EARNINGS EXPECTATIONS
OF FIRST YEAR UNIVERSITY STUDENTS AND
EX ANTE RATES OF RETURN
TO INVESTMENT IN HIGHER EDUCATION:

Evidence from English Business Schools and Czech Faculties of Economics

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A thesis submitted to the University of Huddersfield
in partial fulfilment of the requirements for
the degree of Doctor of Philosophy

January 2011

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LIST OF ABBREVIATIONS

BIS	Department for Business, Innovations and Skills
CfHES	Centre for Higher Education Studies
ČSÚ	Český statistický úřad/ Czech Statistical Office
CZK	Czech Koruna
DfES	Department for Education and Skills
DIS	Diplomovaný Specialista/ Certified Specialist
DIUS	Department for Innovation, Universities and Skills
ERA	Education Reform Act
EU	European Union
FE	Further Education
GBP	British Pound
HE	Higher Education
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institution
ISCED	International Standard Classification of Education
NCIHE	National Committee of Inquiry into Higher Education
OECD	Organisation for Economic Cooperation and Development
QAA	Quality Assurance Agency
TPS	Tertiary Professional School
UA	University Alliance
UCU	Universities and College Union
ÚIV	Ústav pro informace ve vzdělání/ Institute for Information in Education
UK	United Kingdom
UUK	Universities UK

ACKNOWLEDGEMENTS

I would like to thank the University of Huddersfield for making this research possible both through funding and the provision of resources. I would like to express my sincere thanks to my supervisor Dr. John Anchor whose support, guidance and assistance I highly appreciate. Many thanks belong to my colleagues in the Czech Republic Dr. Kateřina Maršíková and doc. Václav Urbánek for their generous help with data collection and provision of feedback. I would also like to thank the students who participated in the research, both quantitative and qualitative.

Martin Buckley is the one who I am deeply indebted to for supporting me even after his duty as my personal tutor was long gone and for helping me to get where I am today. I am grateful to my dear friend Barbara Cafferty for her encouragement and for introducing me to social academic life outside England. My soul mate Tereza deserves more than a thank you for her constant support in my personal life, for her patience with me over the past three years and for pretending so convincingly that she cares about investment in human capital.

I am grateful to my friends and family, particularly those who live in the Czech Republic and who by now would not have known what I look like without a webcam. Despite this they have found the time and resources to visit me here in England and have always made themselves available when I visited them back home.

I would like to dedicate this thesis to my mum for the sacrifices she has had to make for me and for her endless love and support without which this thesis would never have become a reality.

ABSTRACT

This research provides evidence from three Czech Faculties of Economics and one English Business School on students' expectations regarding their investment in higher education. It examines the expected earnings from which rates of return are calculated using the short-cut method, and ex ante risk is estimated using the coefficient of variation. Micro-level data have been collected specifically for the purpose of this study using a repeated cross-sectional survey. In addition to personal and socio-economic characteristics, first year students were asked to estimate their earnings with and without a university degree at two points in time – at the point of labour market entry and ten years later, and at three levels of probability – minimum, most likely and maximum. This study aims to investigate the factors that influence the expectations and to determine whether students act rationally as investors and according to the theory of human capital.

Earnings expectations have been found to increase with education and experience. Students expect their earnings to grow faster and further thanks to a university degree and expect their earnings at the point of graduation to be similar to the earnings they expected with ten years of post-secondary labour market experience. Students from high income families expect higher earnings than those from low income families. Women have been found to expect lower earnings than men and the gender-pay gap increases with education and experience. Students from England expect higher earnings than their Czech peers. The findings reveal that a very large majority of students act according to the theory of human capital by expecting at least zero rates of return, and that there is a positive relationship between returns and risk and thus that students act rationally as investors.

The average rate of return expected by English students is around 23% while those expected by Czech students range from 14% to 18%. Gender differences in rates of return were identified in England with women expecting higher rates of return. Nevertheless, it is concluded that gender differences in rates of return should be reported on in the context of risk-free rates of return otherwise the results may be misleading. Average ex ante risk associated with university education is the coefficient of variation of 0.35, which is similar to a randomly selected financial portfolio of 30 stocks. The expected risk-return trade-off is large; for a 1.1pp increase in risk men expect to be compensated by a 1pp increase in the rate of return while women expect for every 2pp increase in risk a 1pp increase in the rate of return.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Relatively recent technological advances and consequently changing economic and social conditions have resulted in knowledge and skills playing a key role in world economies and their success. They are so important in fact that the term ‘knowledge economy’ is being used more and more often and is recognised by economists, politicians, researchers and the business community (Keeley, 2007a). Knowledge and skills of individuals are important for personal and economic growth. A value of the knowledge and skills that facilitate the creation of personal, social and economic well-being can be summarised by one word, which is key to this study – *human capital* (OECD, 2001; Hartog, 2000). The term human capital has been used by economists, politicians and business leaders and, despite the causality issues reported on in the literature, it is hard to imagine that any of them would argue against investment in human capital (Keeley, 2007a).

An observed positive relationship between investment in human capital and earnings and the role and impact of human capital investment decisions on the distribution and structure of earnings have been the basis for the comprehensive theory of human capital (Becker, 1962; 1993; Mincer, 1974). Education and labour market experience have been used as a proxy for individuals’ human capital. The accumulation of human capital is, according to the theory of human capital, an investment decision, where the individual gives up some proportion of income during the period of education in return for increased future earnings (Becker, 1993). The standard economic model of human capital concentrates on the quantifiable economic costs and benefits of investment in education. However, there are other unquantifiable benefits an individual and society may gain from undertaking education, such as the pleasure derived from learning, the non-financial advantages of working in a skilled profession, better health, interest in social and political affairs, enjoyment of culture, better parenting, lower crime and greater social cohesion (Keeley, 2007b; Hartog, 2001; Blundell et al., 1999).

The benefits of education that spill over from individuals to society have been the reasons for the public subsidy of education. However, it has been argued that higher education is far from being a necessity; it is a career choice (Desai, 2004 in Barr and Crawford, 2005). Moreover, there are often substantial returns to investment in higher education enjoyed by individuals (cf Psacharopoulos and Patrinos, 2004; Arrozola et al., 2003; Blundell et al., 2000; Maami, 1996). The wage premium associated with higher education has been an incentive for individuals to continue schooling and as a result student numbers have expanded (Barr, 2004). Consequently it has become increasingly difficult for governments and taxpayers to fully subsidise higher education (Lleras, 2004). All this has been used as a reason to shift the burden of funding higher education away from the taxpayer and to the student – or sometimes to the graduate (Barr and Crawford, 1998). Thus during the last fifteen years there has been a growth of interest in the returns to higher education by policy makers and researchers.

The literature on returns to investment in education is now substantial. It has examined all levels of education - primary, secondary and tertiary (cf Psacharopoulos and Patrinos, 2004; Kruger and Lindahl, 2001). A very large number of academic studies have demonstrated quite conclusively that there are substantial private and social returns to all levels of education (Blundell et al., 1999; Psacharopoulos, 1981; 1985; 1999). In addition, for example, Nonneman and Cortens (1997) found that private and social returns for tertiary education were substantially higher than long run returns of investment in physical capital. According to the theory of human capital, people will decide to invest money in education if their investment is profitable. Thus it is their expectations of returns to such investment that lead to the decision to undertake extra schooling (Becker, 1964).

1.2 Need for the study

The significant influence of expectations on schooling decisions would suggest that there has been a vast body of economics literature on the subject of student perceptions and expectations. This, however, does not seem to be the case since, as Manski (1993) commented, economists have 'traditionally been sceptical of subjective data; so much that we have generally been unwilling to collect data on expectations' (p.43). 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. Nevertheless they generally conclude that students are aware of the financial benefits of higher education and that they are able to make realistic estimates regarding their future income (Williams and Gordon, 1981; Webbink and Hartog, 2004).

This study is unusual in focusing on students' expectations. It is the first study of its kind which compares expected earnings of business students in the Czech Republic and England. It uses unique survey data specifically collected for the purpose of this research and is the second study ever that estimates expected rates of return using the short-cut method, developed by Psacharopoulos (1981). Moreover, the method is modified to fit different education systems in England and the Czech Republic.

This study views higher education as an investment rather than a consumption good. The theory of human capital is thus used as an underlying theory. The theory of human capital suggests that people will only invest in human capital if the costs of education in the form of foregone earnings and tuition fees are compensated sufficiently by higher future earnings (Becker, 1964). In this study, the theory of human capital is combined with finance theory since investors consider not only costs and returns associated with the investment but also variance in the returns, i.e. risk. Finance theory suggests that higher expected returns compensate for the expected risk. In other words there is a positive relationship between returns and risk, i.e. the higher the risk the higher the returns (Markowitz, 1952). This is the first study that uses survey data on student earnings expectations to estimate ex ante risk of investment in higher education particularly in the context of England and the Czech Republic.

1.3 History of the research

The data collection started at several public and private higher education institutions in the Czech Republic in 2001. In 2004 the University of Huddersfield Business School joined in. Since then universities in Poland and Portugal have agreed to participate and arrangements have been made in Romania and Turkey. Nevertheless since this study is of a comparative nature it is important to have data from the same time period and from institutions which are equivalent in status. Therefore only data from faculties of the Czech public universities and the University of Huddersfield Business School are used in this study.

1.4 Aims and objectives of the study

The main aim of the study is to examine and compare students' expectations in the context of Business Schools in England and Faculties of Economics in the Czech Republic. The focus will be on both expected earnings and ex ante rates of return. Based on the analysis of previous theoretical and empirical evidence, the study aims to identify the main factors that influence students' expectations and to develop a model that summarises the factors that influence the decision to invest in higher education. The objective of the empirical analysis is then to examine the factors and their effect on the expected earnings and rates of return.

From the empirical analysis the study aims to find out whether students act according to the theory of human capital. The theory of human capital says that an individual will only invest in their human capital if they gain at least as much as they invested (Becker, 1964). Therefore ex ante rates of return will be calculated for individual respondents to determine what proportion of students expect at least 0% rate of return. Another objective of the study is to examine the relationship between risk and returns to determine whether students act rationally as investors. Ex ante risk will be calculated and the risk-return trade-off will be estimated.

1.5 Structure of the thesis

The following Chapter 2 provides an introduction to the tertiary education systems in England and in the Czech Republic. It reviews major legislative changes that have had an impact on higher education and outlines the systems' structure. In addition, it describes their financing, with a special reference to recent changes in private contributions especially in the form of tuition fees.

Chapter 3 provides a theoretical background for this study. In particular it introduces the theory of human capital and presents major contributions to its development and shows the importance of investment in human capital in today's era of globalisation and knowledge-based economies. It then goes on to provide a literature review on returns to investment in education, with a special reference to higher education. Finally, finance theory is introduced to complement the theory of human capital when assessing investment in higher education.

Chapter 4 discusses the research process, describes it in general and then applies it to this research project. It focuses on the research philosophy and approach and the choice of the research strategy and appropriate methods of data collection. In addition, it considers the selection of appropriate sampling strategies and methods of data analysis. Finally, the chapter discusses the justification for and limitations of the methodology adopted and the reliability and validity of the research, data and the data collection instruments.

Chapter 5 presents the findings of this study. Univariate and descriptive analyses were conducted to understand and summarise the primary data and to provide a background for bivariate and multivariate analyses. Univariate and descriptive analyses are used to identify similarities and differences between and within samples, which will then be subjected to statistical testing using the multivariate analytical techniques.

Chapter 6 then discusses the results of the analyses in the light of the previous research (Chapter 3) and in the context outlined in Chapter 2. Chapter 7 then summarises the key findings and discusses the contribution of this study to the body of knowledge on expected returns to higher education and the findings' policy implications. Finally it addresses the limitations of the research and suggestions for further research.

CHAPTER 2

TERTIARY EDUCATION SYSTEMS

in the Czech Republic and England

2.1 Introduction

The development of tertiary sectors, changes in funding and increases in participation in higher education have all led to discussions about (in the Czech Republic) and implementation (in England) of tuition fees. The fees need to be taken into account when estimating the rates of return to higher education. This chapter will show why and how the fees have been introduced. The structure of tertiary education outlined will help the reader to understand the differences and similarities of the education systems in the countries in question, and the results of the data analysis can then be interpreted in this context.

The introduction of each system will start with an overview of major legislative acts and their consequences for higher/tertiary education. A brief outline of the tertiary systems' structure will then be followed by a description of their financing, with a special reference to recent changes in private contributions especially in the form of tuition fees. The 2010 general parliamentary elections in both countries have had a particular impact on the latter. The final part of this chapter will focus on participation in higher education in both England and the Czech Republic.

2.2 Tertiary education in England

2.2.1 The Dearing report: tuition fees and student loans

An important date in the history of British education policy was July 23 1997, when the National Committee of Inquiry into Higher Education (NCIHE) (Dearing Committee) published its report, known as the Dearing Report, the largest review of higher education since the Robbins report (1963). John Major's commission to the Dearing committee in May 1996 to make recommendations 'on how the purposes, shape, structure, size and funding of higher education, including support for students, should develop to meet the needs of the United Kingdom over the next 20 years', was the initial impulse for the report to have been written (NCIHE, 1997).

The report concluded that the higher education system was not sustainable and suggested two main solutions. The first one was for government to consider more funding to universities (not necessarily by introducing tuition fees) and the second recommendation was to replace the grant for students' living costs by an income-contingent loan (NCIHE, 1997). In 1998 the government of Tony Blair launched both at the same time.

Means-tested up front tuition fees were introduced, by Education Secretary David Blunkett, as an additional source of funding for universities, which also became responsible for collecting the fees. The tuition fees came into effect in the academic year 1998/1999 and were set at £1,000 per year for a Bachelor degree course. Each following year the tuition fees were increased by £25 to reflect inflation. In 2005/2006, the last academic year when this type of fees was in place for university entrants, the amount charged to students was £1,175.

In order to help students from low income families pay their university tuition fees, a fee grant had been awarded by the Department for Education and Skills (DfES; 2007 - 2009 DIUS - Department for Innovation, Universities and Skills; now BIS - Department for Business, Innovations and Skills) to students whose residual household income[1] did not

[1] *residual household income (RHI) is calculated by the LEA; RHI is a gross income of student's parents or guardians (or partner if applicable) deducted by allowances for a) pension schemes and superannuation payments that qualify for tax relief, b) £1,000 for any child who is totally or mainly financially dependent on them c) £1,000 if the parent is also a student. The LEA will also take into account any income that students may have (above a certain level) from interest on savings,*

exceed £34,295. If their residual household income was less than £23,085 they received a grant to cover all of their tuition fees. Students were entitled to receive a grant to cover part of their tuition fees if their residual household income was between the above mentioned limits. It was assumed that one third of students would pay no fees, one third would pay full fees and one third would pay partial fees (Bligh et al., 1999).

There had also been a means-tested Higher Education Grant – set at £1,000 in 2008/2009 - available for students whose parental income did not exceed £22,735 (2008/2009). Those who had a household income of £16,750 or less were eligible for the maximum grant. Students whose household income was more than £16,750 but less than £22,735 were eligible for £1 less than the maximum grant for each complete £6.30 by which their household income exceeded £16,750, subject to a minimum grant of £50.

2.2.2 Higher Education Act 2004

Although the Labour Party’s 2001 election manifesto stated that it would not legislate for top-up fees, the Labour government published a white paper in January 2003 which outlined proposals allowing universities to set their own variable tuition fees up to a cap of £3,000 per annum (Alley and Smith, 2004). In the Queen’s speech in November 2003 a higher education bill proposing top-up fees was included. A bill was introduced so that ‘more young people can benefit from higher education’, ‘upfront tuition fees’ were to ‘be abolished’ and a new Office for Fair Access was proposed to be established to ‘assist students from disadvantaged backgrounds’ (Hansard, 26 November 2003, col 4).

