

EDUCATION AND ECONOMIC GROWTH

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Abstract

This article considers relation which is established between education, human capital and economic growth. The goal of the article is to show concrete suggestions in relation to the influence of education on raising the living standard, based on up-to-date researches. Education itself represents one of the primary components in human capital formation, which is an important factor in modeling the endogenous production functions. The more important the component of human capital in modeling the economic growth is, the more significant the influence for using the technical progress achievements is. Human capital is of essential importance for achieving the sustainable growth rates for developed countries, but the greatest contribution is accomplished through the investment in quantity and quality of primary and secondary education for developing countries. On the quality of the education system depends formation of the human capital that is an important factor and supposition of the economic growth.

Key words: *human capital, economic growth, education, rate of return, capital.*

Introduction

The subject of this paper is to examine the influence and relations between human capital and economic growth. The human capital is the most important determinant of a capability of the country's national economy to produce and acquire technological innovations, i.e. technical processes achievements. Technical process is the key element in growth decomposition. As Simon Kuznets once said, the key element for the growth of the western countries is not the material capital, but knowledge mass gained through verified research, empirical science breakthroughs, as well as the population's capacity and training to efficiently use the above mentioned knowledge (Kuznets 1955, 7).

Thus, for example, the major part of the material capital in both Germany and Japan was destroyed during the II World War. However, these economies succeeded to recover in a relatively short time because the skills, experience, education, discipline and motivation of the existing workforce remained untouched. The concept of capital is traditionally placed within the framework of the material means of production, but in this way, skills and capabilities that are justified by investing in human capital are indirectly excluded. In 1960, Theodore Shultz suggested that activities related to education and training should also be regarded as a process belonging to capital accumulation i.e. by investing into human capital which could be translated into productivity and income growth (Schultz 1961, 12).

Investment in human capital includes both tangible assets and intangible assets that are used for the purpose of improving the quality of workforce by means of healthcare, education and existing workforce skills improvement. Like any other investment, these investments also require some kind of sacrifice on the part of the individual. These individuals are, again, willing to make such kind of sacrifice if they expect to be rewarded for it in the future with, some sort of benefit. The human capital is formed, initially, by person's education and training which in turn enables the better productivity of that individual, i.e. enables him/her to earn higher wage.

INVESTMENT IN HUMAN CAPITAL

Education is a key investment in human capital. It helps a person to achieve and apply his/her abilities and talents. In developed countries in the process of determining wages, intellectual capabilities are much more important than physical (abilities), when great majority of people is concerned. The school system in the majority of world countries is employed to essentially reproduce class structure; for example the graduates from the best schools earn significantly higher wages than those from inferior institutions. The high quality of education is the best guarantee for the capability to acquire new skills and knowledge. Precondition for investing and spending money on education and healthcare, either by a private person or by the state, rests on a belief that in this way one increases the income and productivity in the long run. The additional income and output that are produced in this way are simply the result of investment yield.

Education yield can be defined as a discrepancy between the increase in wage that one worker receives on the bases of one year of schooling compared to others. The effect of education on wages, based on a research, point to the following: yields from education are 13.4% higher per one year of schooling during the first four school years, i.e. 10.1% higher in the following four years and 6.8% higher after the completion of the eight grade (Hall and Jones 1999, 6). This means that a worker would earn 13.4% higher wage after the completion of the first year of schooling, i.e. 1.134^4 times more when he/she finishes elementary school (first four grades), than a worker that has no formal education at all. If the worker completes 5 years of schooling this difference would be even greater and it would be $1.82 (1,101 \times 1,134^4)$ since the yield per year from the 5th – 8th grade is 10.1%. The education, thus, contributes to differentiation in wages for different individuals.

