# Shifts in Income Expectations of Czech Students at Selected Economic Faculties over the Years 2001 – 2012[1]

*Aleš KOCOUREK* – Kateřina MARŠÍKOVÁ***

**Abstract**

*The financing of higher education has become a long-range, crucial topic for many governments worldwide. As a part of it, there has also been a big discussion about the possible participation of private sources in financing of the tertiary education in the Czech Republic. The objective of the paper is to analyze and test students' expectations about their future incomes and to bring a new quantitative argument to the discussion about the implementation of tuition fees at Czech public universities. The authors analysed data from a large survey among students of selected faculties of economics as well as factors which might influence students' income expectation. The findings provide inspiring comparison and confirm high returns from investment in higher education.*

**Keywords:** *tertiary education, rate of return, expectation, income, tuition fee, median, Man-Whitney Wilcoxon W-test*

**JEL Classification**: I22, H52

## Introduction

Currently, there is an "inertia syndrome" in the public funding of education in many European countries. Most education budgets are managed by predominantly constant systems, i.e., allocation in a given year is more or less equal to the previous year adjusted for inflation. Such a procedure leads to inefficiencies and prevents any policy to meet the objectives of equity and effectiveness. As knowledge on what are the best ways to improve social welfare by education

* Aleš KOCOUREK, Technical University of Liberec, Faculty of Economics, Department of Economics, Studentská 2, 461 17 Liberec 1, Czech Republic; e-mail: ales.kocourek@tul.cz

** Kateřina MARŠÍKOVÁ, Technical University of Liberec, Faculty of Economics, Department of Business Administration, Studentská 2, 461 17 Liberec 1, Czech Republic; e-mail: katerina.marsikova@tul.cz

[1] The paper was written with support of the Czech Science Foundation, No. 402/09/1123.

progresses, also the economic policies should be continuously approaching to the most effective models of public funding (Psacharopoulos, 2009).

Technological changes have driven up the demand for skills: human capital is even more important determinant of economic competitiveness than it used to be in the past – a core argument underpinning increased education spending in the USA, the crisis notwithstanding. To compete internationally, countries need mass high-quality systems of tertiary education. But public budgets face competing imperatives such as population ageing and increased pressures on medical spending. The only realistic way – which tertiary education could avoid being starved of funds by – has been (or could be in some countries as the Czech Republic) supplementing the public spending on a significant scale with private finance (Barr, 1993).

According to the theory of human capital, the choice of level of education, its length and field of study depend on returns to this investment (Becker, 1993). Also people's choice of an educational path is based on what they perceive as the optimum financial return derived from such a choice (Wolter and Weber, 1999).

The economic situation in many countries all around the world is forcing their governments to consider alternative sources of financing for ever more important and also more demanding public universities. One of the possibilities on side is tuition fees. This article provides new facts and figures casting some light on the willingness or readiness of the students themselves to pay for their tertiary education. It compares the data from twelve-year-long survey and introduces a couple of possible factors influencing students' income expectations.

## 1. Theoretical Background and Previous Research Results

Returns to investment in education, in the modern/human capital sense of the term, have been estimated since the late 1950s. In this longer than sixty-year history of estimates of returns to investment in education, there have been published many papers on the empirical results supporting positive returns (Psacharopoulos and Partrinos, 2004). According to Barr, tertiary education creates benefits beyond those to the individual – social benefits in terms of growth, the transmission of values, and the development of knowledge for its own sake. All these justify continuing taxpayer support. However, graduates typically also receive private benefits – higher earnings, more satisfying jobs, greater enjoyment of leisure – making it fair they cover a part of the costs. However, they should bear these costs, once they can afford it, when they receive the private benefits of their university degrees, i.e. as graduates, not when they are students (Barr, 1993; 2010, pp. 9 – 10).

Psacharopoulos (2009) provide an evidence of returns to tertiary education in selected European countries based on the OECD data reaching 12.3% for private and 7.9% for social return s in 2008. Private returns are based on the costs and benefits of education, as those are realized by the individual student, i.e., how much he/she actually pays out of his/her pocket to attend a tertiary education institution, relative to what he/she gets back, after taxation, in terms of increased earnings, relative to a control group of secondary school graduates without university degree. This is a private spending efficiency question. Private rates of return are used to explain the behaviour of students regarding the demand for higher education, or the equity effects of state subsidies to education.

Social returns are based on the costs and benefits of education, as those are realized by the state or society as a whole. The costs are all inclusive, i.e., they refer to how much the education really costs, rather than just what the students pay out of their pockets. Social rates of return should be based on productivity differentials, rather than earnings. The social returns to education are used to assess the efficiency of public spending on education, and as a clue whether to expand or to contract a particular major/faculty/university (Psacharopoulos, 2009).

Other research studies deal with students expectations in Europe and in the US and analyze the reasons why young people postpone decision to enter the labour market after getting a secondary school degree. As Jerrim (2010) points out, there were published several studies investigating students' income expectations. For example in the US, Smith and Powell (1990) asked approximately 400 students at two mid-western universities how much they expect to earn when they graduate and ten years after graduation. Respondents were quite realistic about pay in their first job but overestimated their income over the long term. Betts (1996) asked 1,000 students at the University of California to predict the salary of a hypothetical individual under several different scenarios. Also in this case, the conclusion was that students quite accurately predict the income of young workers, but overestimate the pay of those with ten or more years of working experience. Blau (1991) collected data from 351 students studying at the business faculty of the University of Illinois. Also in this research, students seem quite realistic about their starting wages, but become progressively unrealistic over long time horizon (Jerrim, 2010).

This article provides a wide comparison of data collected between years 2001 and 2013 at three economic faculties. One represents capital university institution – University of Economics, Prague, the other two provide data from two selected region faculties, from the Technical University of Liberec (Faculty of Economics) and from the University of Pardubice (Faculty of Economics and

Administration). All the three represent universities where students enrol in master degree programmes and expect to enter labour market after five years of studying which might also influence their expectations. During the twelve years, more than 5,500 questionnaires were collected from respondents at these three faculties.

