LEVEL OF EDUCATION AND ECONOMIC DEVELOPMENT IN SAARC MEMBER COUNTRIES: A PANEL DATA APPROACH

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This paper examines the impact of higher level of educational attainment on economic development in the SAARC member countries for the period 1985-2013. Eight countries, i.e. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka are considered for the analysis. By using World Bank data and employing panel data model (Fixed effect model), the study has found evidence to show that higher level of educational attainment has a statistically significant effect on economic development (measured by country-wise total GDP). Finally, the paper suggests that co-operation in the field of higher education will be an important factor in improving peace and prosperity in the SAARC members countries. Therefore, cooperation to achieve higher level of educational attainment is essential for the SAARC member countries for attaining higher economic development.

Keywords: Education, Economic Development, SAARC member countries.

INTRODUCTION

South Asian Association of Regional Cooperation's (SAARC) eighteenth summit was held in Kathmandu from 26th to 27th November 2014 with the aim of 'Deeper Integration for Peace and Prosperity'. Improvement in connectivity among the member states was also considered in priority basis. India was represented in the summit by Honorable Prime Minister of India Mr. Narendra Modi whose foreign policy is mainly pays attention in the improvement of relationship between India and its neighboring countries by focusing on Southeast Asia. In pursuit of this goal, he made official visits to Bhutan and Nepal within the first 100 days of his government, followed by various other countries.

By focusing on SAARC countries, this paper analyzes the impact of higher level educational attainment on economic development, as measured by total Gross Domestic Product (GDP) in eight developing countries. The main reason behind focusing on SAARC countries is to know how stronger relationship between SAARC member countries through higher educational attainment can improve peace and prosperity across member countries. The study rightly presupposes that education is one of the important pathways to foster peace in the SAARC member countries. Education, besides building life skills, leads to acquiring values, knowledge, developing attitudes, skills and behavior which help people to live in harmony. To estimate the impact of higher level of education on economic growth in the SAARC countries, the study uses panel data model

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(Fixed effect model) over the period of 1985 to 2013. The rationale for considering this period is that the first SAARC summit was held in Dhaka on 8th December, 1985.

Following structured has been followed to present the paper. The reviews of theoretical and empirical studies on from the role of education on economic development are presented in the next section. Methodological issues explained in Section 3. Estimated results are presented in Section 4. Finally, section 5 highlights the major conclusions and policy suggestions

REVIEW OF LITERATURE

Human capital is one of the main elements for improving a country's well-being as it increases productivity and promotes innovation. Education is also the key input in raising human capital level of the labour force. Several existing studies have found that without higher investment in human capital no country has achieved higher economic development.

The effect of education on economic growth has been well discussed in several theoretical economic models. Most importantly, Solow's (1956) economic growth model considered capital accumulation and change in technology as the main foundation of economic growth. But in the long run technological change is found to be sole determinant of economic growth as capital accumulation suffers from diminishing returns in long run. The main problem with this model is that it considers human capital as the main source of technological change but assumes it to be 'exogenous'. However, the 'new growth theories' try to endogenize technical progresses by considering education, learning and R&D. Lucas's (1988) growth model assumes that higher level of education of the workforce increases overall productivity (or total productivity) by higher level of innovation that leads to higher growth in an economy.

There are several empirical studies that consider school enrolment as a measure of education. Barro (1991) found that school enrolment rates impose positive effects on growth of an economy. Mankiw et al. (1992) found that economic growth increases by 2.2% with the 10% increase in secondary school enrollment. Sala-i-Martin et al. (2004) by evaluating 67 variables found that school enrollment rate positively affects on economic growth in developing nations. More details on the latest findings of empirical research which links education and economic growth are provided in Table 1.

ECONOMETRIC MODEL

Following the methodology in the reviewed literature this study has adopted fixed effect panel data model for analysis. The dependent variable is the total GDP of the eight SAARC member countries i.e. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka for the period of 1985 to 2013. The data

TABLE 1: SELECTED EMPIRICAL STUDIES ON IMPACT OF EDUCATION ON ECONOMIC DEVELOPMENT

Author name	Main objectives	Variable used/Econometrics Model	Major Source of data	Main findings
Amarasinghe & Ratnayake (2008)	To find out why Sri Lanka has not been able to use the policy of free education for economic development in the period from 1950 to 2008.	Economic growth, quality of education, education expenditure as a % of national income, govt. Investments on education, Teacher Qualification and Average Annual Expenditure by households on schooling per student.	World Development Indicators database, Government of Sri Lanka Budget Estimate, Various Issues, Department of Planning, Department of Examination, Sri Lanka, Survey Conducted By the Author	This study found out following major factors behind this failure: creating a monopoly of government on education, free education policies were followed that led to retarded economic growth.
Klasen (2002)	To inspect how long term economic growth can be affected by gender inequality in education for a period of 1960 to 1992	*Dependent variable:* Growth rate for 1960-92, *Independent variables:* Investment, growth rate of population, growth in labor, total no. of years of schooling, ratio of female to male in total years of schooling of the adult population, log of per capita income and regional dummy variables. Panel regression model has been used.	World Bank, UNICEF and National Bureau for Economic Research	The results suggest that economic growth is directly affected by gender inequality through low average level of human capital.
Burchi (2006)	This paper explains the importance of education in reducing the food security in rural and urban areas of developing nations.	*Dependent variable:* food security *Independent variable:* different educational variables of school attendance. Cross section regression model has been used.		Education is found to be crucial for fighting food insecurity; therefore if school attendance of children is increased by 100% it can reduce food insecurity by almost 19%.

