6. CONCLUSION

6a. OVERVIEW

The objective of this thesis was to analyse some issues relating to quality of human capital in an economy and its relation with the growth rate of economies. We considered the educational component of human capital and studied the determinants of educational quality across countries as well as across districts in India. We found that parents’ education and government expenditure on education are important for improving reading proficiency of the working population across countries. For districts across India, we saw that parents’ education and small class size improves student achievement and the proportion of enrolment of SC/ST students in total enrolment has a negative impact on student achievement, which may be due to the relative historical backwardness of the SC/ST community. It was also found for our sample of countries that the quality of education measured in this study in terms of its impact on the reading proficiency of the working population, has a significant positive influence on the growth rate of economies. Our study also concluded that quality composition of human capital is important for growth in the sense that the size of the workforce with primary and secondary education positively influences the rate of growth in economies. This suggests that the stock of human capital affected technological change and growth through diffusion of technology rather than R&D activity in the economy.

6b. CHAPTER CONCLUSIONS

CHAPTER 2: Determinants of reading proficiency across economies: an analysis using panel data

In this chapter an attempt was made to enquire into the determinants of the quality of education. Different studies have used different proxies to represent quality of education. One of the most commonly used measure of quality is academic achievement, that is, test scores in some common examination (Hanushek and Kimko, 2000; Barro and Lee, 2001a; Hanushek and Woessmann, 2008, 2010a etc.). But in this study we have tried to enquire about the quality of education received by the
present work force through its impact on the reading proficiency of the workforce. Reading proficiency cannot be captured by only quantity of education as measured by literacy rates, enrolment rates or years of schooling but depends on the quality of education of the workforce. This chapter studied the determinants of reading proficiency in an economy using data on the per capita circulation of newspapers, by considering the influence of family factors and school resources during schooling of the present work force, controlling for factors other than schooling quality which can affect circulation of newspapers.

This study was based on a panel data set including 40 countries. The data on the circulation of newspapers related to the years 1980, 1985, 1990, 1995 and 1998 and the corresponding years representing the family factors and school resources during schooling period of the work force in these years were 1960, 1965, 1970, 1975 and 1980 respectively.

Studies analysing determinants of quality (measured by test scores) have indicated several possible determinants of the quality of education- family income, parents’ education, school inputs, community inputs (Barro and Lee, 2001a; Krueger, 1999; Finn and Achilles, 1990). Our analysis concluded that (apart from the control variables which can affect circulation of newspapers) parents’ education and government expenditure indicating government’s willingness and ability to impart education and provide educational facilities are important for increasing reading proficiency of the workforce. The results are consistent with the finding of various studies in the literature which have obtained positive effects of parents’ education, infrastructural and school facilities (which depend on educational expenditure) on student achievement (e.g. Barro and Lee, 2001a; Kingdon, 1996a, 1996b, 1998a; National Achievement Surveys, NCERT, 2008).

CHAPTER 3: The Effect of the Quality of Education on Economic Growth

Generally all empirical studies from 1990 onwards regarding economic growth include a measure of human capital in the analysis. But measures like enrolment rates and average years of schooling used in the growth literature (e.g. Barro, 1991, 1992, 2003; Mankiw, Romer and Weil, 1992) are measures of the quantity of schooling and not the quality. Some recent studies have also included
some measures of quality in growth regressions, for example, test scores in some common examination (e.g. Hanushek and Kimko, 2000; Barro and Lee, 2001a). These studies found significant impact of the quality of education on economic growth rates. In this chapter, we examined whether, quality of education as measured by its impact on reading proficiency of the working population has an effect on the economic growth of nations, independent of the effect of the quantity of education. Since, studies by Barro have been widely cited as the evidence of the relation between human capital and growth, we included the measure of quality, that was framed in Chapter 2, in two different growth regression exercises of Barro which found significant effects of human capital (as measured by the quantity of education) on economic growth (Barro, 1992 and 2003). The analysis was carried out for a maximum of 40 countries, for the time period 1980 to 2005.

