EDUCATION AND ECONOMY IN THE CONNECTION TO CZECH REPUBLIC

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1. HUMAN CAPITAL AND GOODS OF EDUCATION

At the brake of the 21-century, the human capital undoubtedly classifies as one of the production factors. Besides land, work force and financial capital stand also extraordinary skills of individual that may be inherited or acquired and happen to form the precious goods (public and private). They may be further promoted by proper investments. The human capital is on the micro level (firms) usually perceived as intangible assets – e. g. primarily knowledge, skills and creativeness, which are for an individual defined as goods of education. It is considered as a source of economic prosperity and strength as for an individual as for some society. It means that human capital\(^1\) is restricted against some specific productive abilities and that it is not inert figure independent from time, place or purpose. The theory of human capital has been working with a such positive approach.

The original perception of capital as capital of strictly physical substance (e. g. Solow, Samuelson, Nicks) was from the first half of the last century successively amended by the representatives of the Chicago and broadened by the term human capital (e. g. Becker, Schultz, Friedman, Mincer). Further, the theory of human capital was developed in relation to economic growth and in relation to economy of the work force, i.e. the individual economic growth. Some questions were lay out as: “Does the development of human capital contribute to growth of welfare? What is the return for investment in human

\(^1\) The basic component of human capital is not only educational goods, but also health, ethic and endurance to pursue a goal.
capital? How the level of education determinates the level of earnings?” All together it could be said that the contributions of these economists target the macroeconomic level (the human capital resources and their growth is the main part of the economic growth) as well as the microeconomic level.

The relation between poverty and human capital has also become an area of human capital theory. We refer in this context to “population quality”, which is dependent on human capital, simply on education. The quality requires some investment, where in economic terms it means that it has to be justified by some adequate returns. If the return is foreseeable, people are willing to invest in education of their children. The result is an increase in “quality” of population and the population growth is hindered because families may bear these investments in reduced number of children.

An interesting historical example of investment into human capital may be the case of Jewish people. Their persistent persecution had lead to investments into mobile, i.e. human capital. The level of education, managerial skills and other mobile qualities was much higher than the one of the other nationalities.

The difference in given investment preferences is possible to demonstrate even at present if we compare both types of capital in relation to GDP. A big gap appears if the level of investment into human capital (know-how) per GDP (I_{sz}) compares to the level of investment to physical capital (industrial goods) per GDP (I_{v}). The CR (19,6) then levels up with Portugal (19,0) or Greece (21,4), while Finland (73,3) or Sweden (82,8) reach much higher levels. The levels in the EU and OECD are depicted below:

<table>
<thead>
<tr>
<th>country</th>
<th>EU</th>
<th>OECD</th>
<th>CZ</th>
<th>PT</th>
<th>GR</th>
<th>FI</th>
<th>SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>lhc/lpc</td>
<td>44,6</td>
<td>51,3</td>
<td>19,6</td>
<td>19,0</td>
<td>21,4</td>
<td>73,3</td>
<td>82,8</td>
</tr>
</tbody>
</table>


The question that may arise is: What is the driving force of competitiveness between two different economies and what is the key factor of economic prosperity. Is this the investment into physical capital or, on the contrary, into human capital? The scarcity of natural resources hints a dominant role of human capital in economy and even in societies. Although the history shows that sometimes the bare investment into human capital does not guarantee as competition, as prosperity, if it is not followed by innovations within the economies. The bearers of innovations (so called creators of resources) derive

2. (they are expressed as costs for education at the universities, research and development, software, where the cost of duplicities is subtracted)
primarily from active individuals who achieved university education degree. The proportional figures of the USA and EU-25 population in comparison with the CR are depicted in the following table.

**Table: Percentage of Groups of Post-school Population in Some Selected Regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>Potential resources</th>
<th>Socially discriminated</th>
<th>Endangered workers</th>
<th>Endangered youths</th>
<th>Bearers of the future</th>
<th>Ordinary workers</th>
<th>The main source creators</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>4</td>
<td>5</td>
<td>17</td>
<td>3</td>
<td>19</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td>EU-25</td>
<td>8</td>
<td>18</td>
<td>20</td>
<td>4</td>
<td>19</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>ČR</td>
<td>5</td>
<td>13</td>
<td>23</td>
<td>2</td>
<td>24</td>
<td>23</td>
<td>10</td>
</tr>
</tbody>
</table>

*Source: KOUCKÝ, J., 2004*

The first in line to achieve fast development of human capital are then the support of science, research, creative potential and personal qualities. The effects of such support are the object of interest of economists who probe the issue of *human capital productivity*. The respective productivity may also gain a negative value (in case of destruction of the precious goods by individuals who aim consciously or even unconsciously their effort at it, e.g. terrorists, ecological catastrophes). In a broader sense, the productive capabilities of human capital include qualities that bring wealth and utility in general—not necessarily in economic sense (e.g. language or music; change in priorities and values, etc.). In such context, the human capital has not only productive, but also consumption value.