The government also received support for its higher education proposals from the Organisation for Economic Cooperation and Development (OECD), who described the plans as ‘essential for the revitalisation of British universities’ (Alley and Smith, 2004). Eventually, after a long debate the government was able to convince enough members of parliament to approve the bill. On 27th January 2004 the government gained a narrow victory, with 316

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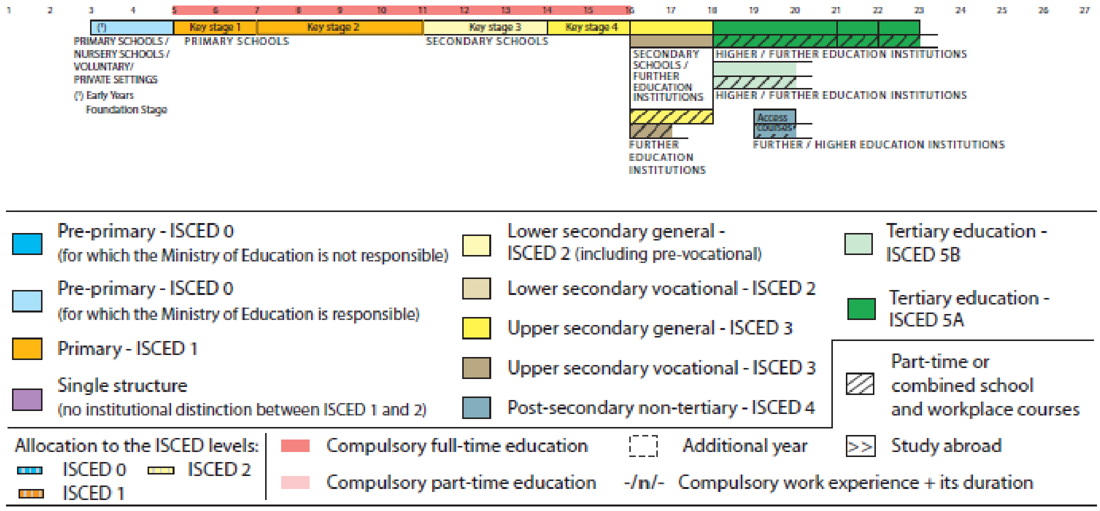
formal sponsorship, dividends on shares and other sources of income they have, but have not earned. The LEA will not take wages and payments from any paid employment students may undertake into account.

votes for the bill and 311 against, and in July 2004 the bill was passed into law as the Higher Education Act 2004.

2.2.3 Structure of tertiary education in England

In August 2008, there were 90 universities in England, and 133 higher education institutions (HEIs) in total[2] (UUK, 2008). A significant number – around 10% – of higher education students study in further education colleges. Many such institutions provide some programmes at ISCED 5A[3], and, more commonly, at ISCED 5B (Figure 2.1). Qualifications are awarded by external bodies such as a university or, for programmes at ISCED 5B only, a national awarding body. The Further Education and Training Act 2007 enabled further education colleges in England to apply for powers to award their own foundation degrees (ISCED 5B). Other awards at ISCED 5B are not regulated by law (Higginson, 2010). Higher education institutions providing programmes at ISCED 5 and 6 are classified as government-dependent private institutions.

Figure 2.1 Structure of the education system in England



Source: Higginson (2010, p.7)

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[2] This total counts the University of London as one university not as several HEIs.

[3] International Standard Classification of Education (ISCED): ISCED 5A refers to Bachelor's and Masters study programmes; ISCED 5B includes tertiary professional schools and further education colleges in the Czech Republic and in the UK, respectively; doctoral studies are at ISCED level 6.

2.2.4 Financing of higher education in England

Higher Education Institutions (HEIs) (providing education at ISCED levels 5 and 6) receive their funding from a variety of public and private sources, including student tuition fees, with the largest proportion provided by government. The government provides funding for the teaching and research infrastructure through an 'arms length' body, the Higher Education Funding Council for England (HEFCE), which determines the methodology within broad policy guidelines provided by the Secretary of State (BIS, 2010).

Funding for teaching takes account of the number of students and the subjects they study, student-related factors that recognise the additional costs of recruiting and supporting students from areas with low participation in higher education, disabled students and part-time students; and institutional factors such as the additional cost of institutions in London and those which have old and historic buildings (Higginson, 2010).

Research funding is distributed by reference to quality, as assessed by performance in the most recent Research Assessment Exercise, and volume of activity. Funding for teaching and research infrastructure are combined into a block grant which institutions are free to spend according to their own priorities. The direct costs of specific research projects are funded not by HEFCE but by the seven Research Councils, operating on a UK-wide basis (BIS, 2010).

2.2.4.1 Students' contributions and financial support

Tuition fees charged to the following categories of students are not regulated by law -part-time students, overseas (non-EU) students, postgraduate students, i.e. students studying a programme above the level of a bachelor’s degree (Higginson, 2010). The information which follows applies only to full-time (ISCED 5A first cycle) home (UK) and EU students.

The 2004 Higher Education Act has been effective since 2006/2007 and the £3,000 cap was planned to remain in place until 2009/2010 inclusive, when the review of the effects of the introduction of the variable tuition fees was scheduled by the government[4]. Fee exemptions and the requirement to pay fees up front were removed. Instead, fees can be deferred until

[4] Independent Review of Higher Education Funding and Student Finance, led by Lord Browne of Madingley, was published 12th October 2010.

after graduation using government secured loans. The repayments are collected alongside national insurance and income tax.

Income-contingent loans are designed in a way that combines a loan approach and an equity finance approach as, according to Friedman (1962), students sell the right to x% of their annual income. Income-contingent repayments appear to be more efficient than mortgage-like repayments since there is no fixed instalment to be paid. Rather it is a percentage of students' subsequent earnings until the loan is repaid (Barr, 2004). In the UK the income-contingent loans are available at a zero real interest rate, i.e. interest rates are linked to inflation, and graduates repay, in real terms, broadly the same amount as that borrowed. The level of repayments is set at 9% of the amount earned above the threshold of £15,000[5] and any outstanding debt is written off after 25 years.

Full-time students are eligible for a non-repayable maintenance grant[6]. These grants are means-tested, i.e. targeted at students from households with a low income. For the majority of students, it is their parents' income that is assessed; for independent students, it is their own and/or their spouse or partner's income that is assessed. Independent students are those who are over 25, or married, or have supported themselves for three years, or are estranged from their parents.

Some students are also eligible for a bursary from the institution at which they are studying. HEIs charging the maximum tuition fee are expected to pay a minimum guaranteed bursary to those receiving the maximum maintenance grant. Beyond this guaranteed minimum, there is a wide range of additional discretionary support provided by individual institutions, which may be means-tested, or may be targeted at students from local schools and colleges and/or awarded for academic merit.

All students on qualifying courses are eligible for student loans. There are two types: loans to cover tuition fees and loans for maintenance to cover living expenses. The loan for tuition fees is paid direct to the institution, and covers the full amount of the tuition fee. The loan amount available for maintenance is means-tested, i.e. it depends on the total household income. The maximum loan available may be reduced for students who receive a

[5] for students who work in the UK
[6] under 2004 Higher Education Act

maintenance grant. The arrangements for repaying both types of loan are the same. Borrowers are not required to repay the amount until they have graduated and are earning over a threshold income.

Additional assistance is available to students who have family members dependent upon them. All such assistance depends on the student's income and that of his/her dependants. Support is also available for students with a disability, mental health condition or specific learning difficulty (DirectGov, 2009).

After the general election 2010 in the UK, which resulted in a coalition between the Conservative Party and the Liberal Democrats, universities called for graduates to contribute more towards the cost of their education. The universities' proposals for a new system of funding of higher education were in favour of replacing the zero real interest rate by a market interest rate on student loans and/or of introducing a higher than 9% repayment rate. There was however no consensus when it came to the issue of the tuition fee cap.

The 1994 Group wanted the tuition fee cap to be raised in stages while Russell Group universities were calling for universities to be allowed to set their own fees, i.e. to remove the current cap set to £3,225 altogether, without requiring the government to increase lending. The Russell Group suggested that the Student Loan Company finance the income-contingent loans by selling bonds linked to graduate repayments to private investors, or that universities, or groups of universities, sell bonds linked directly to graduate repayments or annuities funded by future graduate repayments. University Alliance (UA) also suggested that student loan bonds could be sold to private buyers, which they believed would free up money to expand student numbers, but contrary to Russell Group the UA were for the government to set a ceiling on the fee level. In addition, UA and the Universities UK (UUK) called for re-branding top-up fees as graduate contributions to reduce the fear of debt. Million+, the group representing many post-1992 universities, suggested introducing a 2% interest rate on student loans and extending the graduate contribution period from the current 25 years to 35 years. It also suggested abolishing statutory bursaries which in turn would enable universities to charge lower tuition fees and consequently require students to take out smaller loans. Finally, the Universities and College Union (UCU) and the left-wing think-tank Compass recommended abolishing tuition fees and introducing a business education tax in the attempt to gain more funding from businesses than from graduates (Attwood, 2010).

In October 2010 'Securing a Sustainable Future for Higher Education: An Independent Review of Higher Education Funding and Student Finance', known as the Browne report, was published (Browne, 2010). The report's recommendations are 'a radical departure from the existing way in which HEIs are financed'. They suggest that 'rather than the Government providing a block grant for teaching to HEIs, their finance now follows the student'. It is argued in the report that 'HEIs must persuade students that they (students) should "pay more" in order to "get more" ' (p.6) whilst realising that 'allowing students to defer the payment of fees is critical' (p.22).

The 2006 reform resulted in the government having to set a limit for the student numbers although the demand for higher education kept increasing. Despite the unfavourable demographic development in the 2010s, the demand for higher education is expected to continue to grow and the current (2006 reform) system is unable to fund the increase. This is why the Browne report recommended that the cap on student numbers is removed so that 'popular HEIs will be able to expand to meet student demand' (Browne, 2010, p.6).

The Browne report's recommendation, that the fees are raised so that institutions have 'scope to raise additional funds through tuition fees' was accepted by the Government. The Browne report suggested a removal of the fee cap altogether with a progressive levy to be paid by institutions that choose to charge more than £6,000 per academic year to an undergraduate student. The government however proposed 'a basic threshold of £6,000 pa' as a fee cap whilst allowing an absolute limit of £9,000 'in exceptional circumstances' without the 'need for institutions to pay back a proportion of the graduate contribution as a levy to the Exchequer'. The Government accepted Browne's proposal of introducing real interest rate on a progressive basis with low earners paying 'no more than they pay now [i.e. 2006 reform] whereas high earners will pay significantly more' (Browne, 2010, p.43).

'For graduates earning below £21,000, a real rate of interest will remain at zero. For graduates earning between £21,000 and around £41,000, a real rate of interest will be tapered in to reach a maximum of inflation plus 3%. When graduates are earning above £41,000 they will be making a full contribution to the costs of the system but still incurring interest well below normal commercial rates' (Willetts, 2010). The £21,000 threshold for repayment will be reviewed periodically to 'reflect earnings', the repayment will equal 9% of income earned above the threshold and any outstanding debt will be written off after 30 years (Willetts, 2010). Since the Government is 'committed to the progressive nature of the repayment system' it was suggested that the potential introduction of an early repayment mechanism is discussed so that 'those on the highest incomes post graduation are not able unfairly to buy themselves out of this progressive system by paying off their loans early' (Willetts, 2010). In addition, so that fair access is not threatened, a new £150m National Scholarships programme will be established, to encourage bright potential students from disadvantaged backgrounds to continue onto higher education, and part-time students, who tend to be mature or from disadvantaged backgrounds, should receive the same access to a tuition fee loan on the same basis as full-time students. The Government intends to implement the suggested changes for the academic year 2012/2013.

2.3 Tertiary education in the Czech Republic

After the fall of communism in November 1989, the Czech economy started to transform from a centralised to a free market economy and the system of state economic planning ceased to exist. A transition process started in the education sector too. Education was depoliticised and stopped being a tool for the manipulation of young people. The right to choose education paths was returned to pupils, students and their parents. Privatisation of the education sector was allowed and encouraged, which consequently meant qualitative diversification of schools and curricula and last but not least the decision making power was decentralised and returned to an institutional level (Švecová, 2000).

As a consequence of the transition, the Czech higher education system started to change too and since then has become more liberalised with academic rights, freedom and academic autonomy being restored. These were codified by the Higher Education Act of 1990, which also returned research, which was only conducted at/by the Academy of Sciences during communism, back into HEIs (CfHES, 2005; CfHES, 2006). New universities and faculties were established and new study programmes were developed and introduced. The Act of 1990 also enabled universities to award a Bachelor's degree (Act No. 172/1990) in addition to Masters degrees awarded in the traditional five-year programmes.

The following Higher Education Act of 1998 (No. 111/1998), and its amendment of 2001, introduced new arrangements for financial management of HEIs aimed at the diversification of their usage of financial resources and enabled the charging of the so called study-related fees. The 1998 Act allowed private higher education institutions, a new phenomenon in the Czech Republic, to be established. These started to emerge shortly after the Act came into force mainly as non-university[7] type institutions often developed from private tertiary professional schools (see section 2.3.1.1).

2.3.1 Structure of tertiary education in the Czech Republic

The Act of 1998 changed the institutional structure of HEIs; all state higher education institutions were transformed into public institutions (with an exception of three military institutions, which on 1st January 2004 merged into one institution 'Univerzita Obrany – University of Defence, and the Police Academy). In 2009/2010 there were 75 higher education institutions within the Czech higher education system (MŠMT, 2010a). Higher education institutions may be of a university or non-university type, and both types can be public, state or private institutions; there were 26 public, 2 state, and 47 private higher education institutions (Machálková and Sotonová, 2009; ÚIV, 2010, MŠMT, 2010a). The public and state higher education institutions are of a university-type (with two exceptions) and private HEIs are of a non-university type (with two exceptions that became universities in 2007). Table 2.1 outlines the development of the structure of HEIs between 2002/2003 and 2009/2010.

Table 2.1 Higher education institutions in the Czech Republic 2002/2003 – 2009/2010

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Public HEIs	24	24	24	25[8]	25	25	26[9]	26
Private HEIs	27	28	36	39	38	43	45	47
State HEIs	4	4	2	2	2	2	2	2
Total	**55**	**56**	**62**	**66**	**65**	**70**	**73**	**75**

Source: MŠMT (2010a)

7 Higher education institutions may be of a university or non-university type, and both types can be public, state or private institutions.

8 The addition is the first non-university type HEI Vysoka skola polytechnicka Jihlava

9 The addition is the youngest public HEI of non-university type Vysoka skola technicka a ekonomicka Ceskych Budejovicich

Public universities are funded by the government and managed by its statutory bodies such as academic senate, scientific council, disciplinary commission, administration board, rector, registrar, whose competencies are set by the 1998 Higher Education Act. State universities are not legal entities; they are established by the state and are directly managed by the ministries that are responsible for them, i.e. Police Academy by the Ministry of the Interior and the University of Defence by the Ministry of Defence (ÚIV, 2010).

Higher education institutions of a non-university type usually offer Bachelor programmes, and if accredited they can also provide Masters programmes. However, they are not allowed to offer doctoral study programmes. In addition, they are not divided into faculties like universities. University type higher education institutions comprise the major part of the Czech tertiary education system in terms of student numbers. They provide Bachelor and Masters programmes (ISCED level 5A) as well as doctoral programmes (ISCED level 6) (CfHES, 2006).