Many studies dealing with the relationship between economic growth and quality of education have found significant positive impacts of quality of education on growth rates (e.g. Hanushek and Kimko, 2000; Jamison, Jamison and Hanushek, 2007; Hanushek and Woessmann, 2008, 2010a). In this study also, we found a strong impact of quality of education (measured in terms of reading proficiency of the workforce) on economic growth rates of nation. Quantity of education had no additional impact. The results are similar to the above mentioned studies, where also, quality of education was significant and the quantity variable was often insignificant in the presence of the educational quality variable. Other important variables affecting growth rates were initial GDP (indicating conditional convergence), investment ratio, macroeconomic and political stability.

CHAPTER 4: Determinants of quality of education across districts in India: An Analysis using Panel Data

There is wide variation in the quality of education across different parts of India. There have been some important studies regarding determinants of quality of education in India (Kingdon, 1996a, 1996b, 1998a; National Achievement Surveys by NCERT, 2008). These studies indicated several important indicators of quality of education, for example, family income, parents' education, caste, school inputs, community participation, pupil-teacher ratio. In this chapter we enquired about the determinants of schooling quality in terms of student achievement, across districts in
India. We also studied separate regions to see what specific factors are important for a particular region. In contrast to the NCERT study, we also included proxies for family and social factors in addition to school inputs to analyse their effects on student achievement. The chapter examined the determinants of quality of education across districts of India, as measured by percentage of students getting more than 60 percent marks in Class VIII for each district divided by the percentage of students getting more than 60 percent marks in Class VIII of the state to which the district belongs. We used the data from the District Information System for Education, NUEPA. Initially the analysis was been done for 344 districts across 14 districts in India. Subsequently states were divided into different region based groups and the same analysis was done separately for the different regions.

It was observed that parents’ education and small class size had a beneficial impact and the proportion of enrolment of SC/ST students in total enrolment had a negative impact on student achievement across all districts of India. Presence of strong inter-generational effects of parents’ education is also seen in other studies like Drèze and Kingdon (2001). Beneficial effects of reduced class size on student achievement are in agreement with the NCERT survey (2008), but in contrast with the results of studies like Kingdon (1996b, 1998a) where there was no significant impact of class size on student achievement. Negative effect of the increase in enrolment of SC/ST students on student achievement was also seen in Kingdon (1996b, 1998a). Additionally for the Northern region it was found that increase in the proportion of students enrolled in private schools increased student achievement. For Southern region, the pupil-teacher ratio and district per capita income were also important. The results suggested that the model might not be particularly applicable for the Eastern region of India.

CHAPTER 5: Economic Growth and the Quality Composition of Human Capital

There are conflicting views in the literature regarding the relationship between education and economic growth. According to Lucas (1988) accumulation of human capital over time drives economic growth, whereas Nelson and Phelps (1966) argue that it is the stock of human capital which determines the rate of diffusion of technology and is important for economic growth and. According to Romer (1990a),
as a greater stock of human capital is employed in the research sector, technological progress is greater and this leads to faster growth. Several empirical studies have been carried out on the nature of the relationship between human capital and growth, that is, whether stock of human capital or growth rate of human capital is important for economic growth (Romer, 1990b; Kyriacou, 1991; Benhabib and Spiegel, 1994; Krueger and Lindahl, 2001; Pritchett, 2001) and different results have been derived in different studies. This chapter analyses whether the quality composition of the stock of human capital is important for the relationship between human capital and growth. Can highly educated workers required for R&D activity, for example, be substituted by sufficient numbers of less educated workers without affecting long run growth? There are studies on the effect of quality composition of human capital on economic growth in the literature (Gemmell, 1996; Barro, 1991, 1999, 2001, Barro and Sala-i-Martin, 1995, 2004; Petrakis and Stamatakis, 2002; Papageorgiou, 2003; Hassan and Ahmed, 2008). Most of these, however, fail to link the choice of human capital variables considered to a theoretical understanding of how human capital can affect economic growth. Further, if the human capital stock affects growth through its influence on the rate of technological change, it is of interest to consider then what the relation between quality composition of human capital and growth has to say about how human capital stock affects the rate of technological change. Papageorgiou (2003) also considers this question but the focus and methodology of our study differs from that of Papageorgiou (2003). Our study includes 55 countries for the periods 1980-93 and 1994-2007.

