The Rate of Return to Investment in Tertiary Education in Hungary, 1999-2008

Judit T. Kiss, Ph.D
University of Debrecen
Faculty of Engineering
Debrecen, Hungary

Abstract

According to Human Capital Theory, knowledge and skills incorporated in the individual can be referred to as capital and all activities with which present input make future yields while the productivity of the individual grows can be interpreted an investment. In this paper, we calculate the private and fiscal rates of return to higher education in Hungary for the period 1999 and 2008. Our empirical results suggest that higher education as a human capital investment yields great returns for the individual in Hungary but it is less lucrative, compared to the state, which is due to the significant taxes and para-fiscal charges on labour.

Keywords: tertiary education, wages, rate of return to education, human capital

1. Introduction

The profitability of education, which means the returns of education as a human capital investment can be examined from the individual's, the society's and the state's point of view. The private rates of returns show how profitable for an individual to finish another level of education and social (and fiscal) rates of returns give the answer how profitable it is for the social (state) to spend money on education, on different levels of education and educational programmes (Varga, 1998).

There has been a significantly increase in the number of students of higher education in Hungary in the nineties. The increase started in the beginning of the nineties, when compared to the previous year; the increase shows 10 percent yearly until 2000. The increase in the number of students in higher education did not stop later either, it just shows a smaller increase (below 10% compared to previous years). The first decrease in students' number started in the school year of 2006/07. The number decreased by 4-5 % each year compared to the previous year in 2008 and 2009. As a result of this process, within the age group of 25-64 the rate of those with higher education increased by 6 percent between 1997 and 2007 (OECD, 2009). Although we have to note that this process is not unique in Europe and outside of it. In this paper, we seek to answer the questions whether the expansion of higher education led to a marked reduction in the private rates of return to education, and also to how high is the fiscal return to higher education?

2. Methodology and data

2.1 The private rate of return

The basis of the complete/full method is computing the internal rate of return to education. We look for the rate that equalizes discounted benefits to the discounted costs at the present, or at a given point of time, where the net present value is zero. Considering that net present value is zero, discounted costs and benefits are assumed to be equal:

$$\sum_{i=1}^{t} \frac{((1-\mu_{j-1}) \cdot W_{j-1}^{n} + C_j)_i}{(1+r_n)^i} = \sum_{i=t+1}^{t+n} \frac{((1-\mu_j) \cdot W_j^n - (1-\mu_{j-1}) \cdot W_{j-1}^n)_i}{(1+r_n)^i},$$

where, i is the number of years, j is the given schooling qualification, (university, college), n is the number of work years, t is the number of years of schooling, W_j^n (W_{j-1}^n) is the post-tax earnings at the j-th (j-1-th) schooling level, C_j is the annual direct private cost of schooling at given j-th schooling level, r_n is the private internal rate of return from education and μ_j (μ_{j-1}) is the rate of unemployment at given j-th (j-1-th) schooling level.

The discounted streams of costs and benefits refer to the first (schooling) year of obtained schooling qualification. We computed the internal rates of return only to the tertiary education – college and university.

The costs can be divided into two parts: direct and indirect costs. The foregone post-tax earnings belong to the indirect private costs since the individual studies at school and stays away from labour market i.e. he or she does not realize any benefits from working. Post-tax earnings, as actually realized value by the individual, are taken into account for benefits and indirect costs when calculating the private rates of return to education and are corrected with probability of unemployment. A correction is necessary using the probability of becoming unemployed, because if the individual wants to work and tries to get a job, it is possible that they will not find any; moreover, the probability of becoming unemployed can be different for individuals with different qualifications. Data for earnings by educational level and age group was available for the period 1999 to 2008; the period of present examination corresponds to the same period. Data of pre-tax earnings was provided by the Hungarian Ministry of Social Affairs and Labour, pre-tax earnings are part of the individual earnings survey. The circle of data suppliers included enterprises with a staff of 5 or more, as well as non-profit organisations and public institutions without headcount limit. The survey included full-time as well as part-time employees (NFSZ, 2009). Post-tax earnings and taxes on pre-tax earnings were calculated from pre-tax earnings using data acquired under the Hungarian Act on Personal Income Tax for the year in question.

The survey includes the pre-tax earnings can be obtained from full-time employment relationship (base salary, performance-related pays, extra wages, 13th month pay, premium, and bonus), that does not comprise:

- working incomes apart from the main job;
- within the frameworks of the main job obtained payments of not earnings character;
- the entrepreneurial incomes originating from the dividend.