The amendments to the 1998 Higher Education Act, which were adopted in April 2001, introduced bachelor study programmes as an obligatory first level of higher education and a necessary precondition for continuing studies in any Masters study programme, as required by the Bologna Process (CfHES, 2005). A Bachelor study programme's standard length is 3 - 4 years (the Act of 1998, Part IV). Upon successful completion of the programme by a state final examination the academic degree of 'bakalář' (Bachelor - abbr. 'Bc') is awarded. A Bachelor's programme is focused on the preparation for a vocation but it also provides access to further studies at a Masters level. The two-level structure of higher education studies has not been introduced in medicine, veterinary medicine, pharmacy and some other specific fields of study (CfHES, 2005).

The original long-cycle Masters programmes (abbr. Mgr./Ing.) typically lasted 5 years (6 years in medicine and veterinary medicine) and the Bachelor degree was not awarded. This represents the traditional type of higher education in the Czech Republic. However, almost all of these Masters programmes no longer exist in such a form. Rather they are, in line with the Bologna process, divided into '3+2 form[10]' and thus a Bachelor's degree is required in almost

[10] 3 years is a standard length of Bachelor programmes and 2 years is a standard length of Masters programmes

all disciplines and the possibility of further studies in a form of 'continuing Masters programmes' is offered (standard length 1-3 years) (CfHES, 2005; CfHES, 2006).

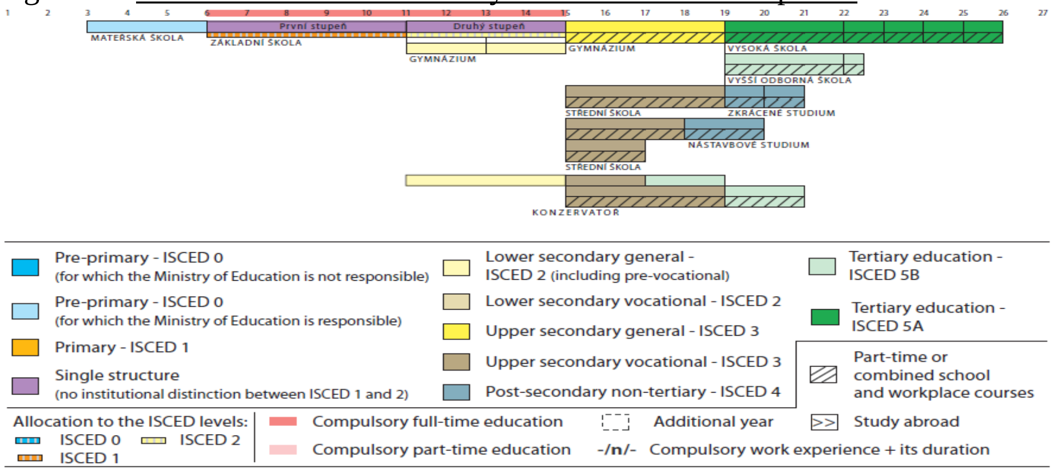
A doctoral programme focuses on scientific activities, research and development. Only graduates from Masters programmes can be enrolled. The standard length of study is 3 years, which is usually not expressed by means of credits (in accordance with Bologna Process agreements). Graduates are entitled to the degrees of PhD or ThD (CfHES, 2006).

2.3.1.1 Tertiary professional schools

In 1992/1993 the Ministry of Education, Youth and Sports (MŠMT) launched a pilot project for establishing a new non-university type of HEI the so called tertiary professional school (TPS), aimed at vocationally rather than academically oriented students, which became a part of the educational system in 1995 (CfHES, 2006; ÚIV, 2010). The Ministry of Education authorised the existence of 21 such institutions whose number increased to 157 in 1996/1997 and in 2009/10 there were 184. These institutions are closely linked to secondary schools, with which they form a single legal entity (CfHES, 2006; ÚIV, 2010). They do not award academic degrees; rather they were established to fill in the gap in qualifications between secondary and tertiary education and have been regulated by the same Education Act (No. 561/2004) as primary and secondary education (Act 561/2004; ÚIV, 2010).

Full-time educational programmes at these schools last 3 years and medical courses, which include practical training, last 3.5 years (Figure 2.2). The students obtain a tertiary professional qualification – ISCED 5B level – based on the final examination, the so called 'absolutorium', and become 'diplomovaný specialista' (certified specialist) (abbr. DiS). Tertiary professional schools represent only 9% of the tertiary sector in terms of number of students attending (ÚIV, 2010). In 2009/10, there were 28,749 students in 184 TPSs.

Figure 2.2 Structure of the education system in the Czech Republic



Source: ÚIV (2010, p.7)

2.3.2 Financing of higher education in the Czech Republic

The Ministry of Education is almost exclusively in charge of higher education funding and governs its allocation mechanisms within the higher education budget while negotiating with other ministries, particularly with the Ministry of Finance. However, the Ministry of Education is legally bound to discuss funding (as well as other aspects of higher education policy) with the representative bodies of higher education institutions – the Czech Rectors' Conference and the Council of Higher Education Institutions. The Research and Development Council plays an important role in the area of research policy and funding.

Public higher education in the Czech Republic is free of charge for all students (regardless of their nationality) with some exceptions such as fees for the administration of admissions proceedings, fees for extending the duration of study beyond a set limit, fees for the study of an additional programme and fees for study in a foreign language (Act No. 147/2001).

The base for fees is 5 % of the average running cost per student paid to the institutions by the Ministry of Education from the state budget in a calendar year. Public institutions can set a registration fee, which can be up to 20 % of the base figure. If the actual period of study exceeds the standard duration for Bachelor or Master studies by one year, then the student is charged at least 1.5 times the base for every further six months of their studies. If a holder of a Bachelor or Masters degree wishes to take another Bachelor or Masters study programme, the student can be charged the full base for each academic year (this is not the case for parallel study programmes, i.e. for students who study more than one programme at the same time). The fee for studying in a foreign language is set regardless of the base (ÚIV, 2010).

The Act of 1998 states that a public HEI is entitled to a government subsidy, with limits defining how the subsidy may be used. It also outlines the regulations according to which the subsidy is determined; the main part of the budget available to the institutions from the government is based on teaching and research performance (Act No. 111/1998). The main part of the budget for teaching is derived from the volume of teaching activity. The research budget consists of a part related to 'specified research' linked to teaching activities and a part devoted to research activities in general (Urbánek et al., 2005). As noted earlier, state HEIs are financed by their responsible bodies – the University of Defence by the Ministry of Defence and the Police Academy by the Ministry of the Interior (Act No. 147/2001).

The principal change in the funding mechanism was implemented in 1992 when formula funding replaced the incremental method (Čermáková et al., 1994; Turner 1994). Since the available public resources were insufficient to support unlimited growth, the Ministry of Education entered negotiations with the HEIs on the annual increase of student enrolments (usually, the agreed rate was between 3-5%) (Pabian et al., 2006).

The most significant change in recent years has been the declining importance of formula funding (Orr, 2005). In 1997, almost 70% of the budget of HEIs was funded through the teaching formula; by 2005, this had dropped to 53%. The reason for this development lies in the fact that the Ministry perceived the previous arrangements as preventing implementation of government priorities beyond enrolment growth. In order to reinforce its steering position, the Ministry launched the Development Programmes (in 2001), a new funding mechanism based on obligatory strategic documents of both the Ministry and HEIs.

Research funding underwent even deeper changes (cf. Muller, 1995). Before 1990, HEIs were not allowed to carry out research; consequently, no funding mechanism to support research existed. Since then, several funding mechanisms commenced have been initiated: Specific Research in 1994; Research Plans in 1999; Research Centres programme in 2000. Overall, the share of HE expenditures allocated to research has grown considerably. Recently, some significant changes occurred in the social support of students. Since 2005, the

Grant for Students' Accommodation was transformed from an institutional grant into a student scholarship. Furthermore, Students' Social Grants were introduced in 2006 (Pabian et al., 2006).

According to the Higher Education Act of 1998, public HEIs are entitled to manage their own property, although a substantial part of their activity is directly financed by the state. Funds for HEIs are set annually by the Act on State Budget[11]. 80 % of education is funded through per capita amounts (cost units) set per student and, since 2005, also per graduate (ÚIV, 2010).

Study programmes are divided into seven groups according to their relative cost, with a cost intensity coefficient (*koeficient ekonomické náročnosti*) of between 1 and 5.9[12]. The total sum is calculated as a product of the basic per capita amount per student or graduate which is set annually by the Ministry of Education, the cost coefficient of programmes and the fixed number of students/graduates on programmes. Students who exceed the normal duration of study by more than a year are not included in the calculation. Any increase in the number of students must be approved by the Ministry of Education. In case an HEI exceeds the agreed limits, only those students within the limits are included when calculating the allocation of state resources to that particular HEI (MŠMT, 2010b). The state provides other funds for investments, which are assessed individually at the request of HEIs, as well as funds for research, catering and accommodation of students (MŠMT, 2010b; ÚIV, 2010).

Public HEIs receive their own income from their properties, from their educational, scientific, research, development and innovation activities and from fees; this income amounts to approximately 25 % of all the total income of public HEIs (Pabian et al., 2006). The students cover the expenses of admission proceedings and pay for any extension of their studies beyond the standard time or if they wish to follow a second study programme or study in a foreign language. Further income comes from lifelong learning programmes since these do not come under the Higher Education Act.

Private HEIs are legally obliged to be financially self-supporting and thus to finance their own activities from their own sources. This is why a majority of private HEIs are almost fully

[11] The latest Act on State Budget is for 2010 – No. 487/2009

[12] Business studies programmes provided by the surveyed universities that are the focus of this study are represented by a coefficient that equals 1.00 (MSMT, 2010b)

dependent on fees[13], which are not regulated by the law, charged to their students. The fees vary across private HEIs, and their amount seems to reflect the demand for this type of institution. Private HEIs can apply for state subsidies; however only if they are listed as public benefit corporations (currently there are 16 such institutions (MŠMT, 2010a)) or if prior to receiving state consent to become a private HEI they were a tertiary professional school and had been allocated a state subsidy. With regard to the rules of equity of the economic competition in the EU, they can get a subsidy only for study programmes that are deemed to be in the public interest; otherwise only up to €200,000 within three consecutive years.

2.3.2.1 Tuition fees

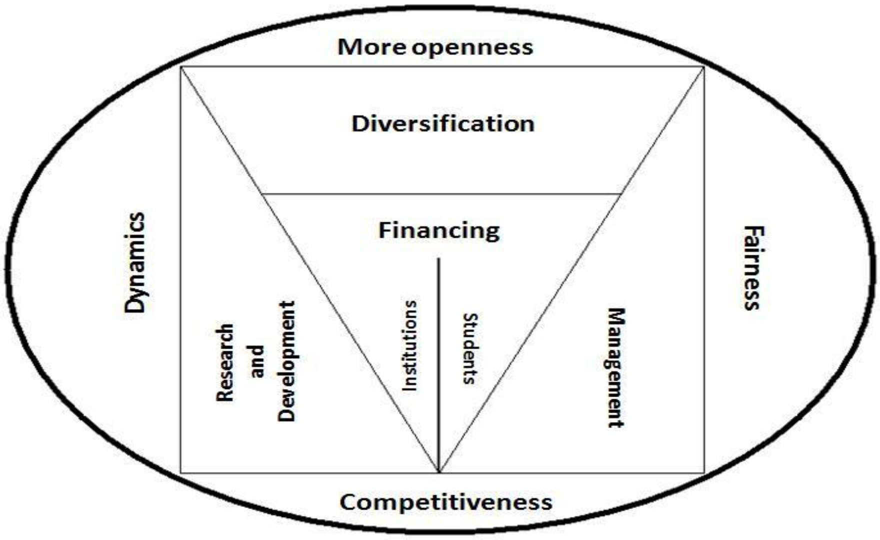
There has been a great debate about private contributions towards public higher education funding. Although in 2009 OECD experts strongly advised the Czech Republic to start charging tuition fees at public HEIs (Rodriguez, 2009) this matter has an important political dimension and has not been an area of consensus. Left-wing political parties prefer the preservation of the current model of predominantly public funding distributed to HEIs whereas the right-wing political parties promote the introduction of tuition fees and other means of private contributions as significant features of the funding system. Support for the left-wing and right-wing parties is almost evenly distributed in the population. Furthermore, the student representative body, the Student Chamber of the Council of Higher Education Institutions, insists on the state's dominant role in higher education funding and resolutely opposes introduction of student fees. It also calls for the development of a national student welfare system (Pabian et al., 2006).

2.3.2.1.1 White Book of Tertiary Education

After 15 years of efforts to change the higher education system, the Czech Republic is finally preparing for a substantial reform of tertiary education (Duhárová, 2008b). A team of independent experts led by Professor Matějů prepared the so called *White Book of Tertiary Education,* a complex review of tertiary education in the Czech Republic which suggests a reform that promotes competitiveness and more diversity. The main aims of the reform are summarised in Figure 2.3.

[13] Approximately 90% of HEI income comes from the student fees (Pabian et al., 2006)

Figure 2.3 Aims of the tertiary education reform in the Czech Republic



Adapted from Matějů et al. (2008b, p.3)

Since tertiary education has started to become a strategic part of the Czech Republic's economic development, the management and financing of higher education require some changes (Matějů in Kvačková, 2009). The White Book suggests the structure of higher education should be adjusted to the labour market's requirement for graduates (Matějů et al., 2008a). Thus more Bachelor study programmes should be open, which should not necessarily prepare students for further academic studies. Rather graduates of such programmes will acquire skills and knowledge necessary for participating in the labour market. The White Book suggests that HEIs must perform better if their financing is to reflect demand for their services. Hence students are regarded as customers in the White Book (Matějů et al., 2008a).

It also recommended that the internal structure of HEIs should undergo changes. The typical governance structure of public HEIs consists of a rector who is elected by an academic senate, faculty deans who report to the rector and a managerial board that deals with university assets. The White Book proposes to decrease the electing power of the academic senate and to shift more power towards the board, which would consist of more people from business and a private sector. It should also enable a rector to be someone from outside academia e.g. an experienced manager of a company (Duhárová, 2008a).

The White Book has suggested that the demand for skilled labour will be represented by well informed students rather than companies lobbying for more money from the government into a particular industry (Matějů et al., 2008a). Companies will be required to convince potential university students about the attractiveness of their business area or industry. The government is advised to invest in universities where students themselves are prepared to invest. In other words, more money, according to the White Book, will go where the interest of applicants and the quality of teaching is higher (Matějů in Kvačková, 2009).

One of the main points presented in the White Book is the introduction of deferred tuition fees. According to OECD (2008) only eight countries (the five Scandinavian countries[14], Poland, the Republic of Ireland and the Czech Republic) provide public higher education free of charge. The proposed system is very similar to the one in place in England, i.e. tuition fees deferred until after graduation. The repayment system proposed is also similar to the one in England, i.e. once a certain level of income is reached graduates will pay a percentage of a threshold above the level. This is proposed to be set at a national average income (Matějů in Kvačková, 2009).

The reason for introducing deferred tuition fees is not only to bring more money into the higher education sector and increase competition among universities but also to change the motivation of universities since, according to Zrzavý (2008), the deferred fees will force universities to produce graduates of higher quality.

This tends to suggest that the fees are to be repaid not to the government, which is the case in England, but to the universities themselves. If the tuition fees were paid upfront by the government to the universities and then graduates would repay the tuition fee loan to the government, universities would not be forced a great deal to make the effort to produce graduates who are more likely to earn at least the national average income and thus start to repay the loan. In this case universities would receive the fees from the government and would not need to be concerned about the employment prospects of their graduates.

The tuition fee cap is proposed initially to be no more than an average monthly salary earned by a graduate in a particular industry within 5 – 10 years of graduation (Matějů et al., 2008a).

[14] Denmark, Finland, Iceland, Norway, Sweden

The private rate of return to the subject studied will be taken into account in the setting of fees. Tuition fees will therefore be based on returns to education rather than its costs. If the latter was to be the basis for setting the fees, technical subjects, medicine, natural sciences etc. would be disadvantaged compared to e.g. law or economics. This however is yet to be subject to careful modelling (Matějů in Kvačková, 2009).

