 1965-1985. They employ the AK framework, which displays constant return to capital as it assumes that the other elements (labor and technology) that determine GDP grow proportionately with capital. In other words, each increase in capital increases output correspondingly. Their results indicate strong positive relationship on the long-run between average GDP per capita and the level of educational attainment, terms of trade and life expectancy. However, some researchers

claim that the type of regressions performed by Barro and Sala-i-Martin (1995) may be subject to reverse causation effect as stated before. For example, a rise in GDP could increase investment in education as the economy develops. Such type of results will have great influence on our research as we want to study the impact of education on the economic growth and not the reverse.

Akcabelen (2009) uses the ARDL approach to determine the short-run and long-run effects of different levels of education on Turkey's economic development. Secondary enrollment and tertiary enrollment are used as different proxies for education and this enables us to examine the impact of each level of education on the economic growth. Akcabelen concludes that there is positive correlation between all levels of education and the long-run economic development of Turkey.

Loening (2002) uses time-series data from 1951 to 2000 and applies the error-correction methodology to analyze the impact of education on the economic growth of Guatemala. He observes that output per worker increases by 0. 16 percent following a 1 percent rise in the average years of schooling. So he agrees on the fact that education does have a positive impact on the overall economic development of the country.

Afzal et al. (2010) use time series data from 1970-2009 to analyze the relationship between education, physical capital, inflation, poverty and economic growth in Pakistan. According to their findings, education and physical capital have both a positive and considerable effect on economic growth in the short-run as well as in the long-run. They also find that inflation

slows down economic growth in the long-run and poverty has no effect at all on the economic development of Pakistan. Other researchers, such as Kakar et al. (2011), have used time series data for the time span 1980-2009 and apply the Error Correction Model (ECM) and come to the conclusion that education influences Pakistan's economic development only in the long-run. They also observe that the ' quality' of education is more important than the ' quantity' of education in achieving economic growth, so the government should increase its investment in education with the aim of enhancing the quality of education further.

Since Mauritius is part of Africa, it is also good to see the results of researches conducted in other African countries. Fonkeng and Ntembe (2009) use enrollment and GDP as proxies for education and economic development and they notice that education at higher level, i. e. at tertiary level, is positively correlated with economic growth of Cameroon. Musila and Belassi (2004) use government expenditure on education as proxy for education for the years 1965 to 1999. They apply the cointegration and the ECM methods and find that there is positive correlation between average worker's expenditure on education and the economic growth of Uganda. Ndiyo (2007) uses time series data from 1970 to 2000 on real education expenditure, real capital formation and GDP, and employs the VAR technique. Based on the results obtained after computations, Ndiyo (2007) demonstrates that education does not have a positive effect on the economic development of Nigeria. He suggests that this result can be explained by various factors such as labor market distortions, redundancy,

brain drain, industrial disputes and job discontinuities, and government failure etc.

Khorasgani (2008) analyses the impact of higher education on Iran's economic development for the period 1959 to 2005. The proxies used for human capital are education attainment and research expenditures. Khorasgani (2008) uses the Cobb-Douglas production function together with the ARDL method to determine the short-run and long-run effects of higher education on the economic growth. The study demonstrates that real output increases by 0. 314 percent in the long run and 0. 198 percent in the short run following a 1 percent increase in higher education attainment. Hence, higher education has a positive and significant impact on the economic development of Iran.

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