Currently, the theory of human capital is broadened mainly in the area of education, where the product (educational goods or *knowledge capital*) is considered as a considerable share of human capital. Investment into knowledge capital is roughly measurable as cost of education. Investor may be an individual together with household, firm, state, investment fund, etc. The actual question is, which of these subjects should contribute to education and what would be the share in order to balance the investment and the future gains.

*Education*—as goods— isn’t by its *nature market commodity*. The goods of education but may be specified on the basis of political decision (on the primary, secondary or tertiary educational level) as *market goods*³, *partial market goods*⁴, or *non-market goods*³ - Bénard, 1989). We can assert that

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3. They do not proceed through the market and therefore the price isn’t set as a market price. The price is set by administration where the market doesn’t decide on the production volume and allocation
educational goods provides a personal utility to its holder which may be simplified as future gains. For the society, it provides social utility that is represented by macroeconomic effects due to the increase in competitiveness or due to economized costs. The theoretic optimum of the “production” of goods of education isn’t –under individual and social approach– equal. The difference is derived primarily from the prediction on externalities. After some simplification, it could be depicted on the following graph.

Graph: Social/Individual Optimum of Production of Educational Goods

where:

A individual optimum (cost input into education of an individual equaled individual utility, which individual estimates to realize in future)

B social optimum (external utility realized by the society has an impact on the optimum and urges some financial assistance provided by the state up to the height of the external utility)

Q₁ quantity of goods of education corresponding to individual optimum (it takes into consideration only internal utility)

Q₂ quantity of educational goods corresponding to social optimum (it takes into consideration as internal as external utility)

C₂ - C₁ social appraisal of positive educational externality (it demonstrates the will of the state to invest a share of tax income from a public budget into the production of educational goods)


The relation between individual and corporate utility is considered as one of the key aspects to set the relation between private and public financing. The critical issue is to find the way, how should one quantify such ratio. A feasible way is to examine the curve of externalities⁴, which should copy the development of state interventions. The curve resembles either the

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⁴. Externality means the cost or contribution generated by other entity than recipient.
tax or subsidy curve, where it may be the combination of both. Provided it is the subsidy, the overall cost $BC_2C_1D$ increases demand from $0Q_1$ to $0Q_2$, which is possible to secure by intervention either on the side of the consumer (schoolchild/student) or on the side of the producer (educational institution).

Economic educational goods may be classified according to the achieved level (primary, secondary, tertiary). The respective rule is, that the quality at the respective level directly depends on the quality of the preceding level. The difference between the quality of educational goods of the two succeeding levels should constitute the added value (Průcha, 2000). Although the creation depends on number of factors and it also overpasses relation: who gives education – whom is education given, the bearer of fundamental responsibility towards the quality and added value of educational goods is the educational institution.

2. COSTS, EFFECTIVENESS AND INVESTMENT RETURN OF GOODS OF EDUCATION

Educational process as a process that generates goods of education is characterized by inputs (costs) and outputs5 (returns). The common attributes are:

- effective use of money (public as well as private),
- production of a standard goods of education (e.g. provision of the quality as well as quantity),
- realization of a maximal added value by educational process,
- the need of comparison by assessment the outputs against inputs.

The key issue is again – (household, student, firms, government) and in what proportion should pay educational costs on relevant level? Who is the recipient of the utility of the educational goods and what is the proportion? The economic calculation takes into consideration that the cost includes besides the direct costs also the loss of earnings, e.g. money that would be earned in the meantime. Such figure may stand for more than a half of the overall educational cost.

5. Better is to use the category outcomes instead of outputs. While the output states usually the amount of graduates, the term outcome states the effect generated within some time (e.g. increase in competitiveness, better active balance of foreign account, growth of GDP, etc.) E.g. category outcome tell about rate of purpose fulfillment, but category output quantities only some of preconditions of purpose fulfillment Sometimes there is spoken about results, what are means number of graduates, amount of hour lectures, number of given grants and the like. Results - itself - doesn’t reflex the fulfillment of the purpose of education, what is the most important.
Effectiveness in economics is usually measured by *marginal rate of return*; where in this case of educational goods may be quantified by the following equation:

\[
\frac{\text{RETURNS}}{\text{COSTS}} - 1 > 0 \tag{a}
\]

The above relation defines the rate of return per 1 crown invested into goods of education. The equation is defined for mentally and physically fit individuals demanding education at a respective level. The practical life doesn’t have to correspond with such a situation. In the case of handicapped groups, the economic return doesn’t have to equal the cost and the case still could be endorsed (the intrigue question remains, who should be the donor – the private or public sector?).