Unemployment rates by educational level were calculated from data deriving from the number of employed and unemployed people, categorised by the highest completed educational level. The source of this data was statistics of Hungarian Stadat tables, provided by the Hungarian Central Statistical Office (KSH, 2010).

The actual expenditures belong to the direct private costs. Direct costs which must be paid by the individual or his provider can appear at any level of education. Among others we can rank the following the direct costs (Cohn-Geske, 1990):

- expenditure of text books, dictionaries, etc;
- the cost of equipment for schooling, e.g. stationeries, exercise-books, gymnastic equipment, etc;
- the additional costs incurred from: accommodation, meals, travel and public transport fees;
- tuition fees, registration fee and other charges. The expense of private lessons, costs of preparatory courses for entrance examinations, the expense of language courses.

Direct private costs were calculated using data of household actual final consumption expenditure by purpose (COICOP - Classification of Individual Consumption by Purpose), contained in National Account Hungary (KSH, 2009).

This spending of the education service expenditures of students studying within the school-based education framework can be considered over-estimation because the expenses shall include such items, such as radio or television distance education, teaching of the over-age illiterates to read and write programs. These surveys contain education services only.

We took into account the expenditures of textbooks. We obtained the data of expenditures on textbooks from tables of the Hungarian Central Statistical Office (supplied on request) that contain households spent on textbooks for one year included in the per capita expenditure between the years 2003 and 2008. We had to estimate the missing data of 1999, 2000, 2001 and 2002. The missing values were determined by the linear regression with the assumption that the cost of textbooks increased relatively steadily over the years. The households' other (different from the textbooks) financial assets purchases were not taken into account because data by educational level and per capita were not available. All this mean that the direct private costs are under-estimated in spite of the fact that education service expenditures are over-estimated.

In general, the living expenses of students (costs of housing, meals, clothing, etc.) and travelling expenses are excluded in direct private costs. In our calculation, the direct private costs are equal to the sum of the expenses devoted to the educational services and course books (Table 1.)

For the purposes of determining the benefit of education as an human capital investment, we took into account the individual's average unemployment rates adjusted post-tax earnings surplus $((1-\mu_j)\cdot W_j^n - (1-\mu_{j-1})\cdot W_{j-1}^n)$ compared to average unemployment rates adjusted post-tax earnings of the individual's with next lower level of education.

Private and fiscal rates of return were calculated under the following conditions:

- The individual begins to work immediately after his studies completed.
- The individual has continued directly to the next highest level of education before entering the labour market.
- The theoretical duration of tertiary studies were taken into account (the individual can finish his studies within the theoretical length of tertiary studies), it means that we disregarded the typical length of tertiary education. We did not take the probability of a drop-out into account. And we assumed that the individual does not repeat a year in the course of his studies.
- The last year of activity in the labour market is 64.
- During our calculations we disregard the student loans, household transfers, unemployment benefit, pension benefits after retirement, saving of transfer costs (in the calculation of fiscal return).

Table 1. Direct private costs of tertiary education for an individual, 1999-2008.

Year	Tertiary education (HUF)
1999*	64 896
2000*	64 163
2001*	70 805
2002	72 198
2003	71 997
2004	79 859
2005	75 127
2006	86 414
2007	84 930
2008	91 992

*: Estimated. Source: Own calculations based on data of Hungarian Central Statistical Office. Data in the table is covered the sum of educational services and the amount of spending for textbooks. (HUF: Hungarian Forint)

2.2 The fiscal rate of return

The fiscal rates of return to tertiary education were determined using the full method similar to the private rates of return:

$$\sum_{i=1}^{t} \frac{((1-\mu_{j-1})\cdot(T_{j-1}+SCB_{j-1})+C_j^p)_i}{(1+r_f)^i} =$$
$$= \sum_{i=t+1}^{t+n} \frac{((1-\mu_j)\cdot(T_j+SCB_j)-(1-\mu_{j-1})\cdot(T_{j-1}+SCB_{j-1}))_i}{(1+r_f)^i},$$

where the nominations are equal to the suitable data of the private rate of return, T_j (T_{j-1}) is the tax on pre-tax earnings and other dues (pension contribution, employees' health insurance contribution, employees contribution to unemployment funds) at j-th (j-1-th) schooling level, C_j^p is the annual direct public cost of education at given j-th schooling level, SCB_j (SCB_{j-1}) is the sum of the employer social security contributions and employer contributions, that is paid after an obtained j-th educational qualification worker's pre-tax average earnings. The employer and employee contributions are included in the yields (and in the indirect costs) beside the social security contributions. The benefits for the public sector are the additional income tax, and social contribution receipts associated with higher earnings. To the calculation of the public benefits, we determined the income tax and social security contribution to each point of the life-cycle to the age of 64. The public investment costs consist of two parts. Both of these expenditure streams are taken into account for the (theoretical) duration of studies. Direct costs (public spending on student) were calculated using data on public expenditure on educational institutions per student provided by the Hungarian Ministry of National Resources (Table 2.; NEFMI, 2010).