Ondřej Liška, the former Minister of Education, said it would be possible to introduce tuition fees in 2010 but only if the system of financial support, including low-interest student loans, grants and scholarships, was fully working (ČT24, 2008). However, a more realistic view seems to be the one of Vlastimil Růžička, the former deputy minister of education, who expected the tuition fees to be introduced not earlier than 2013 (Anonymous, 2008). The reform of tertiary education should be finished by 2015, according to Liška, and should change the system in a complex way for the following 15 – 20 years (ČT24, 2008).

Matějů's team started to work on the White Book in 2006, after examiners from the OECD visited the Czech Republic and presented an evaluation of the Czech tertiary system, which clearly stated that there was a need of reforming it. The first version of the White Book was presented for a public discussion in May 2008. It had been widely discussed at different meetings, in media channels and in the form of written statement and comments. All these brought up various issues which were summarised and many of them were implemented in the White Book (Hrubá, 2008). Its last version, which amended the original proposal, was presented to the Ministry of Education, Youth and Sports (MŠMT) on 3rd November 2008. It was then presented to the government, which approved the White Book at the end of January 2009.

The latest Czech parliamentary election took place on 28th and 29th May 2010. The Social Democrats (ČSSD[15]) were the largest party after the election. However they did not have the majority to create a government even with the support of the Communist party (KSČM[16]), who would be the only party that would enter into a coalition with ČSSD. This is why a right wing coalition government was founded by the Civic Democrats (ODS[17]), TOP 09 and VV[18].

[15] Czech Social Democratic Party/ Česká strana sociálně demokratická
[16] Communist Party of Bohemia and Moravia/ Komunistická strana Čech a Moravy
[17] Civic Democratic Party/ Občanská demokratická strana
[18] Public affairs/ Věci veřejné

Prior to the elections, there were three political suggestions regarding tuition fees at public higher education institutions. If left-wing parties formed a coalition public higher education would remain free of charge. The right and right-centre parties opposed the left wing; the Civic Democrats and VV were in favour of charging deferred tuition fees while TOP 09 proposed upfront fees to be charged because of the fear that the government would not be able to collect the repayments back from those graduates who would leave to work abroad never to come back. Another reason for their hesitation regarding the deferred fees was the large initial investment that the government would have to make prior to the implementation of the deferred fees system (Machálková and Vašek, 2010).

Given the election results and the coalition that had to be formed, compromises had to be made. As a result, the repayment of tuition fees or the tuition fee loan will be deferred until after graduation. The graduates will start repaying once they start earning at least the national average income. Before the system of deferred tuition fees is implemented, a system of grants, student savings and state-secured loans will have to be put into practice (iDNES.cz, 2010). The tuition fees will be variable with a cap equal to 10,000 CZK per semester with universities being able to charge any amount within the set range. Based on the law of supply and demand, this should reflect the attractiveness of the courses and thus regulate the demand for them. Engineering courses are expected to charge lower fees and to be compensated by the state for the difference in fees (iHNed.cz, 2010a).

Although no official date was announced by the coalition as to when the system of deferred tuition fees would be implemented, 2013 seems to be the earliest possible year. In addition, only new students will be affected by the new system so the students who will have been already be enrolled at the time of implementation would remain unaffected (Aktualne.cz, 2010).

2.4 Conclusions

The purpose of this chapter was to provide background information so the findings of the research and their implications are easily understood within the context of the two countries surveyed and their respective education systems. The development of the two education systems has not been parallel mainly due to the political establishments in the modern post-war history. The Czech Republic was a part of the former Soviet Union block where communistic ideology prevailed behind 'the iron curtain' and thus prevented, unlike in Western Europe, a market economy to influence the development of the education system. Czech higher education had been particularly disturbed by forbidding research, denying autonomy, independence and academic rights, and using 'numerus clausus' based on social and political conformity as a way of selecting who could/could not be educated in higher education (Švecová, 2000).

The Czech education system has been catching up with those of Western Europe during the past twenty years. Although the Czech Republic has been criticised for low enrolment rates of students to higher education (HE), the numbers of enrolled HE students have been growing and the capacity of higher education institutions (HEIs) has been expanding (Urbánek et al., 2005). However, as the number of students increases, so do the costs for HEIs and this consequently creates more pressure on higher education funding. Therefore the question of the efficient financing of higher education arises and has become one of the most important political and economic challenges in both the Czech Republic and the United Kingdom.

Private contributions to public higher education funding, particularly in the form of tuition fees, have been extensively debated in both countries. In England tuition fees have been in place since 1998 with a major change occurring in 2006, when the original upfront fees were tripled, capped, and deferred until after graduation and their payments became income-contingent. Changes to this system are scheduled to take place in 2012; the fees will double (triple in special circumstances), the interest rate on the tuition fee loan will increase to reflect the government cost of borrowing and government funding of higher education will be cut severely. In the Czech Republic the so called White Book of Tertiary Education suggested an extensive reform of tertiary education and its financing with a strong focus on private contributions to public HE funding, particularly in terms of tuition fees. Deferred tuition fees which were suggested in the White Book have been accepted by the 2010 Czech government and are planned to be implemented in 2013.

CHAPTER 3

HUMAN CAPITAL

Theory, investment, returns and risk:

literature review and empirical evidence

3.1 Introduction

This chapter provides a theoretical background for this study. In particular it introduces the theory of human capital and presents major contributions to its development, and shows the importance of investment in human capital in today's era of globalisation and knowledge-based economies. It then goes on to provide a literature review on returns to investment in education, with a special reference to higher education. In addition, finance theory is introduced to complement the theory of human capital when assessing investment in higher education.

The assumptions made in the underlying theories and the empirical evidence available in the existing literature will be used to develop a model of investment in higher education. The model will help outline research hypotheses, which will be tested using the primary data collected for the purpose of this study.

3.2 Age of human capital: development of human capital theory

The term human capital has been used by economists, politicians, business leaders etc. and it is hard to imagine that some of them would be arguing against investment in human capital (Keeley, 2007a). However, there had been many discussions about empirical evidence on the benefits of investment in human capital before this political and social consensus was achieved (OECD, 2001). The purpose of this section is to present the key contributors to the development of the theory of human capital and to outline the key elements of their work.

Four factors of production have been recognised traditionally as means for economic growth and success: land, labour, physical capital and enterprise (Griffiths and Wall, 2004). Labour is essentially the basic term from which human capital is derived. However, originally workers were seen as a mass without paying much attention to their knowledge and skills (Keeley, 2007b). The first economist to perceive this differently was Adam Smith, who in 1776 published his famous Inquiry into the Cause and Nature of the Wealth of Nations (Hartog, 2000). He said that ‘the acquired and useful abilities of all the inhabitants or members of the society’ were one of the items that formed a fixed capital, which was then defined by him as one of ‘the three portions into which the general stock of the society divides itself’ (Smith, 1776, p.113). In other words he did not believe that it was the mass that fuelled the economic activities; it was the human capital of individuals.

Smith’s (1776) idea was further developed by Alfred Marshall (1890), who claimed that knowledge and a company organisation were the result of investment activities and that families are responsible for the most precious investment, i.e. education of their children (Marshall, 1956/1890). He claimed that education fully develops abilities and these can add ‘to the material wealth of the country’ (Marshall, 1956/1890, p.467). If families cannot support their children the ‘evil [becomes] cumulative’ and ‘the worse fed are the children of one generation, the less will they earn when they grow up, and the less will be their power of providing adequately for the material wants of their children; and so on to the following generations’ (Marshall, 1956/1890, p.468).

However, it was not until nearly two centuries later when the term ‘human capital’ was used for the first time (Mincer, 1958). Indeed, apart from occasional remarks at the beginning of the 20th century, the study of human capital is a typical feature of the ‘Chicago school’, which has been connected to the University of Chicago since the 1930s (Keeley, 2007b). Smith’s idea of human capital then started to be really incorporated in economic literature in the 1960s (Keeley, 2007b). Despite the relatively late inclusion of the concept of human capital in the work of economists, the last part of the 20th and the beginning of the 21st century is referred to as the 'age of human capital' (Becker, 2002).

Friedman and Kuznets (1945) were the first to apply the concept of human capital – although they did not name it that way– to provide an overview of incomes of professional workers and independent practitioners. They noticed that two things were linked to professional training; namely its costs and the workers' foregone earnings. They said that 'the long and intensive training needed for professional work involves not only direct expenses for tuition fees, books and the like, but also the postponement of the date when the worker can begin to earn an income' (Friedman and Kuznets, 1945, p.390).

Friedman and Kuznets (1945) also found that 'the extra returns from a professional career exceed the extra costs'. Their explanation for the difference between returns and costs were a 'higher level of ability' and 'certain nonpecuniary advantages of their work' but also limited competition due to 'social and economic stratification of the population' (p.390). The last matter was of particular concern since, as Friedman and Kuznets (1945) concluded, the 'capital invested in human beings is not separable from the individual' (p.390). All these factors as well as the fact that 'capital invested in human beings ... cannot be bought and sold on the open market' apparently led to underinvestment in professional training (Friedman and Kuznets, 1945, p.391).

The next very important and influential piece of work was published by Schultz in 1961. His argument that 'people are an important part of the wealth of nations' was not shocking anymore, especially given the work of Adam Smith 200 years before. However, although the fact that education increases productivity was known and accepted at the dawn of the 20th century, Schultz's (1961) proposition, that individuals consciously invest in their education to improve their own personal economic returns, was not generally acknowledged by the economists at that time.

One of the reasons seems to have been the concept of valuing human beings in the way goods were valued. This offended people because of the generally highly appreciated achievement of the abolishment of slavery (Keeley, 2007b). People felt that 'it seem[ed] to reduce man once again to a mere material component, to something akin to property' (Schultz, 1961, p.2).

However, Schultz (1961) did not agree with this social anxiety. He argued that ‘laborers have become capitalists ... from the acquisition of knowledge and skill that have economic value ... [and] are in great part a product of investment ... ‘ (Schultz, 1961, p.3). He was also convinced that human capital should be accounted for when measuring and explaining economic growth (Schultz, 1961). Thus ‘to omit [the skills and knowledge] in studying economic growth is like trying to explain Soviet ideology without Marx’ (Schultz, 1961, p.3).

In addition, Schultz (1961) noticed that the higher was the education of a worker the higher were their earnings and suggested a causal relationship namely that ‘because ... differentials in earnings correspond closely to corresponding differentials in education, they strongly suggest that the one is a consequence of the other’ (Schultz, 1961, p.4). Although he admitted in his work that discrimination might be one explanatory factor of differences in earnings he suggested that ‘the large differences in earnings seem rather to reflect mainly differences in health and education’ (Schultz, 1961, p.4).

Although Schultz (1961) is perceived as the one who was at the birth of human capital theory and Friedman and Kuznets’s work (1945) provided some of the key elements of the theory, it was Becker’s (1964) work ‘which has ever since served as the *locus classicus* of the subject’ (Blaug, 1976, p.1). The preliminary chapters of his famous monograph published in 1964 appeared in the October 1962 supplement of the Journal of Political Economy called ‘Investing in human beings’. There Becker focused mainly on on-the-job training ‘because it clearly illustrates the effect of human capital on earnings, employment and other economic variables’ (Becker, 1962, p.10). Discussion of investments in schooling, information and health are also presented but much more briefly because the ‘analysis of on-the-job training leads to general results that apply to other kinds of investment as well’ (Becker, 1962, p.26).

One of the results that can be generalised and applied to other investments in human capital, such as formal schooling and education, is that ‘future productivity can be improved only at a cost’ (Becker, 1962, p.11). Time, effort, materials, equipment etc. are costs because ‘they could have been used in producing current output if they were not used in raising future output’ (p.11). Additionally, education, like training, makes age-earnings profiles steeper and this is generalised to all human capital thus providing a basis for a unified and powerful theory (Becker, 1962). Since earnings are gross of the return to human capital some people may earn more than others simply because they invest more in themselves; there is evidence that ‘more able’ individuals tend to invest more than the ‘less able’ (p.26).

Becker (1993) dedicated a substantial part of his work to investigating the effects of formal schooling, particularly of higher education (college education in the US), on earnings and productivity. Based on general observation, he concluded that ‘college students tend to be more ‘able’ than high school graduates, apart from the effect of college education’ (p.246). In addition he identified that the rate of return to an average college entrant is 10 – 12% per annum (p.246) and that the gains from college education vary considerably between, as well as within, groups.

In 1958 Jacob Mincer used the term human capital for the first time. Although Mincer (1974) found it modest, he asked the fundamental question — ‘what is the role and impact of human capital investment decisions on the distribution and structure of earnings?’ (p.3). He saw earnings at any given time as a return on the human capital stock, i.e. ‘the skill level that an individual has accumulated’ (Mincer, 1974, p.4). He defined the lifetime earnings stream of an individual as ‘the basic conceptual and observational unit of human capital analysis’ (Mincer, 1974, p.4).

Mincer (1974) also observed that, when average earnings are studied over time, ‘the characteristics of the age profile of earnings show[ed] rapid growth during the first decade of working life, subsequent deceleration of growth and a levelling in the third and fourth decade’ (p.4). His explanation for this phenomenon was based on the investments in human capital, which are ‘staggered ... over time at an eventually diminishing rate’ (Mincer, 1974, p.5). Consequently ‘since earnings are proportional to the level of human capital stock, they rise at an eventually diminishing rate and decline when net investments are negative, if at all, in old age’ (Mincer, 1974, p.6).

Age-earnings profile does not seem to be a very accurate term given that Mincer found ‘the earnings curve ... to be mainly a function of experience, more than of age’ and ‘that earnings profiles differ by occupation, sex and other characteristics in systematic ways not attributable to the ageing phenomenon’ (Mincer 1974, p.7). Mincer (1974) also developed the so called human capital earnings function, which will be discussed later in this chapter.

Schultz and Friedman, as well as Becker and Mincer, belonged to a ‘first generation of human capital theory’ (OECD, 1996, p.19; Blaug, 1985). They all found a strong correlation between years of schooling and earnings which demonstrated a positive rate of return. However, the causality of the relationship was questioned by a second generation in the

1970s and 1980s (cf. Abraham and Medoff, 1981; Berg, 1970; Arrow, 1973; Spence, 1973; Stiglitz, 1975; Blaug, 1985; Gemmell, 1997). Studies which have been published since the 1990s have, similarly to the first generation, again applied a rate of return analysis to assessment of human capital, and thus may be considered to be the background for the 'third generation of human capital analysis' (OECD, 1996, p.19).

What the second generation literature saw as an issue was the belief of the first generation that suggests 'that education makes workers more productive and that employers pay them more because they are more productive' (cf. Blaug, 1985, p.25). Many studies have attempted to explore this issue only to have to admit that indeed there was a great deal of uncertainty as to whether or not 'experience-earnings differentials can be explained by experience-productivity differentials' (cf. Abraham and Medoff, 1981, p.215).

Despite the debate concerning the issue of causality, nowadays, the concept of human capital is more than accepted and the notion - supported by the first generation of human capital theory - that an increase in human capital is linked to an increase in economic growth is well acknowledged and recognised and is a focus of many governments all over the world (OECD, 1996). But what is *human capital*?

3.2.1 Definition of human capital

There is no single and universal definition of human capital. There are some definitions that explain the term more generally such as those used by Hartog who says that 'human capital in its broad sense might ... be valued as the cost of all actions taken to increase future welfare' (Hartog, 2000, p.2) or that 'human capital is the value of a person's productive and marketable skills' (Hartog, 2000, p.1).