*Inputs* are characterized by money allotments from public and private budgets. Outputs are the immediate contributions (utility) of the inputs at the respective education level. The individual holder of the goods of education is usually assessed by the level of his income while on the corporate level it isn’t that explicit. It may mean for example the regional rate of return derived from the decrease in unemployment. Such practice is too intricate and usually neglected. The corporate observation may gather the data on the cost of education per one unit of GDP.

Assessment of effectiveness has many specific pitfalls. Effectiveness –as an economic category– is successfully implemented within market conditions where market forces influence the *market price*. Results (outputs, operations) and further effectiveness are specified its basis –see \(a\). The market price also facilitates evaluation of added value and appraisal of the relevant effort. On the contrary, the same mechanism doesn’t function in public economic sector, which is the environment dedicated to education (Peková, 2002). The value of educational goods is usually set at the level of inputs, e. g. costs derived from public or private sources. By comparing each other on the relevant levels, it is possible to assess only their *economic efficiency* instead of effectiveness. We don’t necessarily generate just irrelevant data, as illustrated in the table 1 which provides comparison of educational institutions on the basis of fixed prices\(^6\) of 1995 and in a time stretch of the previous 8 years.

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\(^6\) Figures in nominal prices in the respective year are misleading due to the changes of the index of price level. The base year for the above table is 1995 and the figures reflect the diminished purchase power of the monetary unit (CZK) in the following years according to the index of changes in customer prices.
Table: Indexes of unit cost changes per student related to indexes of volume changes of teachers and volume changes of students financed by public budgets in 1995-2002 (thousands CZK of fixed prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td>83,6 %</td>
<td>82,6 %</td>
<td>122,1 %</td>
</tr>
<tr>
<td>Primary school</td>
<td>99,0 %</td>
<td>105,7 %</td>
<td>119,9 %</td>
</tr>
<tr>
<td>Grammar school</td>
<td>106,7 %</td>
<td>99,5 %</td>
<td>96,6 %</td>
</tr>
<tr>
<td>High school (HS)</td>
<td>92,9 %</td>
<td>95,8 %</td>
<td>105,9 %</td>
</tr>
<tr>
<td>Field Profession HS</td>
<td>67,7 %</td>
<td>100,9 %</td>
<td>128,3 %</td>
</tr>
<tr>
<td>Special school</td>
<td>91,0 %</td>
<td>107,0 %</td>
<td>129,1 %</td>
</tr>
<tr>
<td>Universities</td>
<td>164,2 %</td>
<td>107,4 %</td>
<td>80,5 %</td>
</tr>
</tbody>
</table>

*Source: VOMACKOVA, H. (2006)*

The economic efficiency related to the present trends in numbers of teachers and students against public costs per student doesn’t imply a balanced environment. One can assert such deduction even though we consider just raw figures.

The issue of the effectiveness of goods of education is closely related to appraising the costs and also to the contribution –see following table–. It also correlates with the issue of investment returns towards goods of education –see following graph– (Urbánek, 2003a) and it resembles the way of financing of goods of education. It usually influences motivation as on the side of demanding as on the side of offering this kind of goods. Motivation plays an important role in achieving the required quality because the result depends on the level –quality– of inputs, not only of quantity of inputs.

In order to track the investment, we can calculate a private, social and fiscal rate of return. Private rate of return of the educational goods includes personal costs of the student and on the side of returns it considers earnings after taxes. Social rate of return measures all costs versus gross returns plus externalities where due to some difficulties in calculating the externalities, they are supplemented by gross wages. The school fee is considered in this case as a transfer if the fee is lower than a state subsidy. Fiscal rate of return considers all state costs and returns that come along with the aid of university education.
Table: Costs and Contribution of the Investment into Education

<table>
<thead>
<tr>
<th></th>
<th>Direct costs</th>
<th>Indirect costs</th>
<th>Direct contribution</th>
<th>Indirect contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>Public educational costs (direct costs on educational goods, subsidiaries for students)</td>
<td>Indirect public educational costs (lower income from state tax)</td>
<td>Higher tax due to the higher income, smaller social transfers, higher employment for educated people</td>
<td>Healthier population, lower criminality, better social cohesion, economic growth</td>
</tr>
<tr>
<td>Private</td>
<td>Private financing of education (fees for the study, study aid costs, living expenses of students)</td>
<td>Students’ loss of earnings (opportunity cost)</td>
<td>Higher income related to higher education, better chances of employment, better status</td>
<td>Better personal satisfaction, health, culture</td>
</tr>
</tbody>
</table>

