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Student Perceptions of Financial Returns to Higher Education in the Czech Republic and England: Evidence from Business Schools

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## **Abstract**

In this paper, the short-cut method is used to estimate perceived rates of financial returns to higher education in the Czech Republic and a modified version of the method is used to suit the current English system of deferred tuition fees. First year university students were asked to estimate their earnings with and without a university degree at two points in time. The findings show that students perceive higher education to be a profitable investment and that rates of return vary by gender as well as by country and a place of study. We conclude that perceptions are a useful proxy indicator for the demand for higher education at any particular point in time, at least in vocationally oriented subjects such as economics or business studies. Therefore policy makers would be well advised to track changes in such perceptions of not only university students, but also of high school leavers.

Keywords: Human capital, Rate of return, Demand for schooling

JEL classification: H52, I21, J24, J31

## 1. Introduction

According to the theory of human capital, the choice of level of education, its length and field of study depends on returns to this investment (Becker, 1964). People will decide to invest money in education if their investment is profitable i.e. if they expect to gain at least the same amount of money as they invest/spend. Thus it is their expectations of returns to such investment that lead to the decision to undertake extra schooling. Irrespective of whether or not there are actual private returns to higher education, if the perceived returns decrease, participation in higher education may decline too.

During the last fifteen years, there has been a growth of interest in the returns to higher education by policy makers. This has been due to increasing difficulty in funding higher education as student numbers have expanded. The fact that there are often substantial private returns to higher education has been used as a reason to shift the burden of funding higher education away from the tax payer and to the student – or sometimes to the graduate (Barr and Crawford, 2005).

In countries where there is a consensus for a welfare state financed by high levels of general taxation (e.g. in Scandinavia), Universities have tended to remain free at the point of entry. This has also been the case in countries in which the age participation rate has remained below the OECD average (e.g. in the former COMECON countries of Central/Eastern Europe). In such countries, the costs associated with university funding have remained “affordable” for the taxpayer. In the Czech Republic for instance, public universities have remained free at the point of entry with student numbers capped and excess demand has been mopped up by encouraging the growth of a vigorous private sector. By contrast in the UK the private sector remains very small and the “marketisation” of higher education has taken place in the public universities via the introduction of tuition fees, which cover part of the cost of study.

This study reports on data on students’ perceptions concerning financial returns to their higher education studies in three Czech faculties of economics and one English business school. The study is unusual in focusing on the question of *perceptions* as most studies in this area have attempted to measure *actual* returns (see for example Dolton and Makepeace, 1990; Blundell, Dearden, Meghir & Sianesi, 1999); Psacharopoulos, 1973; 1981; 1985; Psacharopoulos and Magoula, 1999; Psacharopoulos and Patrinos, 2004; Kruger and Lindahl, 2001; Arrozola, De Hevia, Risveño & Sanz, 2003; Maani, 1991; Nonneman and Cortens, 1997; Sakellariou, 2003; Wolter and Weber, 1999; Barr and Crawford, 1998).

Only a few studies have examined the comparability of earnings expectations to reality within the educational context. However, the known studies differ considerably in terms of methodology and their underlying research questions and thus their results are difficult to compare (see for example Williams and Gordon, 1981; Oosterbeek and van Ophem, 2000; Nicholson and Souleles, 2001; Caravajal, Bendana, Bozorgmanesh, Castillo, Pourmasiha, Rao et al., 2000; Smith and Powell, 1990; Blau and Ferber, 1991; Betts, 1996; Botelho and Pinto, 2004; Webbink and Hartog, 2004). Nevertheless they generally conclude that students are aware of the financial benefits of higher education; that students are able to make realistic estimates; and that there are no systematic differences between expectations and realisations.

Dominitz and Manski (1994; 1996) and Wolter (2000) surveyed high school students and university undergraduates and their expectations of the income they would earn if they completed different levels of education. They concluded that students were “able to respond meaningfully to questions eliciting their earnings expectations” (Dominitz and Manski, 1996; p25) and that information available to students regarding their future earnings were “being used rationally” (Wolter, 2000; p65).

Brunello, Lucifora & Winter-Ebmer (2001) asked students about their personal earnings expectations via two different scenarios (university degree and high school) and at two points in time (at graduation and ten year later) in 10 European countries. They found that the expected earnings are related, among others, to the field of study, gender and family background. Additionally they identified a significant trade off between earnings of university graduates at the time of labour market entry and 10 years after.

Menon (1997; 2008) estimated perceived rates of return to education of high school students and found they “acted according to human capital theory” (p4; 1997) i.e. unlike those who were to continue their studies at university, labour market entrants did not perceive higher education to be a profitable investment since their perceived rate of return to higher education was lower. Therefore she concluded that perceived rates of return are important when deciding whether or not to enter higher education (Menon, 2008).

## **2. Measuring Returns to Higher Education**

When estimating private rates of return to education one must take into account both the benefits and the costs of investment. Quantifiable benefits from the investment are the higher earnings usually experienced by more qualified workers. ‘The costs incurred by the individual are his/her foregone earnings while studying and any education fees or incidental expenses the individual incurs during schooling’ (Psacharopoulos and Patrinos, 2004; p4).