Our study concludes that the stock of average human capital is important for economic growth through its effect on capital productivity. Also, the size of the initial stocks of persons with primary and secondary education has an additional effect on growth, something which is not true for tertiary education. This suggests that the initial stock of human capital affects economic growth with the help of technological change, primarily through diffusion of technology rather than R&D activity. Secondary or primary schooling which might be necessary for absorbing existing technologies but not sufficient for R&D activity are important in explaining growth rate of economies. Thus we conclude human capital affects economic growth both by affecting capital productivity and technological diffusion. We also find that growth rate of physical capital is an important determinant of economic growth.
6c. OVERALL CONCLUSIONS

- Parents' education and government expenditure on education during schooling of the present workforce develops reading proficiency among working population across countries.
- Quality of education, measured in terms of reading proficiency has a significant positive effect on economic growth across nations. Quantity of education has no additional impact.
- Quality of education, as measured by student achievement across districts in India, is affected positively by parents' education and small class size and negatively by increase in the proportion of enrolment of SC/ST students in total enrolment.
- Stock of human capital affects economic growth through its effect on capital productivity and technological change. Analysis of quality composition of human capital indicates that the initial stock of human capital affects technological change, mainly by its influence on the rate of diffusion of technology rather than by influencing the rate of R&D activity.

6d. POLICY PRESCRIPTION

Parental level of education has emerged as an important determinant of the quality of education in our analysis. Therefore, there appears to be a strong intergenerational effect in case of both quantity and quality of education. Since the past cannot be changed, this reinforces the case for providing at least a basic level of education to all independent of levels of wealth and income. This effort should begin as early as possible because the benefits of the intergenerational effect will require at least one generation to be realized. Government schemes in India like Sarva Shiksha Abhiyan aim that all children aged 6 to 14 years should be enrolled in schools and children should complete at least 8 years of good quality schooling till class VIII. The Right to Free and Compulsory Education Act, 2009 was passed in August 2009 and this provides a fundamental right to free and compulsory education to all children in the age group 6 to 14.

Our analysis also suggests that greater emphasis should possibly be placed on strengthening the foundation of the lower tiers of the education system, since this
itself might have a strong positive influence on growth. Primary and secondary education can be beneficial for a country’s growth because it helps in technological change through diffusion of technology. Children and their parents can be provided incentives for education of children till the secondary level like providing scholarships to students, and through more government initiative to provide good educational facilities. Most importantly it is necessary to undertake rational allocation of resources provided for development of the educational system. Amartya Sen, in his speech, *The Importance of Basic Education* (in the Commonwealth education conference, Edinburgh, 2008), analyses the importance of basic education. According to him, basic education invokes independence and self dependence in individuals, reduces fertility and mortality rates due to increase in education especially female education, reduces health problems, increases women empowerment and increase the ability of individuals to understand their political and legal rights which helps in overall development of an economy. Kingdon (2007) suggests that though returns to secondary schooling are higher than primary schooling in India, enrolment is low in secondary schools. Attendance rate is low in primary schools too. Learning achievement is low in both primary and secondary level. Some government schemes in India do provide incentives for education like *National Means-cum-Merit Scholarship Scheme* (scholarship of Rs. 6000 per annum to students whose parental income is less than Rs. 150000 per annum are provided, for a maximum of 4 years from class IX to XII on the basis of tests), *National Scheme of Incentive to girls for Secondary Education* (girls who are unmarried and are below 16 years are eligible for the scholarship if they join class IX after passing class VIII), *National Programme of Nutritional Support to Primary Education*, also known as *Mid-Day Meal Scheme* (providing cooked mid-day meals to all students of Class I to V in government and aided schools) etc.