The aim of the data analysis in this paper is not only to compare absolute results dealing with the answer whether the students' expectations are realistic or not (surveys of Jerrim, Smith and Powel, Blau, Carvajal, etc.), moreover we analyze possible factors which might influence the expectation.

## 2. Methodology of the Survey

Statistics at the Czech labour market do not offer any real data about earnings of university graduates depending on a field of study. To find out how much a graduate from a faculty of economics can earn, there has been carried out a questionnaire about income expectations of economic students in the years 2001 – 2013. In this survey, respondents from the first year of faculties of economics were chosen at three Czech universities. Respondents were questioned personally during selected lectures to ensure sufficient return of questionnaires (100%). Students were asked about their expected incomes after graduation and after ten years of working experience in both cases – with a secondary-school degree only and with a master degree. They also provided information about education and earnings of their parents and about earnings of their friends if they knew it, so that the researchers can find out more about the background of the students' expectations. The first year students were chosen, hence they are very close to the point of decision whether to start working with a secondary degree or to postpone their earnings and attend the university. With most of them, it can be expected they chose the tertiary education for additional gains (higher income) in the future. The other reason to ask this particular group of respondents was to collect data from respondents with similar age structure. The questionnaire surveys were supported by the Czech Science Foundation (see Urbánek, Maršíková and Řehořová, 2009).

As mentioned above the data used in this paper arise from the research that has been carried out between 2001 and 2012 at three selected economic faculties in the Czech Republic, namely at Faculty of Economics, Technical University of Liberec, Economic Faculty, University of Pardubice and University of Economics, Prague. Two of them might be perceived as mainly regional once and the Prague one with a national importance. All the universities are state-financed (no tuition fees are paid there for the regular period of studies).

The survey brought a unique data sample; in total there have been analysed answers from more than 5,800 students. As the results from previous analysis of this research data have shown, students perceive the investment into the higher education as something very expediential (Urbánek, Maršíková and Řehořová, 2009).

For the purpose of this article, we have chosen three key factors to classify the respondents by: gender of the respondent, respondent's awareness of his/her friends' income, and the highest level of education of respondent's parents. In sections 6, 7, and 8, sensitivity of returns to tertiary education on these factors has been tested.

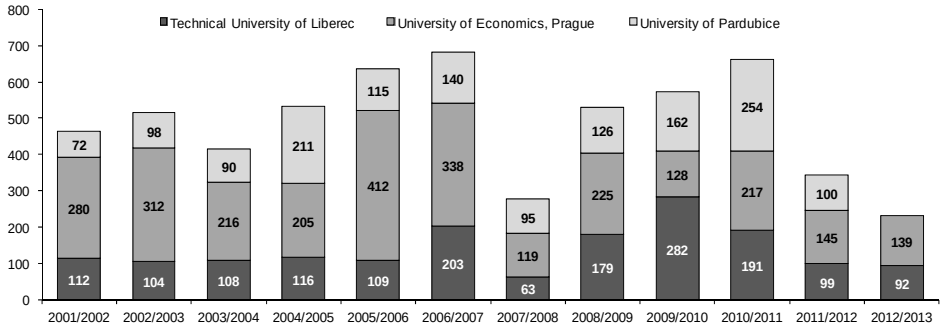
Beyond the private and social efficiency questions analysed in this paper, the returns to education can be also used to answer the equity questions. In Europe, the higher socioeconomic students, as measured by the education of their parents, have better chances to enter tertiary education (OECD, 2001, from Psacharopoulos, 2009).

## 3. Results from the Survey

During the period 2001 – 2013, there were collected more than 5,800 questionnaires. To describe the sample, we can say that the number of respondents varies widely over the years, from 231 answerers of respondents in 2012 up to 681 answerers in 2006.

F i g u r e 1

**Distribution of Respondents by their University**



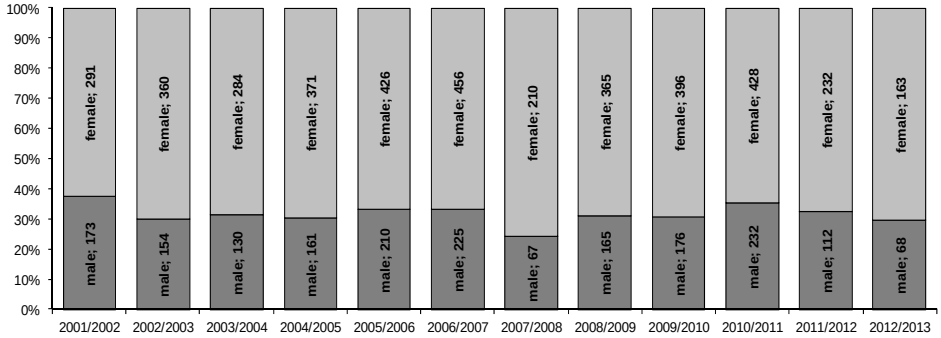

*Source:* Authors' calculations, data 2001 – 2013.

As mentioned above, for the purpose of this analysis, three key factors were chosen to classify the respondents by: gender of the respondent, respondent's awareness of his/her friends' income, and the highest level of education of respondent's parents.

• The major differences in the distribution of respondent by gender are shown in Figure 2. The young women constitute approximately 68% of all answerers; their share has been varying only slightly over the years (ranging from 62.7% in 2001 to 75.8% in 2007).