In this study, when estimating the private rate of return, the costs will consist of foregone earnings and tuition fees but will not include living expenses. Living expenses are usually covered by parents if they can afford them or by government in terms of maintenance grants for those from disadvantaged backgrounds. Since parents will usually not require to be paid back and grants are non-returnable the living expenses should not influence the perceived rate of return.

There are basically two methods to use when measuring returns to higher education. Both the elaborate (also known as the direct or full method) and indirect (also known as Mincerian function or human capital earnings function) methods have their advantages and disadvantages.

The elaborate method seems to be the most accurate method as it uses information on earnings and costs to estimate the rate of return and it discounts net age-earnings profiles. However, it is hard to implement as it requires comprehensive data (Psacharopoulos, 1973). Moreover, when estimating perceived rates of return, students’ estimates of their future earnings become less accurate as the number of years of labour market experience increases.

The Mincerian method, on the other hand, is easier to implement. However, the method assumes that the cost of education is only foregone earnings and that individuals have an infinite time horizon (Mincer, 1974). Therefore this cross-sectional regression of income against years of schooling is not as reliable as the direct method (Lleras, 2004). In addition Psacharopoulos and Patrinos (2004) point out that the Mincerian equation measures wage

effects rather than returns to education and that these should not be considered to be the same.

From these two methods a 'short-cut method' was developed by Psacharopoulos (1981).

## 2.1 Elaborate Method

The direct method was developed from the definition of rate of return to education i.e. a discounted rate balancing the sum of discounted costs related to the investment and discounted earnings produced by the investment. In other words when looking for the rate of return one must find the rate of discount that equalises the stream of discounted benefits to the stream of costs at a given point in time (Psacharopoulos, 1995).

In the case of higher education, direct costs and foregone earnings during the university studies are considered as the investment. Benefits from the investment are considered to be the difference between the income of a university graduate and a secondary school graduate.

The formula (Eq. 1) for any level of education is mathematically expressed as follows:

*Position of (Eq. 1)*

The left hand side of the equation calculates the discounted earnings premium of an individual with  $s$  years of additional schooling in the period between graduation and retirement. These earnings ( $E_H$  - earnings of an individual with higher level of education;  $E_L$  earnings of an individual with a lower level of education) are equal to the total costs  $TC_t$  accumulated during the time of additional schooling. The value of  $r$  reflects the internal rate of return. This method is very demanding in terms of the volume of data necessary for the calculations and is dependent on the parameters used to estimate the differences in future earnings.

In the case of higher education this can be expressed as follows (Eq. 2):

*Position of (Eq. 2)*

where

- $E_u$  is earnings of a university graduate
- $E_s$  is earnings of a secondary school graduate
- $C_u$  is cost of higher education e.g. tuition fees
- $A$  is age at the beginning of higher education
- $G$  is age at graduation from higher education
- $R$  is age at retirement
- $S$  is years of schooling
- $r$  is internal rate of return to higher education

In addition the elaborate method takes into account the fact that the age – earnings profiles tend to be concave. For the difference in costs and benefits between university graduates and secondary school graduates and their age-earnings profiles see Figure 1 (Fig. 1).

*Position of (Fig.1)(Fig1.tif)*

## **2.2 Mincerian Model aka Human Capital Earnings Function**

The human capital earnings function relates the natural logarithm of earnings to investments in human capital measured in time, such as years of schooling and years of post-school work experience (Mincer, 1974; Chiswick, 1997).

In estimating the rate of return from schooling, the coefficient of the schooling variable is often interpreted as the percentage increase in the hourly wage associated with one additional year of schooling and is, according to Psacharopoulos and Patrinos (2004), not accurately, referred to as the rate of return to schooling, regardless of what educational level this year refers to (Psacharopoulos, 1995; Barrow and Rouse, 2005).

Although convenient, as this method requires fewer data, it is inferior to the direct method as it assumes flat age-earnings profiles for different levels of education (Psacharopoulos and Layard, 1979). However, neither referring to wage effects as returns to schooling nor flat age-earnings profiles assumptions are “damaging or unrealistic” (Psacharopoulos, 1981; p6).

The ‘Mincerian’ earnings function takes the following form (Eq.3):

*Position of (Eq.3)*

where

- $\ln E_i$  is logarithm of earnings
- $S_i$  is the years of schooling of an individual  $i$
- $Exp_i$  is experience of an individual in the labour market
- $\beta$  is return to schooling
- $\varepsilon_i$  is an error adjustment

The  $\beta$  coefficient on years of schooling  $S$  is often interpreted as the average rate of return to one additional year of schooling, since  $\beta = \Delta \ln E / \Delta S$  is the relative increase in wages following an increase in  $S$ .

Since the basic version of the ‘Mincerian’ function does not distinguish between different levels of schooling, an extended earnings function was developed, which substitutes a series of 0-1 dummy variables for  $S$ , corresponding to discrete educational levels.