In case of India, our analysis confirms the relatively poor performance of students belonging to the SC/ST population categories. It reinforces the case for providing special attention to students from these categories. More importantly it suggests that it is not only enough to provide access to education to these communities but it is crucial to ensure that special attention is paid to them in the process of learning so that they can overcome their relative historical disadvantages. There are several government schemes for SC/ST and other minority students. The *Sarva Shiksha Abhiyan* gives special attention to these students. Attention is given to
SC/ST students through schemes like Kasturba Gandhi Balika Vidyalaya (KGBV) scheme (residential schools for minority female students in rural areas), Rajiv Gandhi National Fellowship Scheme for SC/ST candidates, Scheme of Coaching for SC/ST Students and Minority Community Candidates for National Education Testing etc. Along with the centrally sponsored schemes, there are different schemes for the development of education of SC/ST students in different states of India.

Our analysis of the determinants of the quality of education also corroborates existing evidence on the importance of class size in furthering both quantity and quality of education. Even if due to supply side bottlenecks the number of schools cannot be increased, the number of sections of a class should be increased and more number of teachers should be appointed to reduce the number of students in a class. There should be incentives for students with merit to opt for school teaching as a profession to ensure the absence of constraints in the supply of teachers.

6e. LIMITATIONS AND POSSIBLE EXTENSIONS

This study has several data constraints. Availability of newspaper readership data would have provided more authentic proxy of reading proficiency. Due to unavailability of data, we have used per capita circulation of newspapers. Further extensions of research include incorporation of closer proxies of the variables. Again, price data of newspapers would have been an important variable in explaining circulation of newspapers but it could not be considered due to unavailability of data.

Since we were interested in analysing the determinants of reading proficiency of the present working population on the basis of the quality of education received during the schooling period of the present workforce, we had to consider values of explanatory variables for years relating to the schooling of the present workforce. Availability of data dictates the choice of the past years to represent the conditions in the years of schooling for the present workforce. Since data were not available for many countries in the past years, we had to consider a relatively small sample of 40 countries in our analysis.

Since comparable average scores were not available at the district level in India, we had to use percentage of students getting more than 60 percent marks as an indicator of quality of education in the study related to India. Though we have
assumed that the mode and standard of evaluation is homogeneous across districts in a state and for comparisons we have expressed the variables as ratios of the state averages, there still exists some amount of heterogeneity across districts in a state. So, further extensions of research (which could not be done due to time constraints of this research) include consideration of average district-level scores in common examinations conducted by state boards of education in different states.

The literature indicates that in case of growth regressions involving human capital there may be presence of some biases which might affect the results. There may be some presence of reverse causality in the relationship between human capital and growth (Bils and Klenow, 2000; Sianesi and Reenen, 2003). Some of the results may be affected due to the presence of omitted variable bias (Krueger and Lindahl, 2001; Bils and Klenow, 2000; Sianesi and Reenen, 2003). Results may biased due to errors in educational data (Krueger and Lindahl, 2001; Cohen and Soto, 2006; De La Fuente and Doménech, 2006). Due to time constraints, our study failed to incorporate the latest data from the updated and modified data sets which have come out very recently. One possibility of further research is to include new data in the analysis and check the results.

In case of Chapter 5, it would be beneficial if we get reliable estimates of rate of growth of capital stock so that it is not needed to capture its effect on economic growth through other variables as done in this study. Another problem in this chapter is the possible problem in the specification of the production function suggested by theoretical models in which there is constant returns to scale in physical and human capital. It might be the case that Papageorgiou’s (2003) rejection of the panel data estimates was more due to a problem in the specification of the production function rather than due to problems in data. An alternative is to consider AK-type models with underlying fixed coefficient production technology in which human capital independently influences output through its effect on $A$ (technology level).