Table 2. Public expenditure on educational institutions per student based on full-time equivalent between 1999 and 2008 (, for tertiary education)

Year	Tertiary education *(HUF)*	Tertiary education *(HUF)*	
		College*	*University**
1999	546 553	546 553	546 553
2000	660 562	660 562	660 562
2001	679 886	679 886	679 886
2002	729 034	902 855	662 914
2003	799 633	942 516	741 536
2004	747 097	783 739	730 425
2005	766 048	825 910	738 875
2006	788 306	909 965	737 372
2007	859 520	1 101 617	772 179
2008	928 976	1 245 662	822 680

Source: Oktatási Statisztikai Évkönyv 2009/2010 (NEFMI, 2010), *: own calculation. (HUF: Hungarian Forint)

As it can be seen in Table 2, public expenditure on tertiary education increased by 70% between 1999 and 2008 (by 128% for college, by 51% for university education) and the state spends more on college education than on university education. The indirect public costs include forgone tax receipts (income tax and social contributions, employer and employee contributions) adjusted for the probability of unemployment rate.

3. Empirical results

3.1 Changes of pre-tax earnings by tertiary educational level

Human capital accumulation is a very important factor in earnings capacity, and one of the benefits of education. Many people forecast the depreciation of the higher qualification and the decay of the relative situation of the secondary school graduated due to the expansion of higher education, the latter case is the result of the process that the graduates of higher education, who enter in large numbers to the labour market, can elbow the secondary school graduates out of their jobs, as a result of their relative position deterioration.

In Hungary the pre-tax earnings advantage of those with higher education are quite high compared to those with secondary education. The pre-tax earnings for those with higher education was 132% more than that of men with secondary education in 2001 (aged 25-64) and 64% more among women, while the two sexes combined was 94% higher earnings of graduates (OECD, 2002:132; 1. table). The income advantage of those with higher education was more than 110% (119% to be precise) in 2003 which after a smaller decrease and increase remained constantly above 110% until 2007 (OECD, 2009).

According to the data of Education at a Glance, and compare it with other countries, we cannot find another country from 1997 to 2007 where the income advantage would be as high for people with higher education compared to those with secondary education as in Hungary (Table, 3; OECD, 2009).

Table 3. Relative earnings of the population with income from employment
By level of educational attainment and gender for 25-64 year-olds, (upper secondary and post-secondary non-tertiary education = 100)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Men	213	218	238	232	232	245	255	253	253	259	247	248
Women	154	159	167	164	164	176	192	190	188	189	185	183
All	179	184	200	194	194	205	219	217	215	219	211	210

Source: Education at a Glance 2009 (OECD, 2009: A7.2a-c. table)

The changes of the pre-tax earnings by educational level does not show the narrowing of the gap between earnings of agents with higher qualification and agents with secondary school graduated in a considerable measure in the 2000s. The income benefit of the university-educated ones decreased but with altogether by only some percentages since 2000. However the labour market premia of college-educated rose further between 2000 and 2008, which still does not show the signs of surplus of individuals with college degree on the labour market.

3.2 Changes of rates of return to tertiary education

In this section, we make a comparative analysis of the private and fiscal rates of return to tertiary education. Results of rate of return calculations are shown in Figure 1 - 3, for the period examined. Incentives to invest in tertiary education appear to be favourable in Hungary, the expected return to tertiary education exceeds 12,2% for an individual obtaining university education (and 6,5% for an individual obtaining college education). The education is an investment which has great returns not just for the individual but also for the state, the fiscal rates of return are larger than 12,6% for university education (and 6,65% for college education). The rewards for an individual investing in university education are generally higher (with at least 1 percentage) point than for college education. Despite of duration of studies, fiscal rates of return are higher for university education than college education.