The extended earnings function may be expressed as follows (Eq.4):

*Position of (Eq.4)*

where

- $D$  is a dummy variable for the subscripted level of schooling i.e. p, s, u = primary, secondary and university, respectively

The private rate of return between levels of education can then be calculated from the extended earnings function by the following formulae (Eq. 5, Eq. 6, and Eq. 7):

*Position of (Eq.5)*

*Position of (Eq.6)*

*Position of (Eq.7)*

where  $r_p$  is the rate of return to primary education,  $r_s$  is the rate of return to secondary education and  $r_u$  is the rate of return to university education and S is years of schooling. The rationale of this procedure is that the rate of return is computed by means of the following formula (Eq. 8) that is educational level specific:

*Position of (Eq.8)*

where

- j is a higher level of education than level i
- $\Delta S$  is the difference in years of schooling between individuals with i and j level of education

### **2.3 Short-cut Method**

The short-cut method was proposed by Psacharopoulos (1981) and is developed from the Mincerian earnings function. The short-cut method does explicitly what the Mincerian function does implicitly. Indeed the underlying formula (Eq. 9) for the short-cut method is

*Position of (Eq.9)*

where

- $\bar{Y}$  is mean earnings of employees with the subscripted educational level
- S is the difference in years of schooling between individuals with i and j level of education

The equation (Eq. 9) is very similar to equation (Eq. 8) with the difference lying in the mathematical approximation (Eq. 10)

*Position of (Eq.10)*

Thus the short-cut method uses the same assumption regarding the age-earnings profiles i.e. that they are as flat as in the Mincerian function. For differences between university and secondary school graduates see Figure 2 (Fig.2).

*Position of (Fig.2)(Fig2.tif)*

Based on the above mentioned backgrounds the following formula (Eq. 11) can be used for calculating rates of return to education.

*Position of (Eq.11)*

where

- $E$  is average earnings of an individual who has an  $j$  level and  $i$  level of education respectively
- $S$  is years of schooling
- $r$  is the rate of return to education

The short-cut method assumes that the earnings are not dependent on the age of individuals. Therefore it is not recommended to calculate estimates using the sample of older individuals and the direct method is thought to produce more accurate results than the short-cut method (Psacharopoulos, 1995).

However, recent research by Menon (2008) shows that the results produced by both the above mentioned methods are highly correlated ( $r = 0.73$ ) and therefore using the short-cut method, which is less demanding in terms of data than the direct method, seems to be appropriate for research and comparative purposes.

### **2.3.1 Adjustments of the Short-cut Method to Different Conditions**

Since the basic short-cut method formula (Eq. 11) assumes foregone earnings as a cost of education it is designed to measure rates of return to higher education in countries where the higher education is provided to students without charge, such as in the case of public universities in the Czech Republic. However, in England tuition fees have been in place since 1998. Therefore some adjustments must be made in order to compute the rate of return in England as accurately as possible.

Tuition fees for full time undergraduate students were first introduced in England and Wales in 1998 (the so called 'old' system) and were set at £1,000 per student per annum for all Bachelor degree courses and rose by inflation (by 2005/06 the fee had risen to £1,175). The tuition fee was contingent on family income, with the possibility of a full or partial waiver for students from lower socio-economic backgrounds.

Since the fees had to be paid upfront they should be added to the formula in the denominator as they were a cost to students as much as their foregone earnings during their university studies. Therefore the formula (Eq. 12) used to calculate the rate of return to higher education in England between 1998/1999 and 2005/2006 is as follows:

Position of (Eq.12)

where

- $E_u$  are earnings of an individual with a university education
- $E_s$  are earnings of an individual with a secondary education
- $S$  are years of higher education
- $r$  is the private rate of return to education
- $C_u$  are the costs of university education

There is however an issue regarding means tested bursaries offered under the ‘old’ system. Since this paper attempts to estimate average rates of return it would not be accurate to assume that all students paid the full fees. For this reason an average amount of tuition fees is estimated. Given that approximately 40% of students at the University of Huddersfield Business School paid full fees, 20% paid half and 40% paid no fees the average tuition fee is estimated to be 50% of the full tuition fee i.e. £575 p.a. in 2004/2005 and £587.50 p.a. in 2005/2006. This figure is then used as the cost of university education when estimating the average private rate of return.

In January 2005 the UK parliament voted to permit universities in England and Northern Ireland to charge a fee of up to £3,000<sup>1</sup> per annum for all courses (the so called ‘new’ system). Contrary to the ‘old’ tuition fee system, the ‘new’ fee regime, which came into force in England and Northern Ireland in September 2006, does not require the payment of an upfront fee – rather it asks students to take out a loan to cover the cost of the fee. The loan is then repayable after graduation and instalments are collected alongside income tax and national insurance and are automatically deducted from wages. In other words this is similar to a graduate tax, such as that which was introduced in Australia in 1989 (Barr, 1993).

Given that students do not pay upfront tuition fees and the fees will be collected from graduates in instalments, which are set at 9% of the threshold above earnings of £15,000 in the UK, for up to 25 years, the tuition fees should not count as costs. Rather they should be seen as a reduction of the benefits from an investment in higher education. Therefore the formula (Eq. 13) developed by the authors, which will be used to calculate rates of return in England after 2006/2007 inclusive, is as follows:

*Position of (Eq.13)*

where

- $E_u$  are earnings of an individual with a university education
- $E_s$  are earnings of an individual with a secondary education
- $S$  are years of higher education
- $r$  is the private rate of return to education
- 15,000 is the threshold of £15,000
- 0.09 is the instalment of 9%

### **3. Survey of Expected Earnings at Czech and English Universities**

#### **3.1 Background**

The institutions surveyed in this study, in the Czech Republic and England, are equivalent in status and form, although they are not identical in terms of curriculum. Czech students have a greater amount of economics, accounting, mathematics and information systems in their curriculum than their British counterparts while the latter tend to study a larger amount of the newer and “softer” management subjects.