Such yield could also be measured by workforce pondering index, where the particular ponder is measured by contribution though which education influences discrepancies between wages of individuals. In order to determine and derive this index, the data on distribution of workforce per year of schooling should be collected first, as well as information on discrepancies between wages that is caused by difference in quality and duration of education. One of the assumptions related to in index derivation states that the discrepancies in wages are produced by differences in education. This approach is in some way arbitrary, because basically it is very hard to determine education yield within the proportion of wage differences.

However, economic and real yields from education can be different which results in lower yields or insufficient exploitation of human capital for the following cases:

- Quality of education during the schooling is low;
- The knowledge acquired by education process does not match the knowledge demanded by the labor market;
- Insufficient demand for human capital due to the low rate of economic growth;
- There is a relative balance in workers' wages weather they have lower or higher qualifications, or the differences are so small that the motivation for additional investment in the quality of workforce decreases;

Considering the number of completed school years (defined by school years or by the highest level achieved), as a rule, the employees' wages increase till the maximum level, which is usually reached at the age of 40 or after; and it is only then that wages stabilize or possibly decrease. For those who have higher education wage curve is higher and the increase phase is sharper compared to those who have lower wages and have started their working career earlier - but whose educational level is lower. Those who have higher educational level reach their maximum wage later, but then again they have higher pension compared to those who have lower level of education.

The education itself is followed by two types of costs: implicit and explicit. Implicit costs are related to loss of wages during the studies, which would have been otherwise earned if that particular individual had been working instead of studying. As a person gets older and the level of education becomes higher, these costs increase. Explicit costs are related to monetary expense. The obvious example of such expenses is school fees. Even if the studies are “for free” there are expenses related to the purchase of books, travel and other purposes. Although such expenses can be moderate they can also represent the real obstacle for education of children that live in poor families.

On the other hand, in order to improve educational level subventions should be reduced, because there is a natural tendency to purchase too much goods which are cheaper than other products and services. Reduction of the level of subventions related to education and getting nearer to the real costs represents the application of market-related solutions but does not take into consideration the criterion of equal distribution. Some of these measures by which we reach more adequate distribution (by applying market principles on education) are related to liberal application of scholarship for poor students who earn it by their good learning record, as well as by using loans and vouchers that could be distributed to a larger interest group. This interest group would make purchase of the above mentioned loan/voucher according to the consumers’ choice of the type of studies that is in his/her opinion most useful.

There are different issues that are the part of investment in human capital and they include: organized formal education, additional education of adults, institutionalized training, study programs, improvement of the healthcare service efficiency, etc. So, there are three main types of learning, i.e. education:

- Formal education in schools/educational institutions, for that part of the population that does not belong to workforce category;
- Non-formal education which is implemented through organized learning programs outside formal educational system whose participants are adults and whose training programs are usually focused, concentrated and short. This particular type of education is easily available and it occupies short time period. This particular type of education is practical, cheap and flexible and it is available for those groups that have lower income. Although there are successful non-formal education programs, they can only be treated as a supplement to the formal education.
- Informal education is the form of education that exists outside the institutional educational framework or organized programs; it is characterized by home-schooling, on-the-job training or learning from a member of a local community. This type of investment can overcome many workforce characteristics that appear as limits to increased production (for e.g. lack of private initiative and lack of workforce mobility, fear of changes, not educated well or at all), not accepting new knowledge, etc.

Improvements in healthcare, education and other social activities can have a significant influence on workmen’s wages and productivity and they can also represent the precondition for introduction of more sophisticated, more advanced technologies into manufacturing processes. Better competence of workers would improve economic growth, because as a rule qualified workers are more productive. There are many ways in which the workers by investing in themselves improve and develop their natural capabilities – but most of such activities include learning and practical work. To sum up, education, practical training and experience are the basis of working capability improvement.