F i g u r e 2

**Classification of Respondents by their Gender**

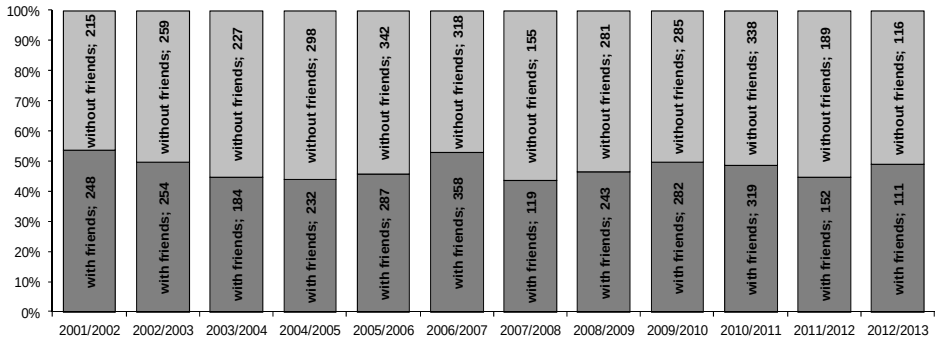



*Source:* Authors' calculations, data 2001 – 2013.

• The classification of respondents to those who are familiar with income of their friends and to those who are not, has been shown in the Figure 3. The respondents are divided into these two groups almost half-and-half: 48% of all the answerers dispose of information on income of their friends, while 52% do not. There is little variance in these proportions over the years.

F i g u r e 3

**Classification of Respondents by their Awareness of their Friends' Income**



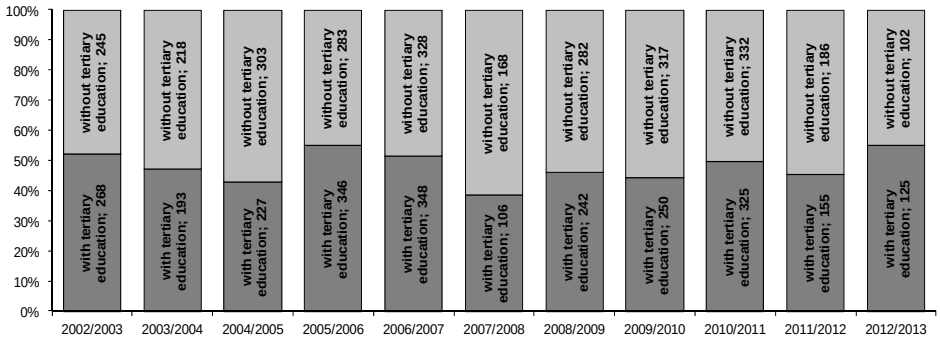

*Source:* Authors' calculations, data 2001 – 2013.

• The classification of respondents by the highest level of education of their parents seems also rather interesting. The shares of students coming from families

where at least one of the parents achieve a university degree and shares of respondents with neither of the parents tertiary educated are highly balanced (see Figure 3). We can notice only a tight predominance of those with only primary or secondary educated parents.[2]

F i g u r e 4

**Classification of Respondents by the Highest Level of Education of their Parents**




*Source:* Authors' calculations, data 2001 – 2013.

The aim of this paper is to calculate the rate of return on each year of the tertiary education (sections 4 and 5) and then test the results sensitivity to a couple of factors (year of survey, gender of answerer, information about income of respondents' friends, and the level of education of respondents' parents). We suppose that this could possibly affect rates of return that respondents expect to receive from their university degree. These tests will be performed in the sections 6, 7, and 8. Their respective conclusions will be summed up in the last part of the paper.

## 4. Research Methods to Ascertain the Returns to Investment in Higher Education

Following the short-cut method published by Psacharopoulos (1995) and Psacharopoulos and Patrinos (2004), rectified by Maršíková and Kocourek (2012), the expected returns on investment to tertiary education can be calculated using the following formula:

$$r = \sqrt[t]{\frac{W_N}{W_{wN}}} - 1 \qquad (1)$$

[2] In the first year of the survey (2001/2002), the students were not asked about the highest level of their parents' education yet, therefore these data are missing for this particular year.

where

$r$ – the expected annual percentage rate of return on investment to tertiary education,

$W_N$ – the expected income immediately after completing the university studies,

$W_{wN}$ – stands for expected income the respondent would earn without the university degree,

$t$ – a number of years of tertiary education ($t = 5$ for a master degree).

This method is a simplification of formula constructed by Mincer (Mincerian function). Authors use it because of a lack of useful data needed for the elaborated Mincer method.

The main presumption for using such an equation is the constant shape of income curve for each respondent. It is almost certainly an overgeneralization and oversimplification, but authors of this article hope, for the purposes of this paper, this method is fairly justifiable and very useful especially for its clarity and easiness.

Since the data received from the survey enable such a procedure, not only one rate of return on investment to tertiary education ($r$) was calculated for each respondent. The authors used minimal expected income (the lowest), mean (the most probable expected income), and maximum (the highest expected income) of expected spot incomes with and without university degree and calculated three levels expected spot rates of return: minimal (*minRn*), mean (*averRn*), and maximal (*maxRn*). Utilizing the expectations of respondent about their income in ten-year perspective (again with and without university degree), also the rates of return with ten-year-long working experience have been constructed – again at three levels: minimal (*minRt*), mean (*averRt*), and maximal (*maxRt*).

With these six levels calculated for each respondent, the next step would be to aggregate the numbers for all the respondents. The basic and obvious option would be an arithmetic average, however, it can be easily demonstrated that the arithmetic average of rates of return is not very suitable measure of central tendency.[3]

Authors performed distribution normality checks for each of calculated variables separately in all twelve years of the survey using standardized Fisher's skewness and standardized kurtosis.[4] In all the cases without any exception, the null hypothesis of normality of the distribution has been rejected at 95% confidence level. Also the whole data set of 5,807 questionnaires exhibited significant departures from normality (see Table 1) indicated by high values of standardized skewness (and kurtosis).

[3] For details and theoretical discussion see e.g. Maršíková and Kocourek (2012).

[4] For details and theoretical discussion see e.g. Wuensch (2005) and Cameron (2004).