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<sup>1</sup> The fees increase yearly by no more than the rate of inflation and are set at a maximum of £3,225 per annum in 2009/2010. Almost all universities have chosen to charge the maximum fee for all Bachelor study programmes.

In the Czech Republic, faculties of economics correspond to UK business schools. Despite the Bologna process, which introduced the system of three years' study towards a Bachelor's degree and two years' study towards a Master's degree in the Czech Republic, most Czech students "graduate" with a Master award after five years' study. This is because of the fact that the Bachelor's degree is not perceived by general public to be a full-value university education. In England, most students who enter higher education aged 18/19 "graduate" with a Bachelor award after three years' study, at least initially. Many English students return to higher education at a later date to pursue a Master's degree by part time study.

### **3.2 Methodology**

Between the academic years 2004/2005 and 2008/2009 a survey of earnings expectations was undertaken of first year students at three Czech faculties of economics: at the Technical University of Liberec, the University of Economics, Prague and the University of Pardubice; and at the University of Huddersfield Business School (UK)<sup>2</sup>. Students completed the questionnaire in Czech (Prague, Pardubice and Liberec) or English (Huddersfield) and altogether there were 3,139 respondents.

A large lecture for first year students, with a high attendance rate, was identified and all those who were present were asked to complete the questionnaire. Those who were from foreign countries were asked to state it on the questionnaire. Their responses were then excluded from the sample since their perceptions of earnings in the country of study are likely to be different. First year students were surveyed, during their first term, because their decision to enter higher education had been a recent one.

The questionnaire began with general questions relating to gender and age. In the second part the students were asked about their expectations of income (in current prices i.e. without taking into account price inflation) in their first job immediately after graduation and then after 10 years of work experience. They were also asked about the level of earnings they would have expected if they had not entered higher education, both immediately after leaving school and after 10 years of employment. In all four cases, the expectations were obtained at three levels: minimum, most likely and maximum. For simplicity only the most likely earnings estimates are used for calculations in this paper.

#### **3.2.1 Survey Sample**

The location and gender structure of the sample is presented in Table 1. Since the gender distribution of the sample is not even, gender differences in expectations could bias the results. Given that existing literature has shown that females tend to expect lower wages but higher returns to university education than males, the perceived private rates of return in this paper are calculated for men and women separately.

*Position of Table 1(table1.xls)*

## **4. Results**

The mean values for the perceived rates of return of male and female students of the Czech and Huddersfield Universities estimated by the short-cut method are presented in Table 2.

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<sup>2</sup> The survey was undertaken with the financial support of GA ČR 402/04/0039 from the Grants Agency of the Ministry of Education of the Czech Republic and of the University of Huddersfield.

The data analysis produced an overall mean rate of return to higher education of 15.27% and 14.07% for all surveyed males and females<sup>3</sup>, respectively. On average, females from Huddersfield appear to expect a similar rate of return to higher education to Huddersfield males<sup>4</sup>. The gender difference in the Czech sample is not significant for graduates. However, the expectations vary later in respondents' working lives with males expecting higher returns than females. In Addition the overall gender difference is statistically significant<sup>5</sup>. It is also interesting to see that students in Huddersfield expect higher rates of return than those from the Czech Republic<sup>6</sup>.

*Position of Table 2(table2.xls)*

The vast majority of students expected, during all surveyed years, higher returns with 10 years of work experience than as fresh graduates. This suggests that returns to higher education are expected to grow faster with experience and thus that graduates benefit from their higher education studies more in the medium term than immediately after graduation. Table 3 provides the average rates of return (from all surveyed years) at all surveyed institutions and for both scenarios i.e. as graduates and with 10 years of labour market experience.

Males from the surveyed Czech universities expect very similar rates of return as graduates<sup>7</sup> but rates of return differ later in their working lives. Males from Prague, Liberec and Pardubice expect as graduates rates of return of 11.80%, 12.33% and 11.50%, respectively. However, 10 years after graduation the returns are doubled in Prague, grow by 50% in Liberec and decline slightly in Pardubice. Rates of return from females differ by approximately 1 percentage point, with females from Prague expecting the highest and females from Pardubice expecting the lowest returns to their higher education<sup>8</sup>. 10 years after graduation the returns of Czech females are expected to increase but not as significantly as those of Czech males; the increase is around 3 percentage points.

*Position of Table 3(table 3.xls)*

## **5. Main findings and implications**

In the present study, perceived rates of return were estimated using the short-cut method, which was adjusted to reflect different higher education funding systems. The findings indicate that there is a significant pay off to higher education. Moreover, the returns increase with work experience suggesting that the benefits from higher education are larger in the medium term than immediately after graduation. Additionally, as expected, the results show that the returns differ by gender and by country.