Practically, specifically produced knowledge about manufacturing processes is gained through experience and it is disseminated between the workers by means of informal training. All of this enables future improvement of production efficiency. A country can advance technologically not only through educational training, but also through gradual production

increase as a process of experience accumulation from the part of the workers, managers and other persons who take part in the manufacturing chain (learning by doing) (Arrow 1962, 1). This enables improvement of productive efficiency in the future when this particular learning process is concerned. Adam Smith used the term division of labor. The advantage of the division of labor can be seen in improvement of worker's skills, time saving and further improvement of machines that are used by the work force. Division of labor leads to improvement of the accumulated knowledge base. Also, through learning process workforce gains experiences and skills that help them to better perform their job tasks. If the work process is seen as the production system input, through addition of new factors, then the same process can be characterized as endogenous. In any moment in time, new machines in the production process, develop as a result of the available knowledge and accumulated experience related to the existing technology. Learning curve connects direct working input per unit of output with cumulative output as a measure of experience. For any product in question, learning cannot maintain the growth of the corresponding rate of productivity permanently. However, product types continuously change and this prevents occurrence of limits in the learning process that is on the aggregate level. This stands for a large number of business activities. When studying the manufacturing processes, it is virtually impossible to establish conformation of the work input to the process of learning through practice, thus contribution of this factor remains residual factor in economic growth.

Education as a macro determinant of the economic growth is an important variable for each research. Contribution of education to the economic growth can be measured if this variable is used for description of discrepancies in growth rate. The simple expression by which education would be included into determination of the growth rate would be the following:

$$g = a + b(PCY) + o$$

g – average growth rate during determined period of time;

PCY – initial rate of per capital yield;

o – education measured by proportion of age groups which are registered in primary and secondary schools in each country, i.e. average value of schooling years;

$a + b$ – exogenously determined parameter constants.

Coefficient o measures contribution of 1% point of difference in years of schooling and the differences in growth rates. According to one research, each additional school year would be on average related to 0.3% higher growth rates of per capital yield during the time period from 1960-1990 (Barro 1991, 2). The rapid growth of East Asian economies is undoubtedly the result of great investments in education. Some earlier studies also determined the importance of the education for the economic growth. Denison found that contribution of education to the increase of per capital growth is actually 40% (Denison 1962, 5). On other hand it is very hard to determine yield rate from education. Yield from investments in education is higher than the yield from investments from other forms of capital (Schultz 1961, 12). The importance of the education in the economic growth process is proved by the research conducted in developed countries and it is supported by quantitative evidence (Navaretti and Tarr 2000, 8). The importance that the investments in human capital have is the same as the importance of investments in material capital, and empirical research justifies this thesis. Economic yields on investments in education in most cases transcend yields from alternative forms of investment and so developing countries, in this respect, usually have higher yields than developed countries.

The highest yield rates originate from investments in primary education, which is consistent with the fact that there is a strong link between the level and growth rate of per capital yield and population proportion within the primary education framework (Colclough 1982, 4). Majority of countries is, thus, dedicated to providing free of charge primary and

secondary education, because it is here where the positive results of the externalities have the biggest value (considering reduction of poverty and salary discrepancies). Although primary education is universal, for many developing countries it is the goal that is still impossible to achieve. Countries which are characterized by low income do not have sufficient public funds which can satisfy the growing needs of population for education. These funds are not only insufficient but their allocation is also unevenly distributed between rural and urban, poor and rich part of population. There is also the issue of gender gap that is reflected in the smaller number of girls that are entered to schools compared to the number of boys; this is especially evident in primary schools. This gap actually reflects cultural norms and traditional perception of the female role in society i.e. those women should stay at home and take care of the household and family; this conception is present in many parts of the world (Middle East, South Asia and Sub-Saharan Africa).