Some are more specific, such as the one used by OECD, who define human capital as 'knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being' (OECD, 2001, p.19). Very often health is included in the definitions of human capital[19] because improved physical and mental abilities of people raise their real income prospects. There are nearly as many attempts to define human capital as there are economists. Nevertheless, the countless number of definitions agree that it is the *knowledge and skills of individuals which are important for*

[19] Health was already recognised by Becker (1962) as part of human capital

personal, financial and economic growth (Becker, 1962; 1964; 1993; Hartog, 2000; OECD, 2001).

3.3 Human capital theory and the law of supply and demand

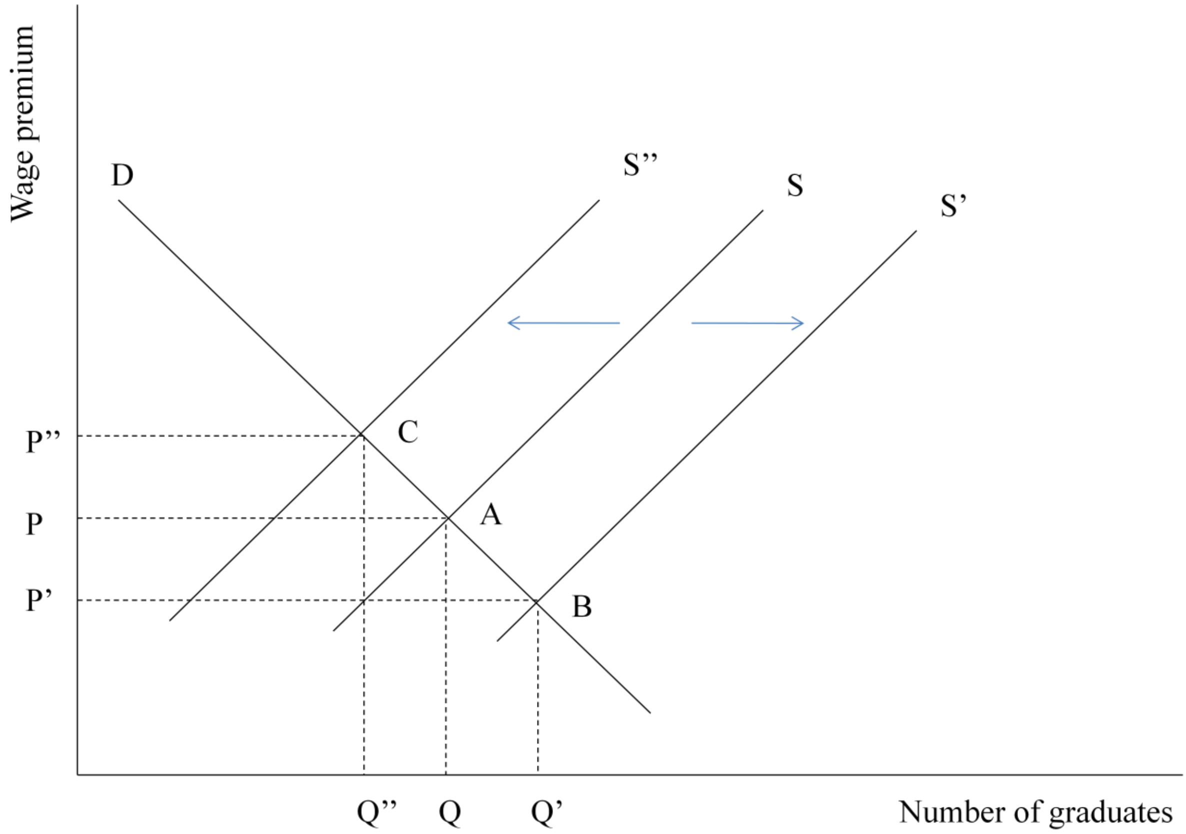
For labour economists, the demand and supply of human capital are key concepts which in aggregate have an important impact on equilibrium in the labour market (Wasmer, 2001). If we presume that the knowledge and skills of individuals, i.e. human capital can be valued and those who value it are employers then a basics for a labour market is created (Becker, 1993). Like in any market, the law of supply and demand applies. Individuals supply their human capital and employers demand it. In other words individuals are sellers and employers are buyers of human capital.

The law of supply and demand essentially says that the higher the price the lower the quantity demanded and the higher the price the higher the quantity supplied and vice versa; an increase in demand will cause an increase in price and an increase in supply will lower the price. The equilibrium price is thus found when the demand and supply are equal. In other words, at the equilibrium price anyone can sell what they intend to sell and everyone can buy what they intend to buy. All this is derived from the cost-benefit comparison (Griffiths and Wall, 2004). A commodity will be supplied by an individual until marginal benefits equal marginal costs and the same is valid for the individual's demand.

According to the law of supply and demand if too many graduates appear in the market and demand for them remains constant there will be excess supply of those with that particular level of schooling (B; Figure 3.1). Consequently the price will drop, i.e. their wages will decrease[20] (P→P′; Figure 3.1); on the other hand if fewer people graduated from that level of education (holding the demand constant) (C; Figure 3.1) the shortage in supply would increase their wages (P→P″; Figure 3.1).

[20] See section 3.4.1.1.2 for the effect of endogenous growth on the wages of graduates

Figure 3.1 Changes in supply of graduates in the labour market



A very interesting example of the functionality of the law of supply and demand is the development of the rates of return to schooling in Sweden, where a greater supply of university graduates lowered the rate of return to university education (Edin and Holmlund, 1993). After a while students reacted to this change by lowering the demand for university education. As a consequence of this reduction of university graduates the rate of return increased again (Edin and Holmlund, 1993).

Like any capital, human capital is acquired at a certain cost which can essentially be perceived as an investment in the capital (Becker, 1993). It is desired to enjoy benefits from an investment and the same is true for investment in human capital. When it comes to assessing the value of a capital e.g. physical capital such as a machine, there are two ways of doing so: calculating the cost necessary to produce it or calculating the present value of all the services the machine can offer (Griffiths and Wall, 2004). A similar approach can be applied to human capital.

3.4 Investment in human capital

The accumulation of human capital is, according to the theory of human capital, an investment decision, where the individual gives up some proportion of income during the period of education in return for increased future earnings (Becker, 1964). Thus, education and training are the most important investments in human capital (Becker, 1993). Individuals will only undergo additional schooling (i.e. invest in their human capital) if the costs (tuition fees and forgone earnings whilst in education) are compensated by sufficiently higher future earnings (Blundell et al., 1999).

In other words, the theory of human capital suggests that it is the schooling and education that increase the human capital and thus the skills and knowledge. However, how to measure the skills and knowledge? Traditionally, years of schooling have been used as a proxy indicator of a person’s human capital (Welch, 1975; Becker, 1993). However, in addition to schooling, human capital includes a range of characteristics such as work experience and health (Mincer, 1974; OECD, 2001). This is why it is very difficult to measure human capital, and investment in education is often interpreted as investment in human capital (Keeley, 2007a).

The human capital of individuals is for simplicity usually thought of as having two main components – education and experience of the labour market – while both are found to raise wages by similar proportions (Wasmer, 2001). If the premise is accepted that education and experience are key components of human capital, one could argue that using them as proxy indicators of human capital is appropriate (Dahlin, 2004). However, neither education nor experience can be measured accurately so all their aspects can be grasped.

In addition to years of schooling, an ideal measure of one’s education should capture such variables as ‘the quality of the schooling, the nature of the curriculum and the student’s effort’ (Dahlin, 2004). However, it is indeed very difficult to create such a measure as the years of schooling is the only directly observable variable. Hence Welch’s (1975) comment: ‘Frankly, I find it hard to conceive of a poorer measure of the marketable skills a person acquires in schools than the number of years he has been able to endure a classroom environment. My only justification for such a crude measure is that I can find nothing better’ (Welch, 1975, p.67).

The same is true for experience of the labour market, which can only be expressed by age or age minus education but does not include what skills a person acquires while on the job (Wasmer, 2001). ‘Every conceivable individual specific observable characteristic (age, education, sex, race, location of residence) typically explains only about 40 percent or less of wage differences, if "human capital" is invoked to explain wage difference there are clearly large amounts of human capital left unmeasured’ (Pritchett, 1996, p.5).

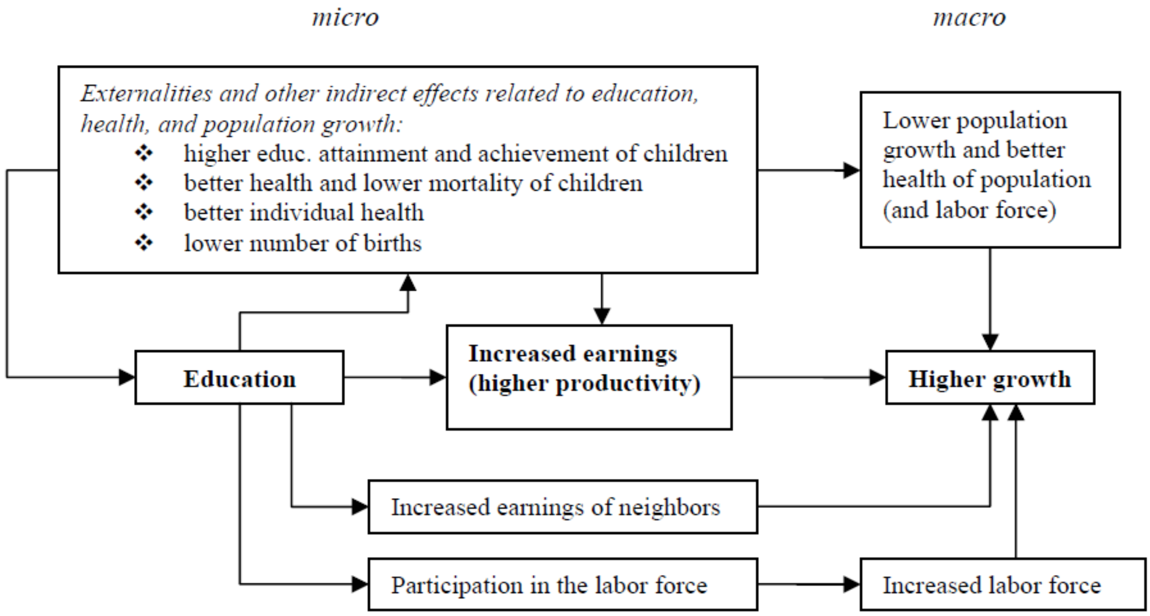
Another issue is the fact that there are not only economic or monetary benefits arising from education. The standard economic model of human capital concentrates on the quantifiable economic costs and benefits of investment in education (Becker, 1993). Nevertheless, there are other unquantifiable benefits an individual obtains from undertaking education, such as the pleasure derived from learning, the non-financial advantages of working in a skilled profession, better health, interest in social and political affairs, enjoyment of culture, better parenting, lower crime and greater social cohesion (Blundell et al., 1999; Hartog, 2000; Keeley, 2007a). Although these tend to be ignored in economic analysis, they are likely to feed back into economic growth and thus it is plausible that investment in human capital has external social impacts, which can in turn have indirect economic effects such as additions to productivity from better health and physical strength (Fogel 1994; Pritchett, 1996; OECD, 1998; Sianesi and Reeden, 2000; McMahon, 2004).

Direct and indirect effects of education are shown in Figure 3.2. Direct effects of education, such as increased individual wages, follow from the assumption that education results in learning that increases a worker’s productivity[21]. If workers are paid the value of their marginal product, it follows that better-educated workers should earn higher wages (Michaelowa, 2000; Dahlin, 2004).

The idea of indirect effects and positive educational externalities is that the benefits of individually acquired education may not be restricted to the individual but might spill over to others (Sianesi and Reenen, 2002; McMahon, 2004). A spill-over might occur if for example more skilled workers use their education to devise improved production methods for less skilled workers (Gemmell, 1997). Michaelowa (2000) offers the example of an educated farmer who implements new agricultural techniques. Neighbours may observe the new methods used by the educated farmer and imitate them. Learning through observation is a mechanism by which such educational benefits may be spread within a community.

[21] See section 3.4.2.2. for signalling effect of education and screening hypothesis

Figure 3.2 Impact of education at both micro and macro levels



Source: Michaelowa (2000, p.2)

It appears that, while primary and secondary education skills are related to growth in developing countries, tertiary education skills are most important for growth in OECD countries (Gemmell, 1995; 1996). In addition, since firms usually invest in firm specific skills rather than transferable skills, these then have to be provided at a supra-firm level e.g. higher education (Gemmell, 1997).

Investments in education, like all investments, can be judged in terms of their rates of return (Becker, 1993). Human capital theory provides a methodology for estimating rates of return to investments in education (Mincer, 1974; Becker, 1975). Application of this methodology to developing countries has produced apparently high rates of return, which are often cited as evidence for further investments in education, particularly primary education, in those countries (Psacharopoulos, 1981; 1985; 1994; World Bank, 1986).

High-income countries invest extensively in education and therefore the returns to investment in education tend to be equal to other investments; low-income countries on the other hand do not invest much in education and therefore the returns are much higher compared to other investments (Lleras, 2004). Thus there are extensive opportunities to invest in education in low-income countries regardless of whether it is an investment in primary, secondary or tertiary education. Any level of education yields positive returns, although each additional year of schooling produces lower returns (Barr and Crawford, 1998, Blundell et al., 1999).

The optimal level of investment in education occurs when the returns to investment in education equal to the returns to other kinds of investments with similar characteristics. Small manufacturing enterprises are considered as an example of such a similar investment since both have high risk and low liquidity (Psacharopoulos, 1994). The high risk and low liquidity are caused mainly by the fact that investment in education cannot be sold (Becker, 1993). Therefore the expected return, which reflects the level of risk and compensates for it, should be higher (Pereira and Martins, 2001). Psacharopoulos (1994) suggests that the benchmark of the rate of return for education is 8.7%. Therefore when investments in education return around 9% it can be said that there is no under-investment in education, i.e. no opportunity costs for individuals and society (Lleras, 2004).

3.4.1 Macroeconomic point of view

There is a vast body of empirical evidence that suggests that schooling is positively correlated with the growth rate of per capita GDP[22] across countries (cf. Barro, 1991; Levine and Renelt, 1992; Mankiw et al., 1992; Barro and Sala-i-Martin, 1995; Sala-i-Martin, 1997). This is based on the notion that a higher rate of innovation is associated with economies richer in human capital and thus increasing the level of human capital is expected to have an effect on the growth rate of productivity (Sianesi and Reeden, 2000).

Gemmell (1996) found that skills obtained at a primary and secondary educational level are important for growth in developing countries and skills obtained at a tertiary level are important for growth in OECD countries. Initial educational levels and the subsequent increase in education levels were included in the analysis and both were found to be positively and significantly associated with per capita income growth in OECD countries (Gemmell, 1996).

While some empirical studies find human capital to be positively related to the growth rate of GDP (cf. Barro, 1991; Levine and Renelt, 1992; Mankiw et al., 1992; Barro and Sala-i-Martin, 1995; Sala-i-Martin, 1997), other studies find the linkage to be insignificant. For example, Pritchett (1996) and Oulton and Young (1996) found a negative effect of

[22] One additional year of schooling is associated with 30% higher GDP per capita (Heckman and Klenow, 1997, p.4)

educational attainment on the economic growth. However, neither of these studies separated their samples by gender. As a result their findings may be biased, since it was reported by Barro and Sala-i-Martin (1995) that female education is inversely related to growth while male education was found to have a large positive effect on growth. They have also found that accumulation of human capital plays particularly important role in increasing growth of countries with low initial GDP.

Nehru and Dhareshwar (1994) reported particularly interesting results. In seeking to explain productivity growth they calculate total factor productivity growth indices over 1960-87 for a wide range of countries. They concluded that 'human capital accumulation is three to four times as important as raw labour in explaining output growth... [and] ...its contribution is larger than estimated in previous studies' (Nehru and Dhareshwar, 1994, p.26).