T a b l e 1

**Summary Statistics of the Whole Data Set (2001 – 2013)**

| | University graduates | | | After ten years of working experience | | |
|---|---|---|---|---|---|---|
| | *minRn* | *averRn* | *maxRn* | *minRt* | *averRt* | *maxRt* |
| Count of respondents | 5,807 | 5,790 | 5,699 | 5,755 | 5,720 | 5,578 |
| Returns (arithmetic average) (in %) | 10.27 | 9.80 | 10.78 | 12.16 | 12.57 | 17.80 |
| **Returns (median)** (in %) | **8.45** | **8.45** | **9.86** | **10.76** | **10.76** | **14.87** |
| Returns (mode) (in %) | 8.45 | 10.76 | 14.87 | 14.87 | 14.87 | 14.87 |
| Variance | 0.0054 | 0.0050 | 0.0101 | 0.0085 | 0.0093 | 0.0283 |
| Standardized skewness | 32.86 | 53.15 | 91.47 | 61.98 | 99.83 | 203.77 |
| Standardized kurtosis | 375.49 | 507.61 | 508.86 | 342.24 | 439.99 | 2,198.37 |

*Source:* Authors' calculations, data 2001 – 2013.

As a result, authors decided to use *median* for a mean value estimate of the rates of return on investment to tertiary education. Its advantages over arithmetic average and over mode have been discussed by Maršíková and Kocourek (2012). The median shows the best and most meaningful interpretation regarding the aims and the focus of this article.

Since the median values of *minRn* and *averRn* for the Czech students of faculties of economics reach *approximately 8.45%* (and *maxRn* is by 1.41 percentage point higher), it can be concluded, that at least half of the students of faculties of economics expect, that their income after university graduation will be by no less than 50 per cent higher[5] than without the master degree.

This simple conclusion of the research will be tested in the following sections for its sensitivity on several agents (year of survey, gender of respondents, information on incomes of respondents' friends, highest degree of education of respondents' parents). All of these factors will be tested for having a significant influence on median of the analyzed levels of expected incomes (*minRn*, *averRn*, *maxRn*, *minRt*, *averRt*, and *maxRt*).

Having proved the skewness of the distribution curve for all these factors, it is clearly not possible to use statistical methods based on the assumption of a normal distribution of the data (such as F-test of variance homogeneity or t-test of mean value equality). Therefore, authors decided to use Mann-Whitney-Wilcoxon (MWW) median test as it is more sophisticated and robust than Mood median test (Mann and Whitney, 1947). Theoretical foundations as well as detailed description of the statistical procedures were given by Maršíková and Kocourek (2012).

[5] If each year at the university yields 8.45% to the expected income, then after five years of master studies the students expect $(1 + 0.0845)^5 \approx 1.5$ higher income.

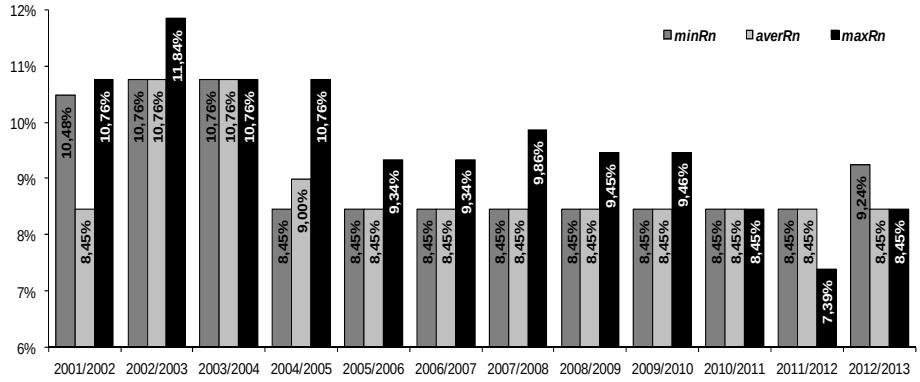
## 5. Changes of Spot Expectations and Expectation with Ten-year-long Working Experience over the Years (2001 – 2013)

The first question, the authors had asked themselves after calculating the median values was, how significantly differ these expected rates of return on investment in tertiary education over the years. Or: Is the year, when the survey has been carried out, an important factor affecting significantly the median value of the rate of return?

Shifts in expectations over the years have been illustrated in the graphs (see Figure 5 and Figure 6), backed up by the MWW statistical procedures.

F i g u r e 5

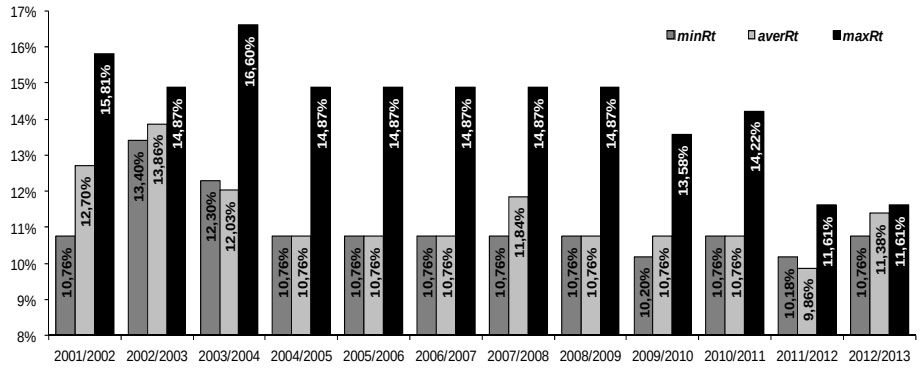
**Changes in Spot Expectations over the Years 2001 – 2013**




*Source:* Authors' calculations, data 2001 – 2013.

F i g u r e 6

**Changes in Expectations with Ten-year-long Working Experience over the Years 2001 – 2013**




*Source:* Authors' calculations, data 2001 – 2013.

The medians of practically all the evaluated levels of income expectations (with two exceptions: *averRn* and *minRt* in 2001/2002) were found to be significantly *higher* than the aggregated results (see Table 1 above) in the first three years of the survey (i.e. 2001 – 2004). In the following five years (2004 – 2009), the annual results were proved to be equal, or not significantly different from those calculated for all twelve years. Then, in the year 2009/2010, the respondents reduced their income expectations with ten-year-long working experience (*minRt*, *averRt*, *maxRt*) significantly below the general median values, but kept the spot expectation on the level of previous years. In the years 2010 – 2012, the overall pessimism about economic outcomes of the Czech Republic reflected itself in all the levels of income expectation of the respondents. It was in this period, when *maxRn* – generally the higher among the spot expectations – fell down 1.06 percentage points below the threshold of 8.45%.[6] In the last year (2012/2013), the minimal and mean levels of income expectations (*minRn*, *averRn*, *minRt*, and *averRt*) returned to the levels of corresponding overall medians, while the maximal levels (*maxRn* and *maxRt*) remain significantly lower than their overall counterparts.