The whole country benefits if its citizens know to read and write, i.e. if they fully take part in the economic and social life. Traditional customs and attitudes cannot be significantly changed until the greater part of the community becomes acquainted with new ideas through educational process and does not achieve elementary literacy. Thus, the yield rate is as a rule greater when the share of population included in education increases. At the same time tertiary educational institutions (both public and private) usually charge school fee because the individual receives greater part of benefits compared to the society as a whole. Yield rate from education at all levels (primary, secondary and higher education) tends to decrease with higher level of development. Since the rates of inclusion in educational processes are higher in developed countries, such attitude suggests effect of the law of decreasing yields. Considering the higher education in countries of high per capital yield, social and private yields from education are almost equal, because the most direct costs are paid by the participants in education, i.e. students themselves. And besides the mentioned expenses there are also opponent costs such as loss of wages which is caused by inability to work during studies. Investments in education in all countries, especially in the less developed countries are cost-efficient. Social yield from investments is the highest when the primary education is concerned (in developing countries) which is verified by empirical research (Psacharopoulos 1994, 11).

Table 1 shows how the level of education changed between 1960 and 2000 monitored on the observed sample: 73 developing countries, 23 developed countries and the USA. In 2000 about 34% of adult population did not have any kind of education in developing countries, in developed countries this figure was 3.7% while in the USA it was 0.8%. In developing countries only 3% of adult population has higher education, in developed countries 13% and 24.5% in the USA. On average, when the adult part of population is concerned, the number of school years has risen in developing countries for 3.1 and in developed countries for 2.7 years. The costs for education in the USA in 2000 were 6.2 from GNP, while in the same year the investments in material costs for education in the USA were 17.9% from GNP. In many developing countries, the rapid growth of population results in the great share of young people in schools (concerning the total population), thus the burden of educational expenses is also large, and also the quality of investment is much more different from those in developed countries.

Table 1 Changes in the Level of Education, 1960-2000

		Percentage of the Adult Population with				
		Average Years of Schooling	No Schooling	Complete Primary Education	Complete Secondary Education	Complete Higher Education
Developing Countries	1960	2,05	64,1	17,1	2,5	0,4
	2000	5,13	34,4	43,0	14,8	3,0
Developed Countries	1960	7,06	6,1	72,9	20,2	3,0
	2000	9,76	3,7	84,6	44,7	13,0
United States	1960	8,49	2,0	78,4	31,0	7,0
	2000	12,05	0,8	94,9	68,1	24,5

ISource: Barro, R. and J. Lee, International Data on Educational Attainment Updates and Implications, NBER Working Paper 7911, 2000.

There is no doubt that need for education is a very popular one. In developing countries, the number of people who request the admittance to school is much bigger than the number of available posts. All over the world there is the opinion that education is beneficial for everyone, primarily, because it is in high correlation with income concerning the individual as well as total population. This not necessarily means that university educated people earn more money then people with high school diplomas, but on average great majority of people with university degree earn more money. Correlation between the level of national income and educational achievements is also strong. People intuitively tend to secure maximum level of education for themselves as well as for their children, thus this item represents great expense for the budget of one household and also at the level of national economy, because each state gives significant funds for functioning of educational system.

Expansion of capacity at one level of education only increases number of people that apply for the next higher level of education. Paradoxically, the continued boom related to demand for education is followed by the decrease of benefits for an individual. The growth of unemployment of the educated part of population posts logical question on magnitude of funds that are given for the expansion of the educational system. The differences between different countries, concerning the education, reflect governmental efforts in those countries to increase the flow of human capital. A particular level of education is naturally required for certain job positions. In growing economy, the occupational structure is changing dynamically as well as the need of economy for particular occupational profiles, so it is necessary to define the patterns and direction of education first. In many developing countries, the number of people that have adequate academic references increases more rapidly than the number of available jobs; in this way the graduates are left without job for longer periods of time and they accept lower salaries than the salaries which their employed colleagues have already secured for themselves.