Both genders in Huddersfield expect on average higher returns than their counterparts in the Czech Republic. However, males from Prague tend to expect higher returns than males from Huddersfield in the medium term. The immediate benefits for males in Prague, Liberec and Pardubice are lower than those for males in Huddersfield. Within the Czech sample, males in Prague expect the greatest increase (almost double) in returns in the medium term when

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<sup>3</sup> Gender difference is not statistically significant at 5% level of significance

<sup>4</sup> Gender difference statistically not significant at 5% level significance for graduates  
(gender difference in rate of return after 10 years of experience is not statistically significant)

<sup>5</sup> 5% level of significance

<sup>6</sup> 5% level of significance

<sup>7</sup> No statistical difference at 5% level of significance

<sup>8</sup> Statistically significant difference at 5% level of significance

compared to returns immediately after graduation. In addition, males in Liberec expect a greater increase (ca 50%) than their peers in Pardubice, whose returns tend to actually decrease with experience.

Females from Huddersfield – like their male counterparts - expect the highest returns for both scenarios when compared to females from Prague, Liberec and Pardubice. Within the Czech sample, females from Prague expect the highest and females from Pardubice expect the lowest returns at both points in time. The increase in returns is also greatest for females in Prague and lowest for females in Pardubice. These differences between universities may be caused by the labour market conditions of the regions in which the universities are located. For example Prague, as the capital city of the Czech Republic, generally offers more job opportunities and opportunities for professional growth than any other region in the country.

It is noteworthy that on average in the Czech Republic the immediate returns to higher education tend to be similar between men and women and tend to differ in the medium term, with men expecting a greater increase in returns. However, in Huddersfield the gender gap is apparent at the point of graduation, with women expecting greater returns, but diminishes in the medium term.

One might expect a priori the returns to higher education in England to be much larger (for both genders) than those in the Czech Republic given the differences in time spent in higher education i.e. in England university studies typically last 3 years whereas in the Czech Republic they last 5 years. However, this advantage in time investment and thus lower foregone earnings is reduced by the direct costs of the investment - the tuition fees - in higher education in England. Nevertheless, the results from Huddersfield clearly show that the perceived returns to higher education are much larger than those expected by Czech students, despite Czech public university education being free of charge.

However, the age participation rate in the UK is almost double that of the Czech Republic (OECD, 2008). This would suggest that the demand for university graduates will stagnate in the UK when compared to the Czech Republic and consequently the wage premium of graduates will stagnate too leading to lower returns to higher education. It seems likely that students see the main benefit of higher education in increased chances of being employed and thus obtaining any wage at all. Due to there being many Bachelor degree holders in the job market students then see university studies as a mean of being able to compete for any job (Becker and Lewis, 1992; Clare, 2005; Ischinger, 2007).

For males in Huddersfield the expected returns declined from 2004/2005 to 2006/2007 (for females to 2007/2008) and then started to grow (see Table A1 in Appendix A). Paradoxically, this may be caused by the fact that during this period the tuition fees increased. Although the fees do not need to be paid upfront students perceived the tuition fees as a burden and thus started to expect (require) higher wage premium to their higher education studies to compensate for the perceived costs. If, however, the fees are entered into the short-cut method according to the economic presumption that they are not direct costs but rather a reduction of the future benefits from the investment the returns consequently will increase.

Since the demand for higher education in England has not declined since 2006/2007 (Bekhradnia and Bailey, 2008), the current level of tuition fees can be considered as not high enough to act as a disincentive for potential students to enter higher education. However, our results suggest that students expect a higher wage premium to compensate for the perceived costs. Thus, there will be a level of tuition fees (even deferred fees), which will eventually act as a disincentive to enter higher education since students will not expect indefinitely that their

future employers will be able to offer them a wage premium high enough to compensate for the perceived costs of higher education. Once the perceived costs outweigh the perceived benefits regardless of whether or not there are actual returns to higher education, the demand for higher education might decline.

This is why tracking students' perceptions of returns to higher education is a useful proxy indicator of the demand for higher education at any particular point in time, at least in vocationally oriented subjects such as economics or business studies. Therefore policy makers would be well advised to track changes in such perceptions of not only university students but also of high school leavers.

## **Appendix A**

*Position of Table A1*

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## **Vitae**

### **JOHN ANCHOR**

John Anchor is a career academic. His PhD was concerned with the factors influencing the allocation of resources to research and development in the UK chemicals industry. Both his Bachelor's degree and doctorate were obtained from the University of Manchester. He currently works at the University of Huddersfield as the Head of Department of Strategy and Marketing.

### **JANA FIŠEROVÁ**

Jana Fišerová's research interest is in economics of education. Her PhD research is focused on students' expectations of financial returns to higher education in England and the Czech Republic. She started her university studies at the Technical University of Liberec, finished her first degree at the University of Huddersfield and her Master's degree was awarded by the University of Leeds. Her intention is to continue undertaking research in economics of education.

### **KATEŘINA MARŠÍKOVÁ**

Dr. Kateřina Maršíková is Assistant Professor in the Faculty of Economics at the Technical University of Liberec. She has been undertaking research into the returns to higher education for the past six years. This has been within the EU context and reflects other research that she has undertaken associated with the economics of European integration.