The investment rate of return is possible to assess through the following equation (Psacharopoulos, 2002):

\[ rs = \frac{AE_i - AE_j}{S_i} \left( \frac{AE_j + C_u}{S_i} \right) \]  

\[ \text{where:} \]

\[ AE \quad \text{… average earnings at i, or j educational level} \]

\[ S \quad \text{… duration of education} \]

In Europe, the private rate of return is circa 19 %, corporate rate of return is lower (circa 10 % regarding the public expenses). The following table compares rate of return of different regions at different levels. One can use some other methods to quantify the return of the investment into education (Urbánek, 2003b).
In Europe, the private rate of return is circa 19 %, corporate rate of return is lower (circa 10 % regarding the public expenses). The table 5 compares rate of return of different regions at different levels. One can use some other methods to quantify the return of the investment into education.

The above mentioned earning differential related to the return for a graduate of high school or of universities depends on the field of study and the particular region. There is an issue of disparities among different regions and therefore attractiveness of some regions and professions. The demand for some particular type of education and for a particular place of its realization doesn’t have to correlate with the public demand (Šašek, 2004).
Table: Return of Investment into Education According to the Level of Education, Respective Region and Type of Return in 1964-1998 (in %)

<table>
<thead>
<tr>
<th>Region/return of investment on the adequate level of education</th>
<th>Social return of investment</th>
<th>Private return of investment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>primary</td>
<td>secondary</td>
</tr>
<tr>
<td>Asia*</td>
<td>16,2</td>
<td>11,1</td>
</tr>
<tr>
<td>Europe/Middle East/Northern Africa*</td>
<td>15,6</td>
<td>9,7</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>17,4</td>
<td>12,9</td>
</tr>
<tr>
<td>OECD</td>
<td>8,5</td>
<td>9,4</td>
</tr>
<tr>
<td>Africa (the rest)</td>
<td>25,4</td>
<td>18,4</td>
</tr>
<tr>
<td>World</td>
<td>18,9</td>
<td>13,1</td>
</tr>
</tbody>
</table>

* Non-members of OECD


3. GRADUATES IN CZECH ECONOMY AND ON A JOB-MARKET

The most common indicator to describe a status of graduates on a job-market is the level of economic activity and unemployment level related to distinct age groups. The indicator behaves as a reciprocal proportion. The level of achieved goods of education has a dominant impact. The higher educational level the region achieves, the lower unemployment and higher economic activity. The rate of economic activity is usually calculated as:

\[(\frac{EA_i}{P_i}) \times 100\]  

where:

- \(EA\) … aggregated number of economically active people aged between 25-64 years sorted according to the educational level
- \(P\) … aggregated number of people aged between 25-64 years sorted according to the educational level
- \(i\) … at the highest achieved educational level

The unemployment rate according to the highest achieved level of education is usually expressed as:
where:

\[ N \] ... aggregated number of unemployed aged between 25-64 years sorted according to the educational level

\[ PA \] ... aggregated number of economically active people aged between 25-64 years sorted according to the educational level

\[ i \] ... at the highest achieved educational level

OECD statistics present the unemployment data of lower secondary education 1.5 times higher than of the higher secondary school graduates (it means finished secondary school with or without the final exam including the field profession training). The finished higher secondary education reduces the unemployment rate of about 6% in average for the age group of 20-24, and 4% for the group 25-29.

24 out of 30 OECD countries experience at least 60% of their population aged between 25 –64 with higher secondary education –. In the CR (the same as Slovakia, Norway, Switzerland and USA) it is 85%. The rate for the same age group that has finished tertiary level of education – type A – is for some OECD countries around 10% (Austria, Denmark, Mexico, Portugal, Turkey) and up to 20% for Australia, Japan, Nederland, Norway, and USA. In the CR it is about 12% if calculating all three types of education – Bachelor, Master and Doctorate –. The general condition is that men achieve higher degree than women.

Significance of education on the job market (e.g. university graduates) also interacts with the wage level and intricacy of work, if we don’t consider the impact on unemployment. The wage level of university graduates against high school graduates in the CR is much higher than in OECD countries (up to 70%). At the same time, the Czech university graduates have twice as much lower unemployment level than those in OECD countries. They are also assigned to much more intricate work in average than their counterparts. The conclusion from above said is, that the CR job market is as much as three times more convenient for the investment into education against the traditional European market economies. Due to the fact, that the alteration of the workforce on the CR job market is circa 2-3% per year, the situation may get even in 20-30 years.

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