Table 2 Education Statistics in relation to GDP per capita and for selected countries (1995)

GDP PER CAPITA (PPP)	% of illiterate adults	Enrollment Ratios				Public Expenditure per pupil (\$)			
		Primary school		Secondary school,	higher education,	% GNP	Primary	Secondary	Higher
		Gross	Net	gross	gross				
<i>By Income Group</i>									
Below \$1,000	49	68	42	20	1	2.4	25	100	1950
\$1,000-4,000	31	105	93	55	8	2.9	120	400	950
\$4,000-7,000	12	105	91	67	25	4.5	400	400	1300
\$7,000-12,000	12	108	92	72	23	5.7	870	900	2700
Above \$12,000	5 ^b	103	97	106	59	5.0	4500	5800	8500
<i>For selected countries</i>									
Tanzania	28	66	48	5	1	3.4	N.A.	N.A.	N.A.
Sri Lanka	9	109	100	75	5	3.4	N.A.	119	678
Bolivia	16	95	91	37	24	4.9	N.A.	N.A.	N.A.
China	17	120	100	75	5	2.3	56	129	2110
Indonesia	15	115	97	48	11	3.4	N.A.	73	143
Brazil	16	120	90	45	12	5.1	N.A.	N.A.	N.A.
Columbia	9	113	85	67	19	4.4	227	249	815
Hungary	1	103	97	98	25	4.6	929	916	2120
Chile	5	101	88	75	30	3.6	487	521	906
S. Korea	3	94	92	102	60	3.7	1983	1361	633
Japan	2	102	100	103	43	3.6	7365	7250	5304
United States	2	102	95	97	81	5.4	5380	6921	7183

Source: UNESCO Statistical Yearbook 1999 (Paris: UNESCO, 1999) i World Bank, World Development Indicators 1999 CD-ROM.

The growing economies give more funds for improvement of all forms of investment in human capital. This in return influences the economic growth, above all through increase of productivity. Table 2 points to the value of public expenses in countries that have average income from 4-6% BNP. The countries with low income give smaller proportion of BNP for the same purposes. From 15-20% of government budget is on average given for education, which makes this activity one of the biggest activates, considering the newly added value as well as the number of employees. Regardless limitations, education is good investment in majority of countries with low or medium income, because yield rates from education are very high. The highest social yields come from primary education, especially in the countries where this type of education is far from universal.

In countries where almost everyone has primary education, the yield rate becomes undetermined because there is no lower level of education to which a comparison could be made. The margin between private and social yield rate can be large, especially where the countries themselves pay for the largest part of educational expenses. Where the expenses of education are financed privately (as for example higher education expenses in OECD

countries) margin between these two yield rates is much smaller. Yields from education tend to decrease as a country becomes more developed because the workers with some level of education are not scarce anymore and thus “regulate” lesser share on the labor market.

CONCLUSION

Rational state and government would invest in these forms of education that bring the highest national yield and would reduce the funds for those forms of education with low yield rate concerning the society as a whole. From the society’s point of view, higher wages are not justified if they are not caused by higher productivity, thus the role of education is not only to educate people but also to select individuals that would have the best references on the labor market.

In order to generate balance of economic and real national yield, the changes on labor market must be monitored as well as the request for knowledge and skills that are being established in one economy. The capacity of absorption of the social capital can depend, among other things, on investments in human capital. Thus the proximity of relations between determinants of human capital and economic growth is created. There are at least several ways in which education can influence and improve growth performances:

- Education has the effect of externalities on other sectors in society, which prevents influence of decreasing yield on capital; thus, for example, population characterized with higher education will probably have more honest and more efficient government. Educated people, as a rule, are the first to accept innovations, and only then are those innovations disseminated to and copied by less educated population.
- This activity has one of the most significant influences on attracting foreign investments;
- Education represents the most important input activity for research and scientific development;
- The influence by which application of knowledge improves the quality of material capital and workforce skills cannot be doubted.

The whole system of education should create and develop person’s capability for innovations and their acquisition in order to provide effective support to the processes of economic development. In competitive economy, educated individuals that lack the ability to think innovatively and who are not skilled in problem solving are faced with a greater risk of low wages and unemployment. Thus the investment in education is not only the need to increase human capital stock but also a necessity to achieve higher standard of living. Data on education represent an important indicator which reflects the quality of living in some country.

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