### **VÁCLAV URBÁNEK**

Václav Urbánek is associate professor at the department of public finance at the University of Economics, Prague and the Technical University of Liberec, Czech Republic, where he has been teaching since 1990. He is a member of the International Institute of Public Finance. Professor Urbánek has published on a variety of subjects including university financing, and the social position of higher education students. His recent research has been focused on human capital and the expected returns to investment in higher education in the European Union countries.

(Eq. 1)

$$\sum_{t=1}^{R-G} (E_H - E_L)_t (1+r)^{-t} = \sum_{t=1}^{t=G} TC_t (1+r)^t$$

(Eq. 2)

$$\sum_{t=G}^R (E_U - E_S)_t (1+r)^{-t} = \sum_{t=A}^G (E_S + C_U)_t (1+r)^t$$

(Eq.3)

$$\ln E_t = \alpha + \beta S_t + \gamma Exp_t + \delta Exp_t + \varepsilon_t$$

(Eq.4)

$$\ln E_t = \alpha + \beta_p D_p + \beta_s D_s + \beta_u D_u + \gamma Exp_t + \gamma_2 Exp_t^2 + \varepsilon_t$$

(Eq.5)

$$r_p = \frac{\beta_p}{S_p}$$

(Eq.6)

$$r_s = \frac{\beta_s - \beta_p}{S_s - S_p}$$

(Eq.7)

$$r_u = \frac{\beta_u - \beta_s}{S_u - S_s}$$

(Eq. 8)

$$r_j = \frac{\ln Y_j - \ln Y_i}{\Delta S}$$

(Eq. 9)

$$r = \frac{\bar{Y}_j - \bar{Y}_i}{\Delta S \cdot \bar{Y}_i}$$

(Eq. 10)

$$\ln(1 + x) \approx x$$

(Eq. 11)

$$r = \frac{E_f - E_t}{S \cdot E_t}$$

(Eq. 12)

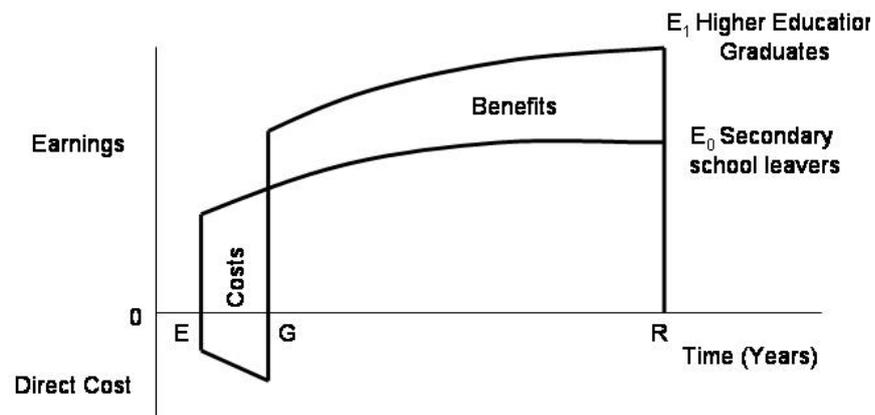
$$r = \frac{E_u - E_s}{S \cdot (E_s + C_u)}$$

(Eq. 13)

$$r = \frac{E_u - [0.09(E_u - 15,000)] - E_s}{S \cdot E_s}$$

(Fig.1)