Public support in the form of state subsidies of education is based on the spill-over effect of education to the economy and society as a whole and thus on the social rates of return to education (Blundell et al., 1999; Sianesi and Reenen, 2000). However, the estimates of social rates of return do not include all social effects of education (McMahon, 2004). The existence of the positive economy-wide educational spill-overs is often assumed a priori by theorists and policymakers but to actually verify their size and thus calculating true social returns is difficult (Sianesi and Reeden, 2000). McMahon (2004) suggests that the size and value of education externalities are affected by choosing static or dynamic neoclassical growth model[23]. '

The narrower static interpretation ... eliminates most education externalities ... since most operate through intervening variables as indirect effects and through delayed feedbacks' (McMahon, 2004, p.219). Given that education effects operate 'very slowly and are long delayed', they primarily affect future generations (McMahon, 2004, p.217). Thus he concludes that the static model rules out most indirect and delayed effects and that as a consequence the education effects are smaller and the evidence for externalities is inconclusive. Under the dynamic model the evidence for education externalities is substantial and robust as indirect effects are traced and each year's investment in human capital affects the initial conditions for the next period (McMahon, 2004).

[23] See section 3.4.1.1.1

3.4.1.1 Theoretical frameworks

Macroeconomic analysis of growth considers the rate of change of per capita GDP. Using aggregate data to examine the relationship between education and growth in a macroeconomic framework, one can better grasp the effects of human capital externalities that affect growth (Dahlin, 2004; Begg et al., 2005). These externalities are not evident in individual estimates of the wage equation; however, in the aggregate, their net impact may be more apparent (Dahlin, 2004). Two main macroeconomic approaches to modelling the linkages between human capital and economic performance are the Solow neo-classical approach and the 'new growth theories' (Sianesi and Reeden, 2000).

3.4.1.1.1 The Solow (or neo-classical) model and growth accounting

The neoclassical growth model, developed in the mid-20th century, is a cornerstone of economic analysis (Dahlin, 2004). However it fails to distinguish between human and physical capital. In the 1990s, researchers extended the neoclassical model in ways that 'emphasize government policies and institutions and the accumulation of human capital' (Barro, 2002; Dahlin, 2004, p.18). The extended neo-classical model then simply expands the basic production function framework to allow an extra input, i.e. human capital to enter the production function, which can be estimated either in levels or in rates of growth (Pritchett, 1996; Sianesi and Reeden, 2000).

In 'growth accounting' exercises, a country's growth in output is decomposed into the growth rates of inputs (i.e. input accumulation) and in residual productivity growth whereas in 'level accounting' exercises, differences in output per worker across countries are decomposed into cross-country differences in productivity and in input intensities (Sianesi and Reeden, 2000). The Solow approach uses non-regression based estimates of the contributions of various types of capital to growth which allows a growth accounting decomposition (Denison, 1967). After accounting for the growth due to factor accumulation effects we can define total factor productivity (TFP) as the residual (Pritchett, 1996).

The so-called puzzle of the 'residual' (the six sevenths proportion of output growth that could not be attributed to growth in capital and labour in Solow's seminal 1957 study) made it clear that the growth of real income per capita cannot be fully accounted for by increases in the quantities of the capital and labour inputs alone. While growth theories began to be built around the 'residual', Solow's (1957) paper stimulated a great amount of empirical work in the 1960s to diminish the importance of the residual by extending the framework. In particular the quality of inputs was explicitly included through investment in education (i.e. accumulation of human capital) and in research and development (R&D) giving rise to technical change (Sianesi and Reeden, 2000, p.7).

These exercises capture none of the potential indirect effects that education can have on output levels or growth (e.g. through physical investments, labour force participation or R&D) (McMahon, 2004). Thus even if productivity growth was allocated in detail to the various components, the existence of such a positive correlation provides no information regarding causality of the relationships or mechanisms and processes through which human capital accumulation affects economic growth (Sianesi and Reeden, 2000).

3.4.1.1.2 The 'new growth theories'

In contrast to the traditional neo-classical Solow growth model, the recently emerged 'new growth economics' theories emphasise the endogenous determination of growth rates instead of being driven by exogenous technological progress (Sianesi and Reeden, 2000; Dahlin, 2004). By adding a research and development sector to the neoclassical growth model the neoclassical model is generalized so that decisions to pursue knowledge are now endogenous (Sianesi and Reeden, 2000). These new approaches have explicitly brought the role of education to the fore and provide the theoretical underpinnings for assuming that education can affect national economic growth (Griffiths and Wall, 2004).

There are two streams/frameworks in the new growth approaches. One focuses on the accumulation (or flow) of human capital by explicitly incorporating human capital as a factor input in the production function and by explicitly modelling individual educational investment choices, as well as often allowing for externalities of human capital and thus departing from the constant returns to scale assumption of the neo-classical model. The second framework, which is focused on the stock of human capital, explicitly relates the stock of human capital to factors that lead to endogenous growth e.g. technological change (Griffiths and Wall, 2004). There is an underlying assumption that human capital directly produces new knowledge/technology or that it is an essential input into a research sector which generates new knowledge/technology (Sianesi and Reeden, 2000).

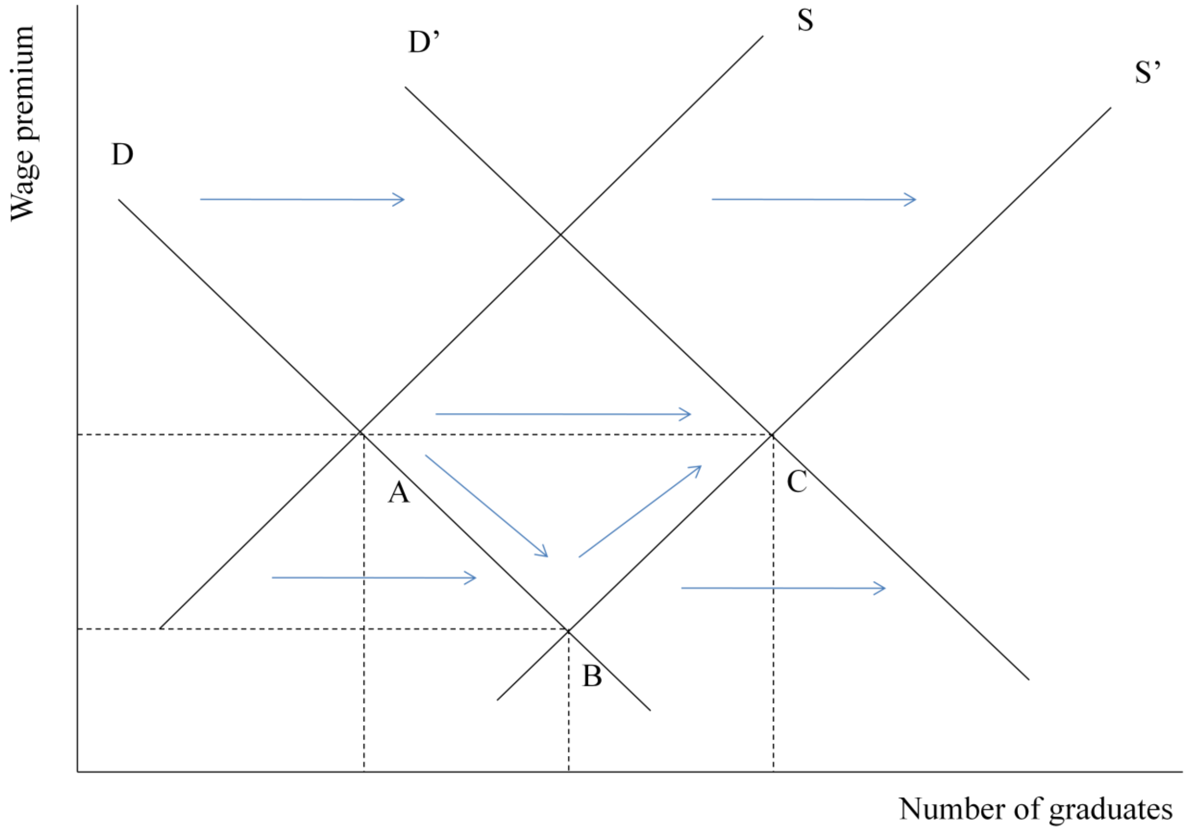
The distinction between the two streams has important implications. In particular, any policy measure, such as a subsidy to education, which raises the level of human capital will have a once-and-for-all effect on output in the first framework, but will increase the growth rate of the economy forever in the second one (Sianesi and Reeeden, 2000). There is no consensus in the empirical literature over which is the appropriate approach (Gemmel, 1996).

A key difference between new growth theory and the neoclassical growth model is that increasing or decreasing returns to scale within the production function for technology allows net increasing, decreasing or constant returns to scale of the produced factors (capital and technology), within the production of goods while the neoclassical model assumes constant returns to scale in production functions (Dahlin, 2004). In addition, some of the new growth theories have distinguished themselves from the traditional neo-classical approach by explicitly proposing a role for education externalities in economic growth (Sianesi and Reeden, 2000).

Endogenous growth theory can be used to explain why the relative wage of graduates has not decreased despite the increased number of graduates in the UK, where nearly half of the young population have a higher education experience (O'Leary and Sloane, 2005; Griffiths and Wall, 2004). Eicher (1996) has identified, using an endogenous growth model, a link (which he called 'absorption effect') between technological change and relative supply, demand and wage of skilled labour. He has shown that 'movements in the relative wage are sensitive to the interaction between accumulation of human capital and absorption of new technology' (Eicher, 1996, p.143). When applied to the law of supply and demand, his model explains why there still are sizeable returns to investment in higher education (Eicher, 1996; Blundell et al., 2000; Arrozola et al., 2003; O'Leary and Sloane, 2005). Figure 3.3 shows the reasoning graphically.

Thanks to relatively recent technological developments the need for skilled workers has increased which has resulted in shift of demand for skilled and educated labour (Ischinger, 2007). As a consequence the demand for higher education has increased and more graduates have appeared in the job market (Barr, 2004). If endogenous growth theory was not applied to the law of supply and demand the graduate premium would decrease with increased number of graduates (movement from A to B in Figure 3.3). However, an increased demand for skilled labour (due to technological advancement) offsets the excess supply of graduates (movement from B to C in Figure 3.3) and thus the graduate wage premium remains relatively stable (wage premium A≈ wage premium C in Figure 3.3).

Figure 3.3 Wage premium as a result of the shift in demand for and supply of graduates



3.4.2 Microeconomic point of view

Macro level studies have been concerned with the relationship between investment in education – by both private and public funders – and its pay off in terms of economic growth (Kruger and Lindahl, 2001). By contrast micro level approaches have generally been concerned to evaluate the returns which individuals and society as a whole obtain from investment in higher education, whether this investment is public or private in origin (Maani, 1991; Nonneman and Cortens, 1997; Wolter and Weber, 1999; Arrozola et al., 2003; Sakellariou, 2003). In other words, microeconomic analysis attempts to determine the effect of education on an individual's wage (Dahlin, 2004).

These studies – both micro and macro – have been undertaken in a variety of countries and have focused sometimes on development related issues in so called less developed countries (LCDs) (Maani, 1991; Glewwe, 1996). In other cases, advanced economies have been the focus of investigation. In both contexts it is important that finite resources are allocated efficiently and effectively and therefore this has often led to a strong policy orientation in these studies (Machin and Stevens, 2004).

Most studies of returns to education at the macro level have demonstrated a positive association between investment and outcomes (Blundell et al., 1999). The same is true for studies at the micro level although there are significant differences between the returns obtained from different levels and types of education with most studies showing higher levels of returns for primary education than for secondary education (Psacharopoulos, 1973; 1981; 1985; 1999; Barr and Crawford, 1998).

Economic effects of education are emphasised in economic literature and indeed, from an individual point of view, investments in education may be more profitable than many other types of investments (Glewwe, 1996). Education as an investment has, like any other investment, decreasing marginal returns, i.e. as investments increase, the expected returns decrease. However, unlike most conventional capital goods, the reason investment in human capital yields decreasing returns is not because the marginal productivity of human capital decreases as human capital stock increases. Human capital investments yield decreasing returns because the value of the investor’s time is increasing due to rising foregone earnings whilst in education (Nerdrum and Erikson, 2001).

Generally speaking, returns to schooling are a useful indicator of the productivity of education and the incentive for individuals to invest in their own human capital (Becker, 1993).

3.4.2.1 Private and social rates of return

There are two types of returns to be estimated regarding investment in human capital. The first one is the *private* rate of return, which compares the costs and benefits of education realised by an individual who undertakes the investment (Barr and Crawford, 1998). The second one is the *social* rate of return, which compares costs and benefits from society’s point of view (Psacharopoulos, 1973).

Psacharopoulos (1985) has suggested that social returns should be based on private returns but adjusted to include all the direct costs of education, i.e. not only costs borne by the individual who undertakes the education. In other words, the social return is measured on the basis of private benefits and total costs. In addition, when calculating the private rate of return and social rate of return net and gross earnings should be used, respectively, since income tax benefits society rather than an individual (Blundell et al., 1999).

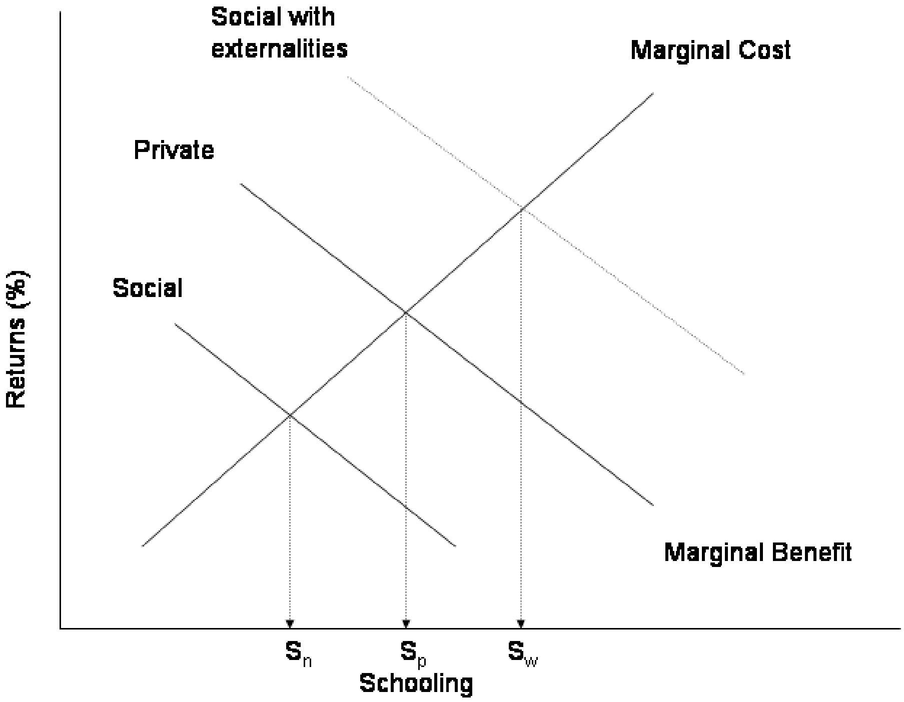
This method however excludes some social benefits. This is why the social returns should be adjusted to include externalities, i.e. true external benefits that affect society. However, as was stated earlier, these are very difficult to identify let alone to measure. As Psacharopoulos and Patrinos (2002) put it: 'if one could include externalities, then social rates of return may well be higher than private rates of return to education' (p.3). When justifying public support for education, the distinction between the private and the social return becomes crucial (Blundell et al., 1999). If however, the social returns are underestimated due to excluded externalities, it may lead to underinvestment in education by governments or insufficient public support of education.