contd. table 1

Author name	Main objectives	Variable used/Econometrics Model	Major Source of data	Main findings
Breton (2013)	This paper studies importance of education on the economy across 61 nations for the year of 2005.	*Dependent variable*: log (national income/adult) *Independent variable*: Human Capital and higher Schooling OLS and 2SLS regression models have been used.	Morrisson and Murtin [2009], Maddisson [2003],	It provides empirical evidence the direct and indirect impact of education on national output. This is because education increases the marginal productivity of educated people. However, the marginal productivity follows diminishing return, but marginal product at macro level is still considerable in highly educated countries, i.e. at around 12% in 2005 and in less educated countries by over 50%.
Cooray (2009)	This paper studies the effect of education on economic development using a cross sectional data of low and medium income countries.	*Dependent variable*: GDP growth rate *Independent variable*: schooling enrolment ratios, government expenditure on education, and growth rate of population. OLS and GMM techniques have been used for estimation	World Development Indicators and Human Development Reports, UNESCO	This study shows that enrolment ratio affects economic growth positively and significantly. However, increase in govt. expenditure leads to increase in quality of education which ultimately increases economic growth.
Gyimah-Brempong (2011)	This paper investigates the effects of education on various development results in African nations for the period of 1960 - 2010.	*Dependent variable*: development outcome *Independent variables*: education human capital level and environmental factors. Static and dynamic panel data model has been used.	UNDP, Barro and Lee (2013).	This study has found educational impact as significant on attainment on all the developmental activities in African countries.

contd. table 1

Author name	Main objectives	Variable used/Econometrics Model	Major Source of data	Main findings
Pegkas (2014)	Paper analyses the impact of educational levels on economic growth of Greece for the period of 1960 to 2009 by using Mankiw, Romer and Weil (1992) model	Dependent variable: aggregate output Independent variables: Physical capita, Human capital, labour, technological efficiency; Gross enrolment ratio in school years; enrolment for each education in school years; population of school years age group have been used as a proxy for human capital. For the empirical analysis VAR model is used.	AMECO data base	The results reveal that secondary and higher education significantly affect gross domestic product but primary education do not have a significant impact.
Khattak and Khan (2012)	This study analysis the link between education and economic development in the context of Pakistan for the period of 1971-2008.	Dependent variable: Real GDP per capita. Independent variable: labour, physical capital, human capital, school enrolment. OLS and Johansen Co integration approach is used.	Economic survey of Pakistan, State Bank of Pakistan and Federal Bureau of statistics, Pakistan and World Bank.	It shows the positive and long run relationship between education and growth.

Source: Authors compilation

for the explanatory variables are sourced from the World Development Indicators (WDI) of the World Bank.

1.1. Model Specification

The econometric specification to estimate the impact of higher level of education on economic growth, we consider the following econometric model:

$$y_{it} = \beta_0 + \beta_1 X_{it} + \delta t + \eta_i + \varepsilon_{it} \tag{1}$$

Where y_{it} is the economic growth of the SAARC countries, X represents the various independent variables, η_i, δ_t, ε_{it} follow the standard meaning of panel data.

The reviews of literature of various studies in section II show that various panel data models have been used to find the link between level of education and economic development. In this study, the models are mainly used for to overcome the omitted variable bias and to make use of the available information to find the relationship. Given this, this study estimates equation (1) by using panel data model.

To select between panel data econometric models diagnostic tests such as Breush and Pagan Lagrange Multiplier (LM) Test along with the Hausman (H) test were conducted. The significant LM test suggests us to select fixed or random effect model over pooled OLS model. On the other hand, significant Hausman test indicates us to select fixed effect model over random effect model.

EMPIRICAL RESULTS

TABLE 2: DESCRIPTIVE STATISTICS

Variable	Observations	Mean	Standard deviation	Min	Max
GDP at market prices (current US$) (in Millions) (gdp)	216	121000	307000	127	1860000
Gross enrolment ratio, secondary, male (%) (ger_m)	140	51	16	16	98
Percentage of students in secondary general education who are female (%)(student_f)	154	43	9	0	53
Official entrance age to lower secondary education (in years) (e_age)	231	11	1	10	13
Pupil-teacher ratio in primary education (headcount basis) (ptr)	126	34	10	11	63
Enrolment in secondary education, both sexes (number) (in Millions) (ese)	143	15	29	0	1190
Gross enrolment ratio, tertiary, both sexes (%) (ger_t)	106	8	5	0	25

Source: Authors'

Table 2 presents the summary statistics for each variable used in the regression analysis. As can be seen from the table, dispersion about the mean is higher for average of gross enrolment ratio in tertiary, official entrance age to lower secondary

education, enrolment in secondary education, pupil-teacher ratio in primary education, etc. This implies that a more symmetrical distribution is taking place. However, total GDP and gross enrolment ratio in secondary show less symmetrical distribution.