The conclusion of section 5 is rather fundamental: It seems probable that the income expectations of the surveyed students of selected economic faculties in the Czech Republic tend to respect (to certain degree) the situation and perspectives of the Czech economy. Nevertheless, they only exceptionally fall below 8.45%.

## 6. Sensitivity of Expected Returns on Investment in Tertiary Education to the Gender of Respondent

The next question, the authors had asked themselves, was focused on gender differences in the expected rates of return. In the first place, it should be pointed out that the interest of the authors was not in expected *absolute* values of income, but in expected relative increases due to university studies. The fact women expect significantly lower incomes even with the university degree was discussed in Urbánek, Maršíková and Řehoříková (2009).

The sensitivity of expected rates of return to the tertiary education to the gender of respondents was found surprisingly weak. The diversity between the genders at the particular levels of spot rates of return (*minRn*, *averRn*, and *maxRn*) was found significantly strong in less than three years. When evaluating the gender differences at the levels of returns with ten-year-long experience (*minRt*, *averRt*, and *maxRt*), the gender played significant role in three years for *minRt*,

[6] We will discuss this exception in the following sections.

five years for *averRt*, and six years for *maxRt.* In all the cases (highlighted in the Table 2 with gray background), the male respondents showed significantly higher expectations about the percentage increase of their future incomes while females stuck "closer to the ground" (see Table 2).

T a b l e 2

**Sensitivity of Expected Rates of Return on Investment in Tertiary Education to the Gender of Respondent (in %)**

| | | | 2001/2002 | 2002/2003 | 2003/2004 | 2004/2005 | 2005/2006 | 2006/2007 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | male | 10.76 | 13.18 | 10.76 | 8.45 | 8.45 | 9.00 |
| | | female | 10.20 | 10.76 | 10.76 | 8.45 | 8.45 | 8.45 |
| | *averRn* | male | 9.00 | 11.84 | 10.13 | 10.27 | 8.45 | 9.00 |
| | | female | 8.45 | 10.76 | 10.76 | 8.45 | 8.45 | 8.45 |
| | *maxRn* | male | 10.76 | 12.07 | 12.48 | 8.45 | 10.48 | 10.06 |
| | | female | 10.76 | 11.84 | 10.76 | 10.76 | 8.45 | 9.00 |
| After ten years of working experience | *minRt* | male | 11.84 | 14.87 | 14.22 | 10.76 | 10.76 | 10.76 |
| | | female | 10.76 | 12.06 | 11.47 | 10.76 | 10.76 | 10.76 |
| | *averRt* | male | 12.70 | 14.87 | 13.97 | 10.76 | 11.84 | 10.76 |
| | | female | 12.48 | 12.48 | 11.84 | 10.76 | 10.76 | 10.76 |
| | *maxRt* | male | 17.32 | 20.11 | 19.29 | 14.87 | 14.87 | 14.87 |
| | | female | 14.87 | 14.87 | 14.87 | 14.87 | 14.87 | 14.87 |

| | | | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | male | 10.76 | 8.45 | 9.46 | 8.45 | 8.45 | 9.00 |
| | | female | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 9.34 |
| | *averRn* | male | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 |
| | | female | 8.45 | 8.45 | 8.83 | 8.02 | 8.45 | 8.45 |
| | *maxRn* | male | 10.76 | 9.86 | 9.86 | 8.45 | **7.66** | 8.45 |
| | | female | 9.00 | 8.45 | 8.45 | 8.45 | **6.96** | 8.76 |
| After ten years of working experience | *minRt* | male | 14.87 | 10.76 | 9.24 | 10.76 | 10.76 | 11.84 |
| | | female | 10.76 | 10.76 | 10.76 | 10.76 | 9.86 | 10.76 |
| | *averRt* | male | 12.48 | 11.70 | 10.76 | 10.76 | 9.91 | 12.48 |
| | | female | 10.76 | 10.76 | 10.35 | 9.86 | 9.86 | 10.76 |
| | *maxRt* | male | 20.11 | 14.87 | 14.87 | 14.87 | 14.87 | 10.76 |
| | | female | 14.87 | 14.87 | 12.30 | 12.70 | 10.76 | 11.84 |

*Note*: Values significantly higher than their counterpart at 95% level of confidence are indicated with gray background. Exceptionally low results of *maxRn* in the year 2011/2012 are indicated in bold.

*Source:* Authors' calculations, data 2001 – 2013.

The exceptionally low result at the level of *maxRn* (7.39%) in the year 2011/ 2012 highlighted in the section 5 can be described in a more detailed way on this place. In that particular year, men as well as women were very pessimistic about their *maxRn* level of income. Although the difference between men (7.66%) and women (6.96%) was not found statistically significant at 95% level of confidence, women contributed to the fall of aggregated value of *maxRn* in 2011/2012 more dramatically not only because their expectations were lower than those of men, but also because their number (232) was more than twice as high as the count of male respondents (112).

The section 6 supported the partial result of Maršíková and Kocourek (2012), since the gender of respondent plays an important role especially when speculating about incomes in further future (with ten-year-long working experience). Thereupon, male respondents expect more often higher increases of their incomes due to university degree then female answerers do. Only exceptionally, under the conditions of extreme pessimism, fall the rates of return on investment in tertiary education under 8.45%.