The private and fiscal rates of returns of the university graduates, after an interim period of increase between 1999 and 2003, show a slight decrease (Figure 1).
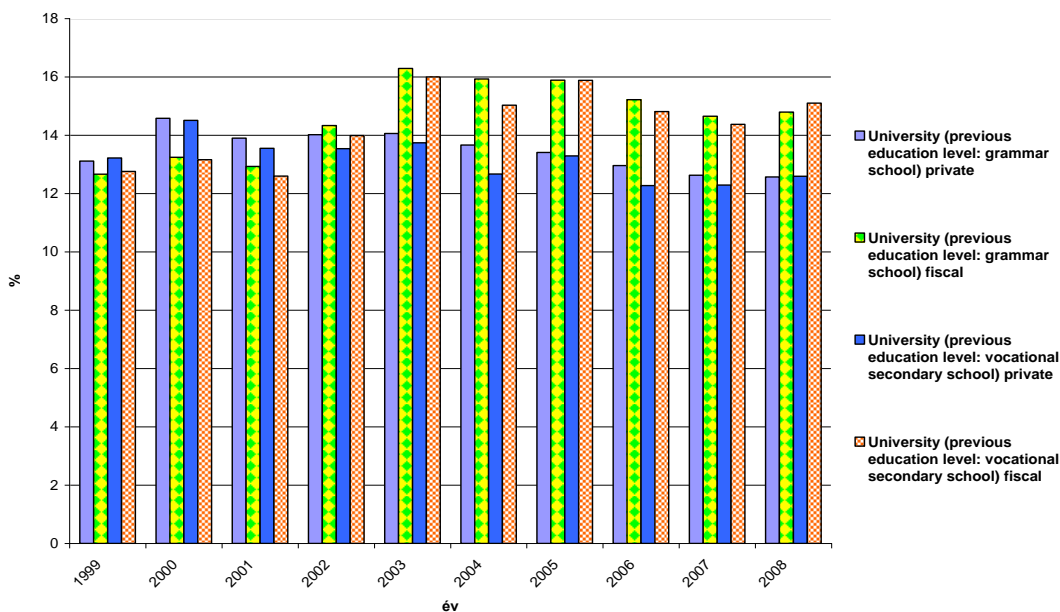

Fig.1. Private and fiscal internal rates of return for an individual obtaining university education (the previous acquired education level: grammar school and vocational secondary school) between 1999 and 2008 (%)

Source: Own calculation

The private rates of returns reached the highest value in 2003, which rates have decreased by 1.49 and 1.15 percentage points by 2008 among people who continue their education after grammar school and vocational secondary school. The fiscal rates of returns of university graduates started from a lower value compared to the private rates of returns in 1999. However, until 2003, the increase of rates exceeded that of the private rates of returns and because of that even from 2002 the private returns of education proved to be the smallest and remained so until 2008.

The rates of returns of the college graduates are characterized by bigger variability in change, a slight increase and decrease in the years of the examined period (Figure 2, 3). As a result during the examined period, depending on the preliminary training and the length of education, the private rates grew by 2.3 – 2.59 percentage point while fiscal rates of returns increased by 3.13-3.63 percentage points.
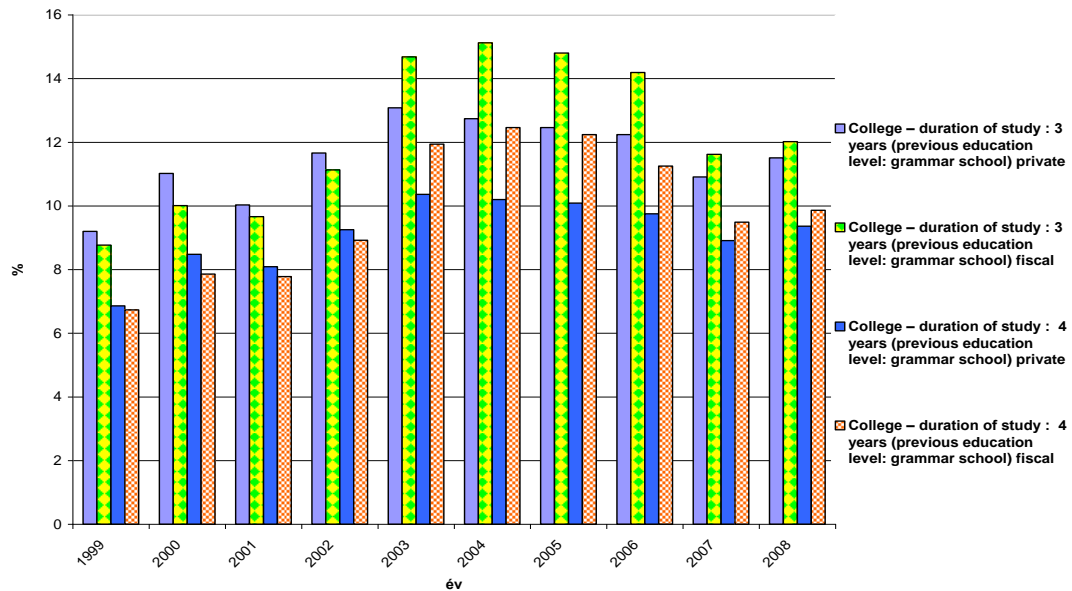