TABLE 3: CORRELATION COEFFICIENT OF DETERMINANTS OF GROSS
DOMESTIC PRODUCT

	gdp	ger_m	student_f	e_age	ptr	ese	ger_t
gdp	1						
ger_m	-0.04	1					
student_f	-0.08	0.64	1				
e_age	-0.19	0.13	0.16	1			
ptr	0.17	-0.76	-0.58	-0.19	1		
ese	0.96	0.00	-0.06	-0.08	0.16	1	
ger_t	0.24	0.62	0.56	-0.35	-0.38	0.21	1

Note: See Table 2 for variable definitions.
Source: Authors'

Table 3 provides the correlation coefficient of the variables used in the fixed effect model. The values of the correlation coefficient (r^2) shows that total gross domestic product (GDP) is positively associated with total enrolment in secondary education (i.e. r^2 is 0.96), percentage of gross enrolment ratio in tertiary (i.e. r^2 is 0.24) and pupil-teacher ratio in primary education (i.e. r^2 is 0.17). On the other hand, total gross domestic product (GDP) is negatively associated with percentage of male gross enrolment ratio in secondary (i.e. r^2 is -0.04), percentage of female students in secondary general education (i.e. r^2 is -0.08), and official entrance age to lower secondary education (i.e. r^2 is -0.19).

Table 4 presents the estimated regression results. The significant value of chi^2 of LM test validates use of estimation of panel model. In addition, the significant value of chi^2 of the Hausman test validated the choice of the fixed effect model over random effect model for the regression estimation.

Regression results explain 86 per cent of the total variation in the total GDP. The higher value of F statistics which is significant at 1 % level indicates overall significance in regression analysis. The results of the estimated fixed effect model show that official entrance age to lower secondary education has a positive and significant (at 5 % level) effect on total GDP of SAARC countries. In particular, a 10% increase in official entrance age to lower secondary education is associated with 32% increase in total GDP. Pupil-teacher ratio in primary education has statically strong significant (at 1 % level) effect on total GDP. The result indicates that a 10 % increase in pupil-teacher ratio in primary education leads to 31% increase in total GDP. The result indicates that higher level of pupil-teacher ratio increases quality of the education and leads to higher economic development.

TABLE 4: EDUCATION AND ECONOMIC DEVELOPMENT IN SAARC
COUNTRIES: FE-MODEL

Independent variable	Dependent variable: Country wise total GDP from 1985 to 2013
Gross enrolment ratio, secondary, male (%)	2.42
	(6.87)
Number of students in secondary general education who are female (%)	4.59
	(11.88)
Official entrance age to lower secondary education (years)	3.27**
	(1.54)
Pupil-teacher ratio in primary education (headcount basis)	3.12***
	(0.89)
Enrolment in secondary education, both sexes (number)	9.69***
	(2.42)
Gross enrolment ratio, tertiary, both sexes (%)	0.559***
	(0.165)
Intercept	-5.64***
	(1.88)
LM(chi^2)	52.28***
H(chi^2)	18.11***
Overall R^2	0.858
F Model test	27.38***
Number of observation	52

Note: Figures in parentheses represent standard errors. *** and ** indicate statistical significance at 1% and 5% level, respectively.

Source: Authors' calculation

Total enrolment in secondary education for both sexes has a significant effect (at 1% level) on total GDP. The coefficient 9.69 indicates that a 10% increase in total enrolment in secondary education for both sexes increases total GDP by 96 %. Finally, percentage of gross enrollment ratio in tertiary sector for both sexes has a positive and statistically significant effect on total GDP. The result specifies that 10 % increase in percentage of gross enrollment ratio in tertiary education for both sexes increases total GDP by 5.5%. The results validate our assumptions about the positive relationship between higher gross enrollment ratio and higher economic development. The results support the earlier studies such as Barro (1991), Mankiw *et al.* (1992) and Sala-i-Martin *et al.* (2004).

The results also show that gross enrolment ratio in secondary for male and percentage of students in secondary general female education have a positive effect on national level GDP of the SAARC member countries. However, the estimated values of the coefficients are not statistically significant.

CONCLUSIONS

The paper tries to assess the impact of level of education on economic development in the SAARC member countries for the period of 1985-2013. Using data from

World Bank the study has estimated Fixed Effect panel data model. The analysis shows that pupil-teacher ratio in primary education, total number of enrollment in secondary education and percentage of gross enrollment ratio in tertiary sector have a positive impact on economic development in the SAARC member countries. Finally, the paper suggests that in order to improve peace and prosperity, attainment of higher educational levels in all SAARC member countries is absolutely essential, for which cooperative efforts by SAARC member countries are absolutely necessary.

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