## 7. Sensitivity of Expected Returns on Investment in Tertiary Education to the Information from Respondent's Friends

The authors also suspected[7] the information about friends' income situation may affect the expected rates of return. Analogically to the routine followed in section 6, authors divided the data set into two groups: one made up from respondents who submitted the information about their friends' incomes (in the Table 3 denoted as "with") and the other one containing the results from answerers without knowledge of their friends' incomes (in the Table 3 denoted as "without"). Then, the authors run again the testing procedures sketched in section 4.

Neither the availability of information on income of respondents' friends seems to be an important factor forming the income expectations of students at Czech faculties of economics. In five cases (all of them at *minRn* or *averRn* levels of income expectations), friends significantly contributed to reduction of respondents expectations. In thirteen cases (four of them at *maxRn* level, eight at the levels of income expectations with ten-year-long working experience), friends raised the expectation of respondents significantly. In the last three years (2010 – 2013) as well as in 2006/2007, the information on friends' income did not play any statistically significant role in forming any income expectations of students at faculties of economics. The results of the year 2009/2010 analyzed and commented in Maršíková and Kocourek (2012) are from the general, long-time perspective rather an exception. It seems more probable, there has been *no systematic* influence of friends' wages and salaries on the income expectations of answerers.

There is one point, where the information on friends' incomes exhibited some importance. Respondents who had no idea about incomes of their friends (or who did not admitted it) expected in 2011/2012 at the level of *maxRn* the rate of return of 8.45%. The answerers familiar with their friends' incomes recorded only 6.96%. We can conclude that female respondents and among them especially those acquainted with income of their friends seem to be responsible for the major part of the decrease in *maxRn* rate of return in 2011/2012.

[7] For broader analysis, see e.g. Urbánek, Maršíková and Řehoříková (2010).

T a b l e 3

**Sensitivity of Expected Rates of Return on Investment in Tertiary Education to the Information from Respondents' Friends (in %)**

| | | | 2001/2002 | 2002/2003 | 2003/2004 | 2004/2005 | 2005/2006 | 2006/2007 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | without | 10.76 | 10.76 | 10.76 | 10.48 | 8.45 | 8.45 |
| | | with | 9.00 | 10.76 | 10.48 | 8.45 | 8.45 | 8.45 |
| | *averRn* | without | 9.00 | 10.76 | 11.20 | 8.69 | 8.45 | 9.00 |
| | | with | 8.45 | 10.76 | 9.86 | 9.24 | 8.45 | 8.45 |
| | *maxRn* | without | 10.76 | 10.76 | 10.76 | 10.76 | 8.45 | 9.34 |
| | | with | 10.76 | 14.87 | 10.76 | 9.86 | 10.76 | 9.34 |
| After ten years of working experience | *minRt* | without | 10.76 | 11.84 | 13.68 | 10.76 | 10.76 | 10.76 |
| | | with | 11.84 | 14.87 | 10.76 | 10.76 | 11.84 | 10.76 |
| | *averRt* | without | 10.76 | 12.48 | 12.39 | 10.76 | 10.76 | 10.76 |
| | | with | 13.00 | 14.87 | 11.84 | 10.76 | 11.84 | 10.76 |
| | *maxRt* | without | 14.87 | 14.87 | 14.87 | 14.87 | 14.87 | 14.87 |
| | | with | 18.34 | 19.14 | 17.32 | 14.87 | 14.87 | 14.87 |

| | | | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | without | 9.60 | 8.45 | 8.45 | 8.45 | 8.45 | 9.00 |
| | | with | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 9.86 |
| | *averRn* | without | 9.34 | 8.45 | 8.45 | 8.45 | 8.45 | 8.66 |
| | | with | 7.39 | 8.45 | 9.00 | 8.45 | 8.45 | 8.45 |
| | *maxRn* | without | 10.76 | 8.45 | 8.45 | 8.45 | **8.45** | 8.45 |
| | | with | 8.45 | 10.48 | 10.76 | 8.45 | **6.96** | 8.45 |
| After ten years of working experience | *minRt* | without | 10.76 | 10.76 | 9.86 | 10.76 | 10.76 | 10.76 |
| | | with | 10.76 | 10.76 | 10.65 | 9.86 | 8.45 | 10.76 |
| | *averRt* | without | 11.76 | 9.86 | 9.86 | 10.76 | 10.50 | 10.76 |
| | | with | 11.84 | 11.60 | 10.76 | 10.76 | 9.86 | 11.84 |
| | *maxRt* | without | 14.87 | 14.87 | 12.59 | 14.87 | 11.84 | 11.38 |
| | | with | 14.87 | 14.87 | 14.87 | 13.55 | 11.38 | 13.00 |

*Note*: Values significantly higher than their counterpart at 95% level of confidence are indicated with gray background. Exceptionally low results of *maxRn* in the year 2011/2012 are indicated in bold.

*Source:* Authors' calculations, data 2001 – 2013.

## 8. Sensitivity of Expected Returns on Investment in Tertiary Education to the Degree of Education of the Respondents' Parents

The last testing section of the paper discusses the sensitivity of expected rates of return to the highest degree of education achieved by any of the parents. The respondents were divided into two samples, one containing those whose parents (at least one of them) received the university degree (in the Table 4 denoted as "with"), the other sample consists of the rest of the respondents (none of their parents has university degree; in the Table 4 denoted as "without").

The authors run the testing procedures introduced in section 4. The role of tertiary education on income expectations seems the weakest of all tested factors. All the spot rates of return (*minRn*, *averRn*, and *maxRn*) remain robust with

regard to the highest level of education of respondent's parents. The expected valorisation of incomes after ten years of working experience has been more frequently higher in the families with tertiary educated parents (especially in the recent years), but there are still *no* explicit signs of *systematic* effect of parents' education on the income expectations of respondents (including the lowest recorded values in 20011/2012).