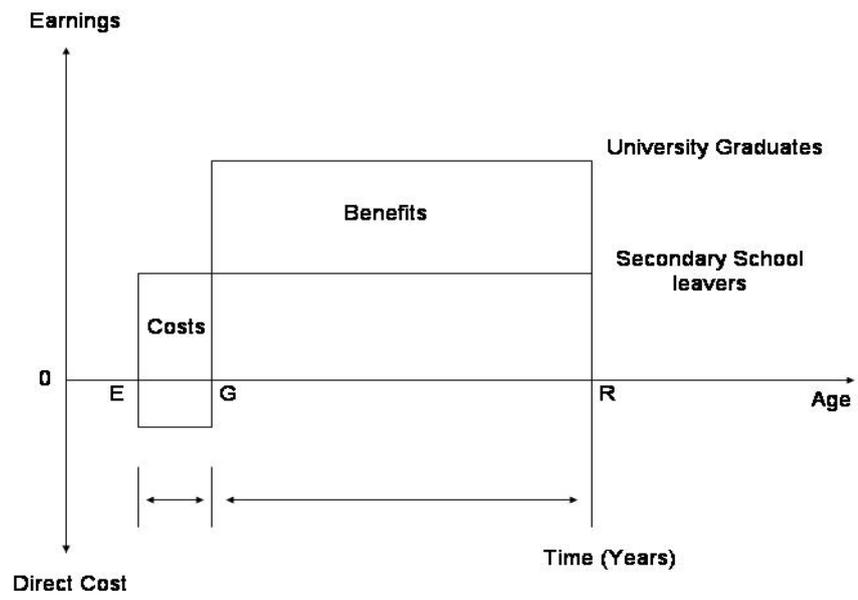
Figure 1 Stylised Age-Earnings Profiles



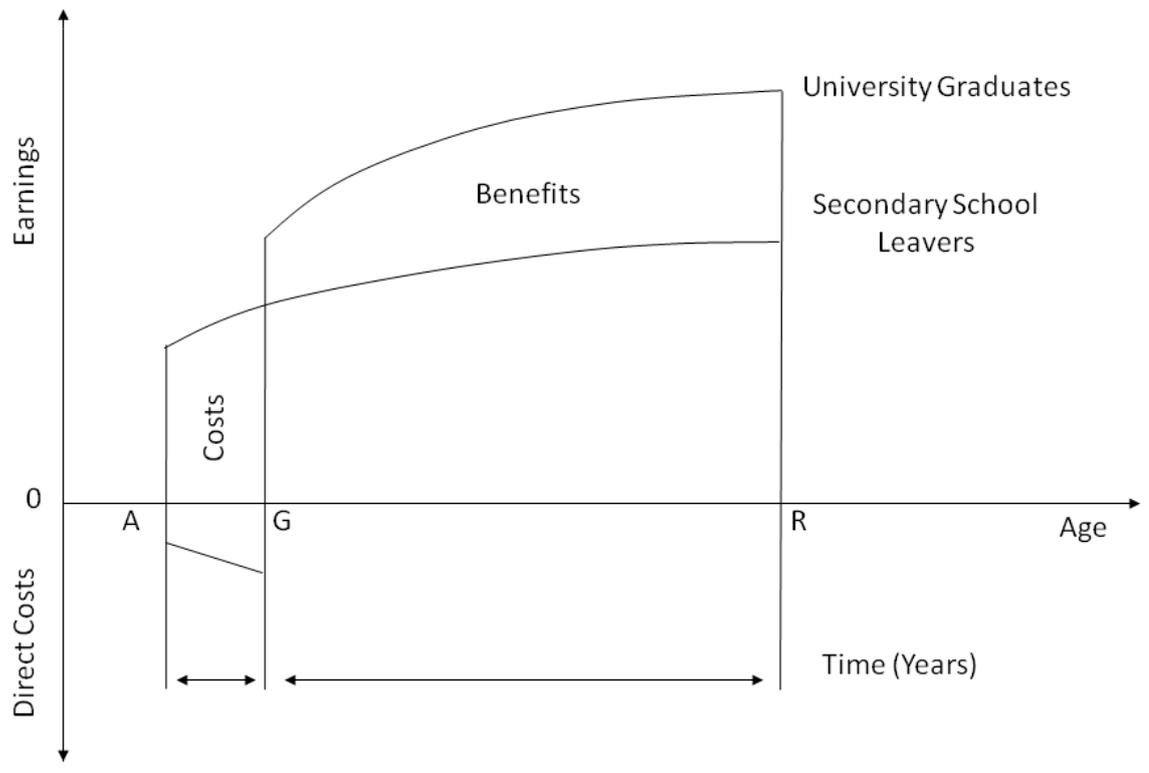
Adapted from Psacharopoulos (1995)

(Fig.2)

Figure 2 Flat Age-Earnings Profiles



Adapted from Psacharopoulos (1995)