This is the case for all levels of education including higher education. The Dearing Report (1997) indeed suggested that if the benefits from higher education, i.e. higher wage premiums compared to those who did not enter higher education, were all enjoyed by graduates only there would be 'no immediate economic case for subsidising the [higher education] system' and that 'state-funded education would merely be taxing some individuals in order to enhance the private gains to others' (NCIHE, 1997, section 1.3). Ashworth (1998) adds that 'society must believe that the immeasurable social benefits of more higher education are sufficient to outweigh the low rates of return on what is "measurable" ' (Ashworth, 1998, p.28).

Social returns are usually presented in the existing literature to be lower than private returns (Psacharopoulos, 1985; Blundell et al., 1999). Although, Nonneman and Cortens (1997) found in their study, which focused on schooling effects on production value, that in Belgium the social returns outweighed the private returns of every level of education, particularly in higher education, even with no externalities or indirect effects being included in their calculations.

Figure 3.4 shows how important it is to distinguish correctly between private and social returns to education. The difference which externalities may cause to the social rate of return, which is consequently used by policy makers when deciding the level of state subsidy to education, is also apparent (Figure 3.4). It illustrates that the privately optimum number of years of schooling (S_p) represents an overinvestment in schooling according to social returns (S_n equilibrium) but an underinvestment according to the social returns where externalities are included (S_w equilibrium).

Figure 3.4 Private and social optimum levels of schooling



Adapted from Psacharopoulos and Patrinos (2004, p.3)

3.4.2.2 Screening hypothesis

Although a link between education and productivity has been identified (cf. Schultz, 1961; Becker, 1964 and 1993; Mincer, 1974), the causality of such a relationship seems to be an issue. The theory of human capital assumes that the correlation between education and income is due to enhanced productivity through schooling (Nonneman and Cortens, 1997). However, an alternative view suggests that education (including higher education) may be no more than a screening device which allows employers to identify the more able potential employees from the rest (Arrow, 1973; Spence, 1973; Berg, 1970; Stiglitz, 1975; Blaug, 1985 and 1987; Gemmell, 1997).

Spence's (1973) signalling model considers the possibility that education is purely a signal of ability. Spence's (1973) model assumes that education adds nothing to an individual's human capital; rather, the educational system serves as a filter through which the most able students pass. As a result, the possession of more education 'signals' a worker's quality in the job market.

The so called ‘screening hypothesis’ denies the economic value of education and claims that education makes no direct contribution to individuals’ productivity (Layard and Psacharopoulos, 1974). It states that although additional education is related to higher income and financial benefits, education does not cause them and that education is only a signal of productivity (Brown and Sessions, 2006). Hence graduates’ wages are higher because they are inherently more productive (Blundell et al., 1999); for example because they work harder or have more innate ability, but not because they are better educated (Gemmell, 1997). Thus education signals their pre-existing productive abilities. Since these abilities are non-observable, schooling is used as a proxy and, as a result, higher levels of education are correlated with higher earnings (Spence, 1973; Pons and Blanco, 2005).

If this is the case then the current system of higher education may simply be providing employers with a privately cheap, but socially expensive, screening system. If firms know that the more productive individuals will choose to go to university, they will select graduates in preference to non-graduates even if education has no effect on their productivity (Gemmell, 1997).

It is in the firm’s interest to screen out potentially less productive applicants but, according to Brown and Session (2006), relying on educational achievement is perhaps an inefficient method of achieving this. Many firms choose to conduct their own screening tests before hiring. One might expect that relatively more able applicants will be attracted to firms conducting such tests, and that these firms will also pay relatively less attention to conventional educational signals (Brown and Sessions, 2006). However not all companies use such tests as they are expensive and do not guarantee the desired abilities of the worker. Thus education is commonly used by employers as a screening device.

It is quite possible, if employers and/or employees had to fully fund a screening system privately, that they would be able to devise something more efficient than the current higher education system (Gemmell, 1997). Since the current higher education system is subsidised by the government and graduates, it represents a relatively cheap screening device for employers. Thus, when more capable students need to distinguish themselves from the less capable ones, they choose to go to higher education to signal their capabilities to potential employers. Even if the screening hypothesis is true, there may still be a case for governments subsidising this 'screening system' if there are adverse social consequences, from the alternative screening systems, such as unemployment or high labour turnover (Gemmell, 1997).

There are two types of screening hypothesis – the strong screening hypothesis and the weak screening hypothesis (Arrow, 1973; Spence, 1973; Stiglitz, 1975; Psacharopoulos, 1979). The strong screening hypothesis presumes productivity to be immutable with schooling being used exclusively as a signal (Psacharopoulos, 1979). The weak screening hypothesis, on the other hand, concedes that whilst the primary role of schooling is to signal, it may also augment inherent productivity (Arrow, 1973; Spence, 1973; Stiglitz, 1975).

Tao (2006) tested the strong screening hypothesis for both males and females and rejected it for both genders. The results of Arabsheibani and Rees (1998) did not provide any support for the strong hypothesis either. Brown and Session (1999) using a sample of full-time male Italian workers found evidence for the weak screening hypothesis but not for the strong version. The findings of Pons and Blanco (2005) tend to confirm the validity of the human capital theory since they found little evidence of sheepskin effects (another term for screening/signalling effect of education) in the Spanish labour market. Their findings showed a diploma effect in the public sector but stressed that due to public sector requirements such an effect should be differentiated from the sheepskin effect (Pons and Blanco, 2005).

While there are various interpretations of education's effect on an individual's human capital, Krueger and Lindahl (2001) note that 'definitive answers to these questions are not available, although the weight of the evidence clearly suggests that education is not merely a proxy for unobserved ability'. Regardless of whether schooling signals or augments productivity, it certainly enhances lifetime earnings and as such represents a good investment for individual workers (Psacharopoulos, 1994). Whether or not schooling is a good investment for society is less clear (Brown and Sessions, 1999).

3.4.3 Micro vs. Macro - reconciliation

The literature on returns to investment in education is now substantial. It has examined all levels of education - primary, secondary, and tertiary - at both macro and micro level (cf. Psacharopoulos and Patrinos, 2004; Kruger and Lindahl, 2001). A very large number of academic studies have demonstrated quite conclusively that there are substantial private and social returns to all levels of education (Psacharopoulos, 1981; 1985; 1999; Blundell et al., 1999).

Many studies identified that private returns, especially to higher education, are higher than social returns. Given the difference between private and social returns to higher education, i.e. high private profit margin, shifting costs of education from taxpayers to students and/or graduates and/or their families should not act as a disincentive to investing in higher education (Psacharopoulos and Patrinos, 2004). This issue is particularly discussed in countries where the costs of higher education have been borne by the government, i.e. taxpayers (Barr and Crawford, 1998).

The social return from education may be higher or lower than the private return estimated from such micro studies. It can be higher due to positive externalities arising from individual educational investments, but if educational degrees are simply used as a device to signal higher innate ability without raising individual productivity, the social rate will be less than the private one (Psacharopoulos and Patrinos, 2004).

Although from the micro evidence on earnings it cannot be decided whether the social return to education exceeds the private gains, other micro evidence points to positive externalities in the form of lower crime, reduced welfare dependence, better public health and parenting, all factors that are likely to positively affect economic productivity (OECD, 2001). Thus it is likely that when the financial returns to investment in human capital are measured we omit a great part of the benefits of education that cannot easily be quantified (McMahon, 2004). Despite this, the estimate of the financial returns to education still provides a great deal of information. Although education does not only have an economic value, educational benefits must be quantified so education, as an investment opportunity, is be able to compete with other investments and is attractive for investors (Lleras, 2004).

Pritchett (1996) suggested three possibilities for reconciling the macro and with the micro evidence:

> *First*, schooling may not actually raise cognitive skills or productivity but schooling may nevertheless raise the private wage because it serves as a signal to employers of some positive characteristic like ambition or innate ability. *Second*, expanding the supply of educated labour in the presence of stagnant demand for educated labour causes the rate of return of education to fall rapidly. The *third* possibility is that education does raise productivity, and that there is demand for this more productive educated labour, but that demand for educated labour comes from individually remunerative but socially wasteful or counter-productive activities so that while individual wages go up with education, aggregate output stagnates or even falls.
> (Pritchett, 1996, p.2)

Microeconomic analysis of private rates of return to investment in education is less difficult than macroeconomic estimation of social rates of return to investment in human capital. Ambiguity in empirical estimates of these rates of return hinder consensus among researchers as to what educational policies produce sustained economic growth. Michaelowa (2000) suggests that the best models from which to derive policy implications are those at the micro level, because 'at the current stage of empirical growth analysis, aggregate approaches do not offer any consistent insight concerning these issues' (p.26). New growth theory holds promise for future theoretical and empirical study of the relationship between human capital and growth. As a frontier of economic research, enhancements to new growth models that further clarify this relationship may lead to further agreement among macroeconomists as to optimal subsidies for human capital investment (Dahlin, 2004).

3.5 Private returns to higher education

There has been a substantial increase in the number of individuals obtaining a Bachelor's degree in Britain since the Second World War (Barr, 2004). The proportion of young people studying full time at universities increased from 13% in 1980 to 33% in 2000 (Walker and Zhu, 2003). The British government's target for this figure was 50% by 2010 (O'Leary and Sloane, 2005). With more graduates entering the labour market the demand for graduates might decrease and consequently reduce the returns to higher education.

Nonneman and Cortens (1997) surveyed 3821 households in Belgium. All full-time working males and females between 16 and 65 (for males) or 60 (for females) were selected from the sample. They found returns for females to be systematically higher than those for males. Indeed, the rates of return at each level of education have been found to vary by gender with females generally experiencing higher rates of return than males at all levels (Maani, 1991; Psacharopoulos 1985; 1999; Blundell et al., 1999; Daoud, 2005).

Returns are also found to vary substantially across disciplines (Chevalier et al., 2002; Walker and Zhu, 2005; O'Leary and Sloane, 2005). In the case of some subjects, there were even negative returns (Finnie and Frenette, 2003). The undergraduate subjects that offer the greatest labour market rewards for men are Accountancy, Engineering, and Maths and Computing. These also offer some of the most substantial benefits for women. Arts-based subjects, on the other hand, consistently offer some of the lowest mark-ups for both men and women (Chevalier et al., 2002; Walker and Zhu, 2005; O'Leary and Sloane, 2005). For all subjects, the returns are higher for women than for men (Chevalier et al., 2007). However, this does not indicate that female graduates earn more than their male counterparts; rather it suggests that higher education reduces the gender pay gap (Chevalier et al., 2007).

Rossi and Hersch (2008) focused their study on the effects of having a double major. They found that most of the gains from having a double major come from choosing fields across two different major categories. Graduates who combine an arts, humanities or social science major with a major in business, engineering, science or math have returns 7–50% higher than graduates with a single major in arts, humanities or social science (Rossi and Hersch, 2008). But such double major combinations have returns no higher than single majors in business, engineering, science or math. Majors combining business and science or math have been found to yield returns more than 50% greater than the returns to having a single major in these fields (Rossi and Hersch, 2008).

At the postgraduate level, there is evidence of substantial earnings premia for some subjects over and above what are earned upon undergraduate degrees, and again there is substantial heterogeneity across disciplines. In particular, further degrees, both Masters and PhDs, in business and financial studies appear to offer the greatest financial rewards for men and women alike (O’Leary and Sloane, 2005).

Under the ‘old tuition fee system’ in England, male graduates were found to expect a rate of return on their investment of around 9% p.a. and female graduates 13% p.a. (O’Leary and Sloane, 2005). Under the ‘new system’ graduates were expected to earn returns of 7.3% p.a. and 10.3% p.a. by male and female graduates respectively (O’Leary and Sloane, 2005).

Blundell et al. (2000) however presented even higher private returns to an undergraduate degree. Average returns for males were found to be 21% and for females 39%. When controlled for various characteristics these returns were reduced to 17% and 37% for men and women, respectively. The reasons for this difference seem to be different methodology, sample of older individuals, and the fact that gross rather than net returns were measured, in the latter study. Nonetheless both studies show that returns are positive and higher for females than for males.

Arrozola et al. (2003) estimated returns per educational level in Spain and found that returns for women were always greater than returns for men and that these differences were concentrated at the vocational and university levels. Daud (2005) estimated private returns to schooling in Palestine, using eight quarterly labour force surveys between 1999 and 2001, and, in line with other studies, found that returns to schooling, including higher education, were higher for women than for men.

To conclude, recent studies suggest that there are still sizeable returns to be gained from investing in higher education even when the age participation increases (cf. Blundell et al., 2000, Arrozola et al., 2003). There is also evidence of substantial heterogeneity in returns across disciplines (cf. Finnie and Frenette, 2003; O'Leary and Sloane, 2005), and of a greater advantage for women to investing in a university education (cf. Maani, 1991; Psacharopoulos, 1999; Daoud, 2005; Chevalier et al., 2007). Finally, in so far as education is treated as an investment rather than a consumption decision, regularly updated information on returns to different degree programmes can make an important contribution to the educational decisions of future students.

3.5.1 Measuring returns to higher education

As discussed above, investments in human capital, like in physical capital, require certain benefits to be yielded. These benefits can be measured as returns to such investments. According to the theory of human capital, education is 'a process of investment in the individual which yields a flow of return in the future' (Peston, 1981). Thus it is possible to estimate returns to education, i.e. the economic value of education, which is crucially important for those working in education policy (Institute of Education, 2008).

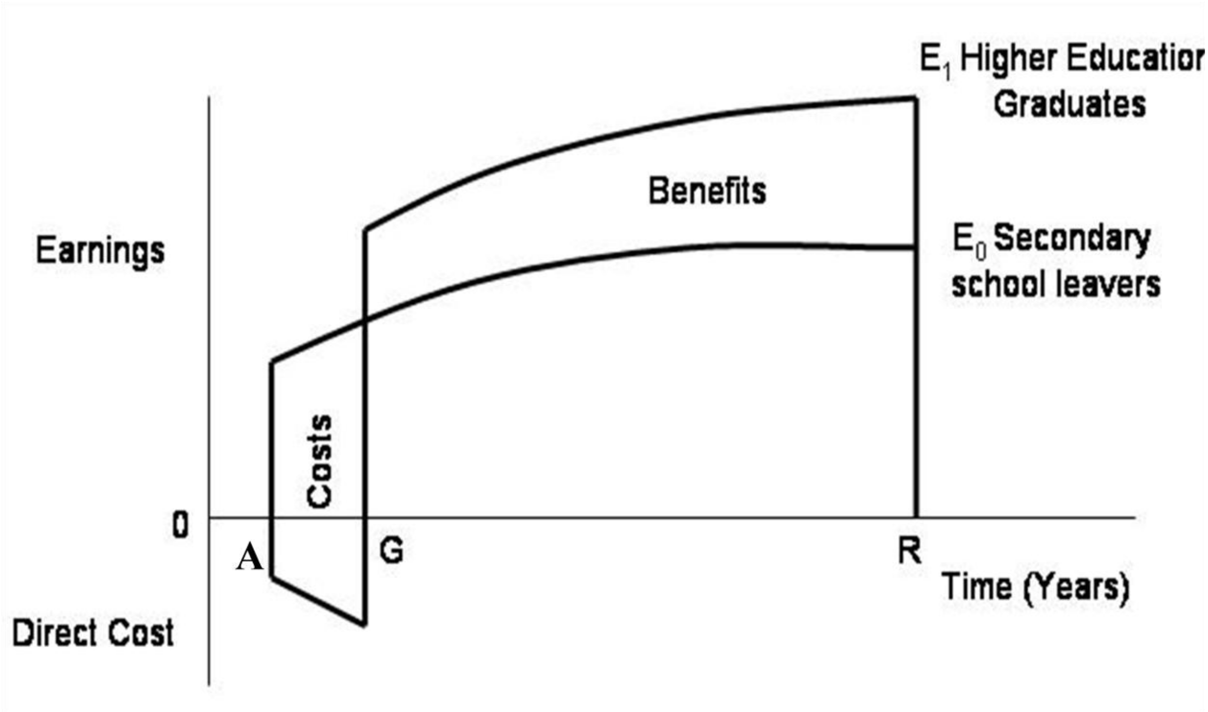
When estimating private rates of return to education one must take into account both the benefits and the costs of the investment. Quantifiable benefits from the investment are the higher earnings usually experienced by more qualified workers. 'The costs incurred by the individual are his/her foregone earnings while studying and any education fees or incidental expenses the individual incurs during schooling' (Psacharopoulos and Patrinos, 2004, p.4).