T a b l e 4

**Sensitivity of Expected Return on Investment in Tertiary Education to the Highest Level of Education of the Respondents' Parents (in %)**

| | | | 2001/2002 | 2002/2003 | 2003/2004 | 2004/2005 | 2005/2006 | 2006/2007 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | without | n/a | 10.76 | 10.76 | 9.24 | 8.45 | 8.45 |
| | | with | n/a | 10.76 | 10.76 | 8.45 | 8.45 | 8.45 |
| | *averRn* | without | n/a | 10.76 | 10.76 | 9.24 | 8.45 | 8.45 |
| | | with | n/a | 10.76 | 10.76 | 8.45 | 8.45 | 8.93 |
| | *maxRn* | without | n/a | 11.84 | 10.76 | 10.76 | 8.45 | 9.40 |
| | | with | n/a | 11.84 | 10.76 | 10.76 | 10.76 | 9.00 |
| After ten years of working experience | *minRt* | without | n/a | 12.59 | 10.76 | 10.76 | 10.76 | 10.76 |
| | | with | n/a | 13.40 | 14.87 | 10.76 | 10.76 | 10.76 |
| | *averRt* | without | n/a | 13.62 | 10.76 | 10.76 | 10.76 | 10.76 |
| | | with | n/a | 14.10 | 13.40 | 10.76 | 11.84 | 10.76 |
| | *maxRt* | without | n/a | 15.81 | 14.87 | 14.87 | 14.87 | 14.87 |
| | | with | n/a | 14.87 | 17.32 | 14.87 | 14.87 | 14.87 |

| | | | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 |
|---|---|---|---|---|---|---|---|---|
| University graduates | *minRn* | without | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 9.00 |
| | | with | 9.86 | 8.45 | 8.45 | 8.45 | 8.45 | 9.86 |
| | *averRn* | without | 8.45 | 8.45 | 8.93 | 8.45 | 8.45 | 8.66 |
| | | with | 8.45 | 8.45 | 8.45 | 8.02 | 8.45 | 8.45 |
| | *maxRn* | without | 9.79 | 9.73 | 9.69 | 8.45 | **7.39** | 8.45 |
| | | with | 9.86 | 9.24 | 9.00 | 8.45 | **7.78** | 9.73 |
| After ten years of working experience | *minRt* | without | 9.86 | 10.76 | 9.29 | 10.76 | 9.86 | 9.40 |
| | | with | 11.84 | 10.76 | 10.76 | 10.76 | 10.76 | 11.84 |
| | *averRt* | without | 10.76 | 10.76 | 9.86 | 9.86 | 9.86 | 9.86 |
| | | with | 12.30 | 11.07 | 11.38 | 10.76 | 10.22 | 12.59 |
| | *maxRt* | without | 14.87 | 14.87 | 12.30 | 12.48 | 10.76 | 10.76 |
| | | with | 17.46 | 14.87 | 14.87 | 14.87 | 14.87 | 14.87 |

*Note*: Values significantly higher than their counterpart at 95% level of confidence are indicated with gray background. Exceptionally low results of *maxRn* in the year 2011/2012 are indicated in bold.

*Source:* Authors' calculations, data 2001 – 2013.

The results of the MWW tests only partially proved the robustness of the conclusions in the section 4. The spot expected rates of return (*minRn*, *averRn*, *maxRn*) remain unbiased by the level of education of the parents, while the expected rates of return after ten-year-long working experience in several cases over the years recorded significantly higher values for respondents with tertiary educated parents.

## Conclusion

Private participation on financing of tertiary education should not be meant as a response to fiscal constraints only. It is necessary to consider a parallel micro-economic argument: the tertiary education has significant private benefits, justifying a contribution from the beneficiary on both efficiency and moral grounds. Thus, the case for some private finance is robust, but policy needs to be designed carefully so that it does not harm the efforts to widen the attendance and does not discriminate against people from poorer social backgrounds. As Psacharopoulos (2009) concludes, the size of the private returns to education means that part of the increased funding could come from private sources, such as introducing and/or increasing student fees. This statement is reinforced by the regressive incidence of public financing of higher education systems.

Especially for these purposes, it is crucial to know the perceptions and expectations of university students. All the tests performed in this study have shown and proved one critical piece of information: the values of the expected rates of return on investment to tertiary education calculated for Czech students of economic faculties immediately after their graduation *do not fall below 8.45%* for majority of them. Whatever the gender of respondents, whatever information about their friends' incomes they dispose of, whatever the degree of their parents' education, even whatever the year of survey; the majority of Czech students at faculties of economics expect their income will increase at least by 50%[8] after they receive their master degree.

Psacharopoulos (2009) also confirms on his data analysis that on average, university graduates have 61% earnings advantage over secondary school graduates. He points out that there is very limited evidence on the returns to various tertiary education faculties. His calculations are also based on a slightly different methodology dependent on data availability.

This conclusion also supports the findings of Filer, Jurajda and Plánovský (1999) who calculated very similar values of the expected rates of return on investment to tertiary education twelve years ago, although they used a different approach. Finardi, Fischer and Mazouch (2012) confirm relatively high returns in higher education based on real earnings data from the Czech labour market. The Czech results also do not differ much either from the outcomes of surveys in Poland and in the United Kingdom (Maršíková and Kocourek 2012), or from the results of Psacharopoulos (2009) for business and economic faculties in Greece (6.5% in 2008) and in the United Kingdom (13.9% in 2005).

[8] This result is based on the most moderate expectations of majority (or at least one half) of Czech respondents, i.e. on the annual rate of return at 8.45% for every year of master studies.

8.45% could be used as a reference value when suggesting and estimating the tuition fees for the Czech universities. None of the rational students would be willing to pay more on tuition fees than how much he/she expects to gain due to the university degree. What seems to be a reasonable solution based on the data and research introduced in this paper would be the tuition fee in a form of income tax charged after the studies when the graduates achieve a certain level of income. The findings of this study lead us to suggest that most graduates would be ready to pay such a tuition fee, if its tax rate did not deplete their salaries to an inequitable and inadequate extent. Nevertheless the implementation of tuition fees at Czech universities seems to be mainly a question of political will and of social coherence.

## References


ANCHOR, J. – FIŠEROVÁ, J. – MARŠÍKOVÁ, K. – URBÁNEK, V. (2011): Student Expectations of the Financial Returns to Higher Education in the Czech Republic and England: Evidence from Business Schools. Economics of Education Review, *30*, No. 4, pp. 673 – 681.