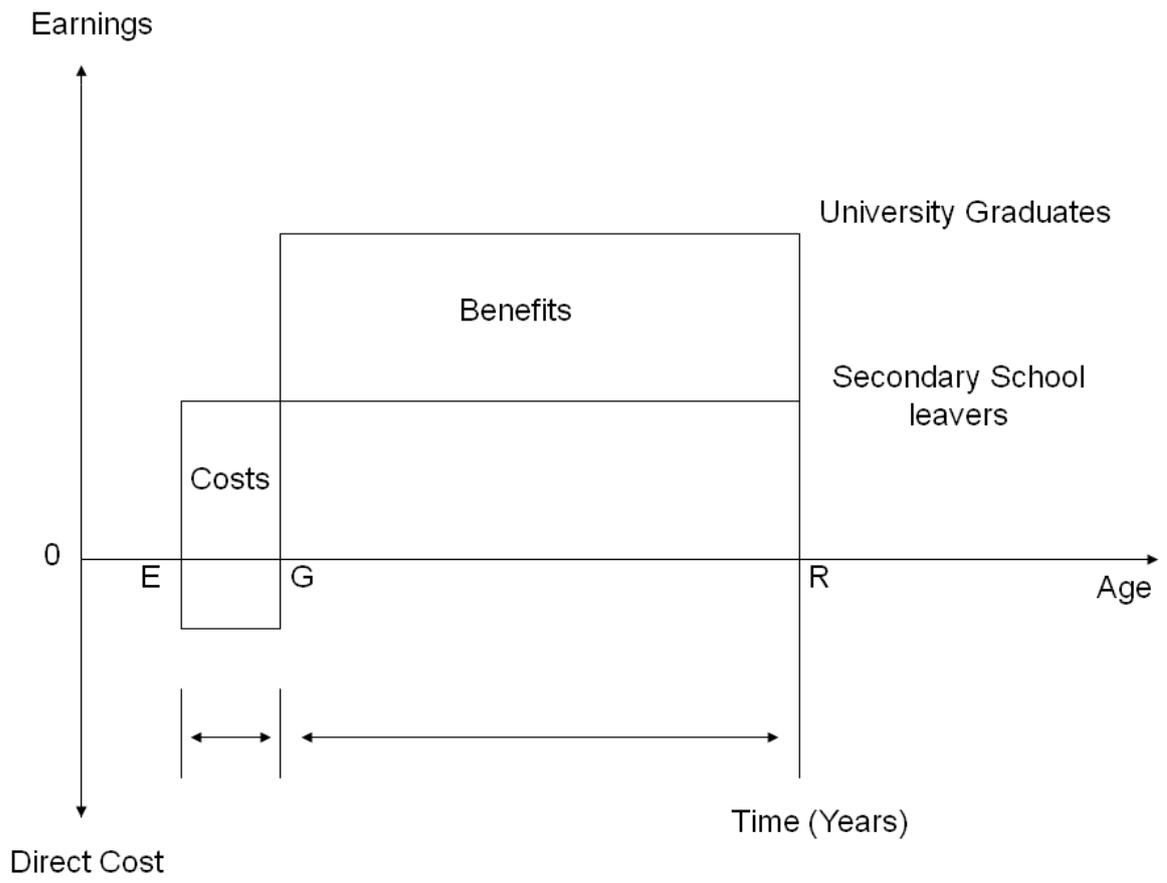


Figure 1 Stylised Age-Earnings Profiles

Adapted from Psacharopoulos (1995)

Figure 2 Flat Age-Earnings Profiles

Adapted from Psacharopoulos (1995)

Table 1 Sample structure

Year	Gender	Huddersfield	%	Liberec	%	Pardubice	%	Prague
2004/2005	Male	103	60	41	35	36	17	84
	Female	68	40	75	65	175	83	121
	Total	171	100	116	100	211	100	205
2005/2006	Male	46	69	29	27	21	18	160
	Female	21	31	80	73	94	82	252
	Total	67	100	109	100	115	100	412
2006/2007	Male	33	46	59	29	41	29	125
	Female	38	54	144	71	99	71	213
	Total	71	100	203	100	140	100	338
2007/2008	Male	105	60	20	32	13	14	34
	Female	69	40	43	68	82	86	85
	Total	174	100	63	100	95	100	119
2008/2009	Male	124	57	52	29	16	13	98
	Female	94	43	127	71	110	87	128
	Total	218	100	179	100	126	100	226

The location and gender structure of the sample is presented in Table 1.

%
41
59
100
39
61
100
37
63
100
29
71
100
43
57
100

Table 2 Mean Rates of Return (%) in the Czech Republic and Huddersfield in 2004/2005 - 2008/2009

	Czech Republic		Huddersfield	
	Male	Female	Male	Female
UNI <sup>a</sup>	11.87	11.19	14.27	16.30
UNI 10 <sup>b</sup>	17.78	14.52	21.99	21.52
Both scenarios	14.83	12.85	18.13	18.91

UNI<sup>a</sup> refers to the point at graduation

UNI 10<sup>b</sup> refers to the point in 10 years after graduation

The mean values for the perceived rates of return of male and female students of the Czech and Hudd

)

ersfield Universities estimated by the short-cut method are presented in Table 2.

Table 3 Average Rates of Return (%)

	Prague		Liberec		Pardubice		Huddersfield	
	Male	Female	Male	Female	Male	Female	Male	Female
UNI	11.80	12.35	12.33	11.32	11.50	9.91	14.27	16.30
UNI 10	23.91	16.07	18.04	14.80	11.38	12.68	21.99	21.53

Table 3 provides the average rates of return (from all surveyed years) at all surveyed institution

is and for both scenarios i.e. as graduates and with 10 years of labour market experience.

Table A1 Perceived Private Rates of Return (%) to Higher Education by Gender, Place of Study

		Prague							
		2004/2005		2005/2006		2006/2007		2007/2008	
		male	female	male	female	male	female	male	female
UNI		11.35	11.54	13.83	13.47	11.51	12.11	12.62	13.33
UNI 10		16.25	14.12	24.68	5.27	32.90	18.66	28.20	24.17
		Liberec							
		2004/2005		2005/2006		2006/2007		2007/2008	
		male	female	male	female	male	female	male	female
UNI		12.84	11.10	12.20	11.30	13.44	13.80	10.70	8.81
UNI 10		14.33	14.15	22.99	14.22	18.50	19.69	16.84	12.50
		Pardubice							
		2004/2005		2005/2006		2006/2007		2007/2008	
		male	female	male	female	male	female	male	female
UNI		10.02	12.17	10.93	9.05	13.20	10.82	16.25	8.76
UNI 10		13.90	14.20	10.40	11.58	5.31	11.63	15.43	13.69
		Huddersfield							
		2004/2005		2005/2006		2006/2007		2007/2008	
		male	female	male	female	male	female	male	female
UNI		17.12	20.53	13.15	16.13	9.95	15.21	13.18	13.11
UNI 10		23.12	30.16	18.23	18.57	18.50	14.78	21.84	24.30

y and Years of Work Experience between 2004/2005 and 2007/2008

2008/2009	
male	female
9.68	11.30
17.53	18.12

2008/2009	
male	female
12.45	11.58
17.55	13.43

2008/2009	
male	female
7.07	8.76
11.89	12.30

2008/2009	
male	female
17.96	16.53
28.25	19.81