Fig. 2. Private and fiscal internal rates of return for an individual obtaining college education (the previous acquired education level: grammar school) between 1999 and 2008 (%)
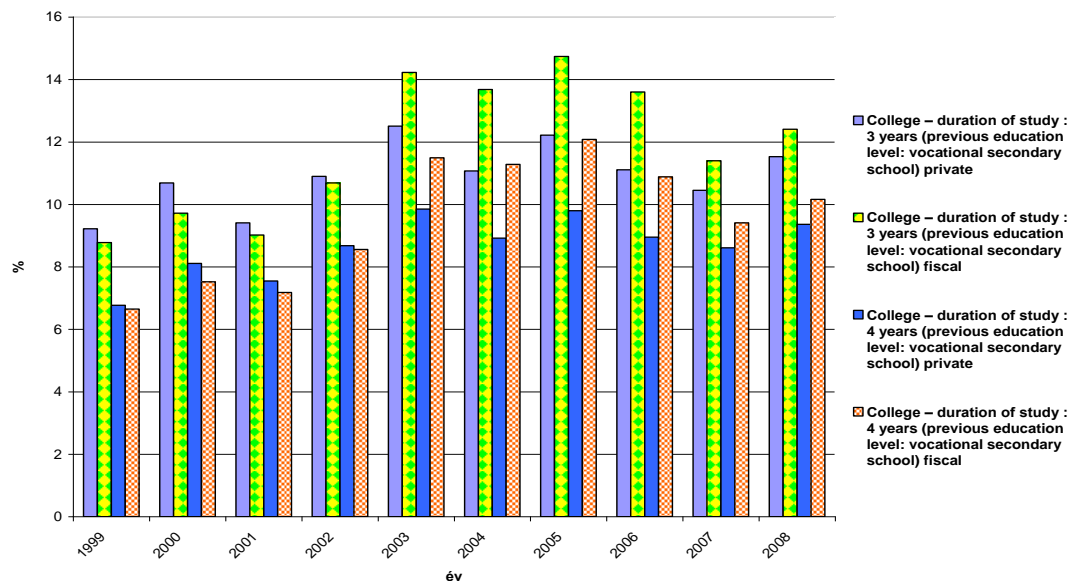
Source: Own calculation

Fig 3. Private and fiscal internal rates of return for an individual obtaining college education (the previous acquired education level: vocational secondary school) between 1999 and 2008 (%)
Source: Own calculation

On the basis of our calculations, the values of the fiscal rates of returns exceed the private rates of returns in Hungary (applied to college graduates from 2003 and university graduates from 2002 until the end of the examined period), which can be explained by the high rate of taxes and para-fiscal charges on the work-related incomes. The taxes and para-fiscal charges, compared to the gross income is the highest among university graduates. It is above 75% which means that from the work-related income of the university graduates more than 75% of the gross income comes up as revenue for the state.

4. Conclusion

Besides the rise of income for those with higher education, compared to those with secondary education, the number of students in higher education has increased considerably.

Moreover, the expansion of higher education, the rates of returns of higher education did not decrease considerably in Hungary between 1999 and 2008. The long term process of the increasing value of knowledge was not followed by a bigger change and the appreciation of knowledge remained at a high level.

With the human capital investment in education, the possibility of the individual becoming unemployed decreases, this has a clear return for the state. It can be pointed out, especially in the higher education, that after the human capital investment, with the improving situation of employment, the state wins more compared to the individual.

The state strongly intervenes in the education through the financing, supporting and regulation of education in almost all countries of the world. There is a direct effect of the relation between the state role and education, which is a result of the direct state interventions like the financing of education, the state regulation of public education, the definition of those receiving state support and the maximum number of students who can be accepted for higher education. There is also an indirect effect, which is the result of the presence and activity of the state, whose primary aim cannot be related to education but the effects can still be felt because they can influence the decisions of the individuals concerning the human capital investment. This kind of influence is the nature of tax system, the peculiarities and changeability of the structure of the income tax and the main factors of the support system of those with smaller income.

The extent of taxes on labour income and the para-fiscal charges (and tax wedges) are very high in international comparison in Hungary. However, the reason for the very high fiscal rates of return to tertiary education is the Hungarian very high taxes on labour income.

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