BETTS, J. R. (1996): What Do Students Know About Wages? Evidence from a Survey of Undergraduates. Journal of Human Resources, *36*, No. 1, pp. 27 – 56.

BLAU, F. D. – FERBER, M. A. (1991): Career Plans and Expectations of Young Women and Men. Journal of Human Resources, *26*, pp. 581 – 607.

BARR, N. (1993): Alternative Funding Resources for Higher Education. Economic Journal, *103*, No. 418, pp. 718 – 728.

BARR, N. (2010): Paying for Higher Education: What Policies, in what Order? London School of Economics. Submission to the Independent Review of Higher Education Funding and Student Finance. [Online.] Cit. 2011-03-21. Available at: <http://econ.lse.ac.uk/staff/nb/BarrJohston_Interestsubsidies100215.pdf>.

BECKER, G. S. (1993): Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. Chicago: University of Chicago Press. ISBN 0-226-04120-4.

BELFIELD, C. R. (2000): Economic Principles for Education, Theory, and Evidence. Northampton, MA: Edward Elgar Publishing, Ltd. ISBN 1-84064-444-3.

BROWN, M. B. – FORSYTHE, A. B. (1974): Robust Tests for the Equality of Variances. Journal of the American Statistical Association, *69*, No. 346, pp. 364 – 367.

CAHLÍK, T. – HLAVÁČEK, J. – MARKOVÁ, J. (2006): Školné či dotace? (Simulace a modely systému vysokých škol). Politická ekonomie, *54*, No. 1, pp. 54 – 66.

CAMERON, A. C. (2004): Kurtosis. In: LEWIS-BACK, M. S., BRYMAN, A. E. and LIAO, T. F. (eds): The SAGE Encyclopedia of Social Science Research Methods. Volume 1. Thousand Oaks, CA: SAGE Publications, pp. 543 – 544. ISBN 978-07-6192-363-3.

FILER, R. K. – JURAJDA, Š. – PLÁNOVSKÝ, J. (1999): Education and Wages in the Czech and Slovak Republic during Transition. Labour Economics, *6*, No. 4, pp. 581 – 593.

FINARDI, S. – FISCHER, J. – MAZOUCH, P. (2012): Odhad míry návratnosti investic do vysokoškolského vzdělání podle oborů, pohlaví a regionů. Politická ekonomie, *60*, No. 5, pp. 563 – 589.

JERRIM, J. (2010): Who has Realistic Income Expectations: Students or Workers? University of Southhapmton. Southhampton Statistical Science Institute. [Working paper A10/05.] [Online.] Cit. 2013-05-02. Available at: <http://eprints.soton.ac.uk/162937/1/s3ri-workingpaper-A10-05.pdf>.

LEVENE, H. (1960): Robust Tests for Equality of Variances. In: OLKIN, I. et al. (eds): Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling. Palo Alto, CA: Stanford University Press, pp. 278 – 292. ISBN 978-08-0470-596-7.

MANN, H. B. – WHITNEY, D. R. (1947): On a Test of Whether One of Two Random Variables is Stochastically Larger than the Other. Annals of Mathematical Statistics, *18*, No. 1, pp. 50 – 60.

MARŠÍKOVÁ, K. – KOCOUREK, A. (2012): Income Expectations of University Students: Sample of Selected Economic Universities in the Czech Republic, England and Poland. Statistika: Statistics and Economy Journal, *49,* No. 4, pp. 35 – 47.

MATĚJŮ, P. et al. (2009): Bílá kniha terciárního vzdělávání. Praha: Ministerstvo školství, mládeže a tělovýchovy ČR. [Online.] Cit. 2009-05-08. Available at: <http://www.msmt.cz/uploads/bila_kniha/schvalena_bktv/BKTV_finalni_verze.pdf>.

PSACHAROPULOUS, G. (1995): The Profitability of Investment in Education: Concepts and Methods. [Online.] [Human Capital Development and Operations Policy Working Papers.] Cit. 2010-06-30. Available at: <http://commdev.org/files/1863_file _Profitability_Investment_Edu.pdf>.

PSACHAROPULOUS, G. – PATRINOS, H. A. (2004): Returns to Investment in Education: A Further Update. Education Economics, *12*, No. 2, pp. 111 – 134.

PSACHAROPULOUS, G. (2009): Returns to Investment in Higher Education: A European Survey. Higher Education Funding Reform Project CHEPS-led. European Commission. [Online.] Cit. 2013-02-20. Available at: <http://ec.europa.eu/education/higher-education/doc/funding/vol3_en.pdf>.

SMITH, H. – POWELL, B. (1990): Great Expectations: Variations in Income Expectations Among College Seniors. Sociology of Education, *63*, pp. 194 – 207.

ŠÁDEK, M. (2010): Analysis of Investment in Higher Education in Selected European Countries. [Diploma Theses.] Liberec: Technical University of Liberec.

URBÁNEK, V. – MARŠÍKOVÁ, K. – ŘEHOŘOVÁ, P. (2009): Návratnost investice do vysokoškolského vzdělání: komparace očekávaných a reálných výdělků I. Liberec: Technická univerzita v Liberci. ISBN 978-80-7372-556-3.

URBÁNEK, V. – MARŠÍKOVÁ, K. – ŘEHOŘOVÁ, P. (2010): Policy in Higher Education Development: Return on University Investment and Tuition Fees. E+M Ekonomie a Management, *10,* No. 1, pp. 37 – 45.

WOLTER, S. C. – WEBER, B. A. (1999): A New Look at Private Rates of Return to Education in Switzerland. Education + Training, *41*, No. 8, pp. 366 – 372.

WUENSCH, K. L. (2005): Skewness. In: EVERITT, B. S. and HOWELL, D. C. (eds): Encyclopaedia of Statistics in Behavioural Science. New York: John Wiley & Sons, pp. 1855 – 1856. ISBN 978-04-7086-080-9.