In this study, when estimating private rates of return, the costs will not include living expenses. These are usually covered by parents if they can afford to do so 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 are not a burden to students during or after their studies. Such costs therefore do not influence the private rate of return and thus do not need to be included when estimating the private rate of return. On the other hand, if tuition fees are in place they should also be included in the calculation regardless of whether they are being paid upfront or are deferred until after graduation, as they represent a direct cost (Psacharopoulos, 1981).

This study examines differences between expected rates of return in England and in the Czech Republic. A new system of tuition fees has been in place at universities in England since 2006/2007. On the other hand public higher education in the Czech Republic is provided free by the state. This is why the only cost of university education in the Czech Republic is indirect, i.e. foregone earnings.

For a mapping of the difference in costs and benefits between university graduates and secondary school graduates see Figure 3.5.

Figure 3.5 Stylized age-earnings profiles



Adapted from Psacharopoulos (1995, p.3)

- *A* is age at the beginning of higher education
- *G* is age at graduation from higher education
- *R* is age at retirement

3.5.1.1 Methods used to estimate private rates of return

There are basically two methods to use when measuring returns to higher education. Both the direct and indirect (also known as Mincerian function or Human capital earnings function) methods have their advantages and disadvantages (Psacharopoulos, 1973; Mincer, 1974; Lleras, 2004).

The former seems to be the most appropriate method as it uses information on earnings and costs to estimate the rate of return and discounts net age-earnings profiles. However, it seems to be hard to implement as it requires comprehensive data and it is difficult to measure all dependent and independent variables (Psacharopoulos, 1973).

The latter on the other hand is easier to implement. However, it includes only foregone earnings as the cost of education and assumes 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).

From the previous two methods a 'short-cut method' was developed (Psacharopoulos, 1981). The three main methods mentioned in this section can also be found in the literature using slightly modified versions of the models; they vary in particular by personal characteristics and other sources of variation identified by the researchers (cf. Hussain et al., 2009; Walker and Zhu, 2011). The following section presents the basic formulae used in the above mentioned methods and describes the methods in more detail.

3.5.1.1.1 Direct method

The direct method was developed from the definition of rate of return to education, i.e. discounted rate balancing the sum of discounted costs related to the investment and discounted earnings produced by the investment (Griffiths and Wall, 2004). 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 university studies are considered as an investment. Benefits from the investment are considered to be the difference between an income of a university graduate and a secondary school graduate (Psacharopoulos, 1981).

The formula for any level of education is expressed mathematically as follows:

$$\sum_{t=s+1}^{R}(E_H - E_L)_t(1+r)^{-t} = \sum_{t=0}^{t=s} TC_t(1+r)^t$$

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 *(s+1)* and retirement *R*. These earnings (E_H - earnings of an individual with higher level of education; E_L earnings of an individual with 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:

$$\sum_{t=G}^{R}[E_u - E_s]_t(1+r)^{-t} = \sum_{t=A}^{G}[E_s + C_u]_t(1+r)^t$$

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, i.e. tuition and other fees
- *A* is age at the beginning of higher education
- *G* is age at graduation from higher education
- *R* is age at retirement
- *r* is internal rate of return to higher education

3.5.1.1.2 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 referred to as the rate of return to schooling (Barrow and Rouse, 2005) regardless of what educational level this year refers to (Psacharopoulos, 1995).

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).

The basic 'Mincerian' earnings function takes the following form:

$$lnE_i = \alpha + \beta S_i + \gamma Exp_i + \gamma_2 Exp_i^{\ 2} + \varepsilon_i$$

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
- β is return to schooling

The β coefficient on years of schooling can be interpreted as the average rate of return to one additional year of schooling. Since $\beta = \Delta lnE/\Delta S$ this is the relative increase in wages following an increase in S, or the rate of return to the marginal year of schooling.

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:

$$lnE_i = \alpha + \beta_p D_p + \beta_s D_s + \beta_u D_u + \gamma Exp_i + \gamma_2 Exp_i^{\ 2} + \varepsilon_i$$

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:

$$r_p = \frac{\beta_p}{S_p} \qquad r_s = \frac{\beta_s - \beta_p}{S_s - S_p} \qquad r_u = \frac{\beta_u - \beta_s}{S_u - S_s}$$

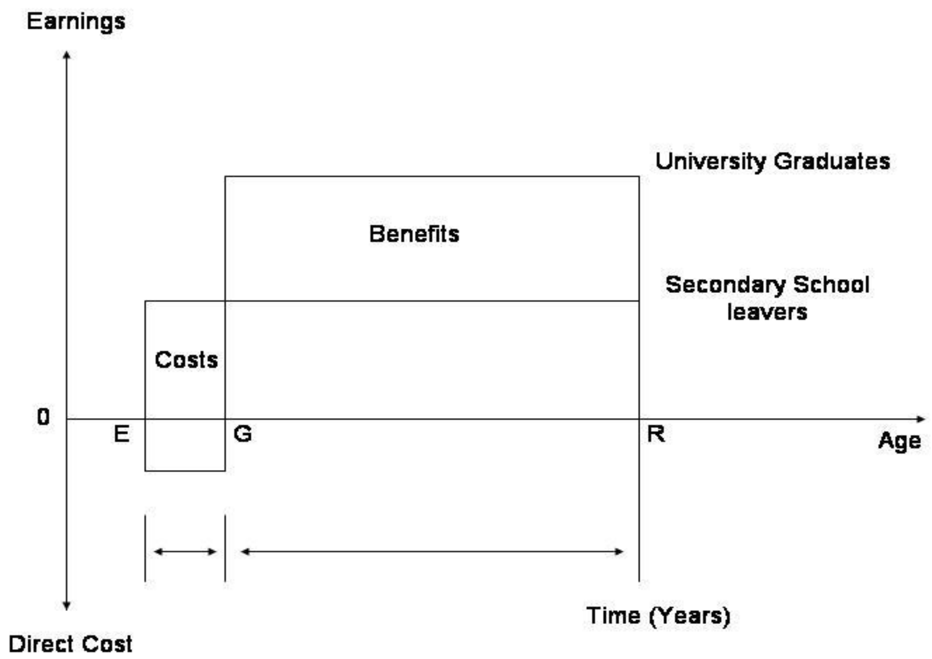
Where r_p is the rate of return to primary education, r_s is the rate of return to secondary education and r_u is the rate of return to university education. S is the number of years of formal education at the end of the subscripted level of schooling, i.e. p, s, u = primary, secondary and university, respectively.

3.5.1.1.3 Short-cut method

The short-cut method was proposed by Psacharopoulos (1981) and is developed from the Mincerian earnings function. Indeed the underlying formula for the short-cut method is β=ΔlnE/ΔS derived from the simple original Mincerian formula: $lnY_j = lnYi + \beta S$

Thus the short-cut method uses the same assumption regarding the age-earnings profiles, i.e. that they are flat. For differences between university and secondary school graduates see Figure 3.6.

Figure 3.6 Flat age-earnings profiles



Adapted from Psacharopoulos (1995, p.6)

Based on the above mentioned backgrounds the following formula can be used for calculating the rate of return to education.

$$r = \frac{E_j - E_i}{(s_j - s_i) \cdot E_i}$$

where

- E is average earnings of an individual who has an j level and i level of education respectively
- S is years of schooling of an individual who has an j level and i level of education respectively
- r is the internal 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).

On the other hand, Menon (2008) shows that the results produced by both 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.

3.5.1.1.4 Adjustments of the short-cut method to different conditions

The basic short-cut method formula stated above is only suitable for measuring rates of return to higher education in countries where the higher education is provided to students by the state for free, such as in the case of public universities in the Czech Republic (Psacharopoulos, 1981; Menon, 1997). However in England tuition fees have been in place since 1998. Moreover, in 2006/2007 the tuition fee system changed the payment of the fees from upfront to being deferred until after graduation. Therefore some adjustments must be made in order to compute the rate of return as accurately as possible.

During the years 1998/1999 - 2005/2006 inclusive the tuition fees were required to be paid up front. Thus foregone earnings were not the only cost of higher education. Since the fees had to be paid upfront they should be added to the formula in the denominator as they were a burden to students as much as their foregone earnings during their university studies. The formula used to calculate the rate of return to higher education in England between 1998/1999 and 2005/2006 is as follows:

$$r = \frac{Eu - Es}{(s_u - s_s) \cdot \left(Es + Cu\right)}$$

However, as mentioned above, the tuition fee system has changed and the tuition fees are not required to be paid up front. Rather they will be collected along with national insurance and tax and will be deducted automatically from wages and salaries. This was designed to reduce the burden to students and rather make graduates pay for their studies. Given that students do not pay for their education while they study and the tuition fees will be collected in instalments (9% of the threshold above £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 the investment. Therefore the formula, which was developed by the author and which will be used to calculate rates of return in England after 2006/2007 inclusive, will be as follows.

$$r = \frac{Eu - \left[0.09\left(Eu - 15{,}000\right)\right] - Es}{(s_u - s_s) \cdot Es}$$

3.5.2 Expected earnings and rates of return to education

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.

The significant influence of expectations on schooling decisions would suggest that there has been a vast body of economics literature on the subject of student perceptions and expectations. This, however, does not seem to be the case since, as Manski (1993) commented, ‘the profession has traditionally been sceptical of subjective data; so much that we have generally been unwilling to collect data on expectations’ (p.43).

Dolton and Makepeace (1990) surveyed economics graduates and asked questions about their earnings and social and family background but it was their actual earnings rather than their expectations that were examined. Dominitz (1998) on the other hand focused his research on future earnings expectations but these were surveyed amongst employees rather than students. In addition, Dominitz and Manski (1994; 1996) surveyed members of American households and their expectations regarding the probability of their income decreasing during the following 12 months.

Only a few studies have examined the comparability of earnings expectations to reality within the educational context (cf. Dominitz and Manski, 1996; Caravajal et al., 2000; Webbink and Hartog, 2004). However, the known studies differ considerably in terms of methodology and their underlying research questions and thus their results are difficult to compare. A short review of the existing literature is provided in this section.

Oosteerbeek and van Ophem (2000) estimated a structural model of schooling choices and the human capital production function and found, among others, that children from different social backgrounds have different attitudes towards schooling and consequently expect different rates of return to schooling. These differences were found to be apparent already when children were 12 years old. In addition they found that those who did not have any post-compulsory education came from a lower socio-economic background and that education attainment increases with the level of the father's education and a family's social status (Oosteerbeek and van Ophem, 2000).

Williams and Gordon (1981) surveyed 16-year-old students in England, who were tested on their reasoning ability and asked about their family backgrounds, educational intentions and anticipated earnings capacity at various stages of their working lives. This study was the first to attempt to estimate ex ante perceived rates of returns to upper-secondary and higher education. Their results showed that by the end of their compulsory education English pupils were aware of the relationship between educational qualifications and average earnings and that there was a close association between perceived and actual rates of return to education (Williams and Gordon, 1981).

Smith and Powell (1990) and Blau and Ferber (1991) attempted to find out how accurately students could estimate the current wage levels of different worker categories. Both these studies focused on gender differences in earnings expectations and found that at the time of graduation women expect to earn as much as men. However, it is later in their careers that women's expected earnings profiles start to become flatter when compared to men, which complies with the fact that indeed the gender pay gap tends to increase with age (Blau and Ferber, 1991). In addition, Smith and Powell (1990) show that men have the tendency to 'self-enhance', i.e. to overestimate their returns to schooling.

Betts (1996) examined earnings expectations of undergraduates at the University of California and found that differences in expectations were dependent on field of study and the year of study, i.e. the closer the students were to graduation the more accurate information regarding their earnings they had. 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, p.25) and that information available to students regarding their future earnings were 'being used rationally' (Wolter, 2000, p.65).

Menon (1997; 2008) estimated perceived rates of return to education of high school students and found they 'acted according to human capital theory' (1997, p.4), i.e. unlike those who were to continue their studies at university, labour market entrants did not perceive the higher education to be a profitable investment since their perceived rate of return to higher education was lower (Menon, 1997; 2008). Therefore she concluded that perceived rates of return are important when deciding whether or not to enter higher education (Menon, 2008).

Caravajal et al. (2000) used a small sample of students in Florida to predict salaries of graduates which they compared with the data of actual graduates of the same school participating in the same survey. They showed that although students' expectations accorded with the trends of recent graduates' marketplace experiences, students were only partially aware of the labour market conditions. Specifically, students underestimated the earnings outcome of working more hours and overestimated the effect of age. Graduates reported lower levels of earnings when they worked in large firms, while students expected to earn more there (Caravajal et al., 2000).

Nicholson and Souleles (2001) published a study on income expectations of medical students and showed that specialty of choices after graduation could be explained by differences in their income expectations. They also came to a conclusion 'that subjective expectation questions can help predict people's behaviour, including their investment in human capital' (p.26).

Brunello et al. (2001) asked students about their personal earnings expectations in 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.

Webbink and Hartog (2004) used Dutch panel data and surveyed students for five subsequent years. All years, levels and types of higher education were included and participants were asked every year about their positions in or outside higher education, motivations for the decisions made and their future plans. They found that there were no systematic differences between expectations and realisations, and that students are able to make realistic estimates at both a group and an individual level, although students from high-income families tended to overestimate their returns.

Botelho and Pinto (2004) surveyed first and final year university students in Portugal and examined their expectations of the economic returns to higher education. They confirmed that students can estimate their future earnings 'and that, as a consequence, economists' reluctance to gather subjective data on expectations does not seem warranted' (Botelho and Pinto, 2004, p.7). Their findings are in line with previous studies which found that students are aware of the financial benefits of higher education.

In addition, Botelho and Pinto (2004) found that female students expected lower returns than their male counterparts and that their (female) estimates were more accurate when compared to the actual returns. Another conclusion of their study is that final year students expect lower returns to higher education than those in their first year and that they have, irrespective of gender, 'a relatively accurate understanding of the national average market returns to education' (Botelho and Pinto, 2004, p.7). Finally their findings revealed a tendency to 'self-enhance' since students – both male and female – tend to overestimate their future returns when compared with their perceptions of average returns to schooling.

There has been little research on expectation particularly when it comes to earnings expectations within educational context. The studies that have been conducted in this area differ considerably in terms of methodology and therefore are difficult to compare. Nevertheless, these studies tend to conclude find that students' expectations are realistic and thus are worth exploring; that expectations are influenced by personal characteristics; and that students act according to the theory of human capital. This study will explore the issue of expectations in the context of two countries in one subject area and will attempt to determine what factors influence students' expectations.

3.5.3 Expectations formation

The theories of consumption based on the work of Friedman (1957) and Modigliani (1954) suggest that households plan their consumption decisions based on their 'permanent income' from which they derive their expected future income. How households and individuals arrive at their expected future income is a very controversial question though (Campbell, 2009; Griffiths and Wall, 2004). Friedman (1957) used adaptive expectations to explain the phenomenon, i.e. he assumed that consumers adapt or change their view of their expected income in the light of any errors they have made in the past. The main reason why this approach to modelling expectations formation has been criticised is the ignorance of all other relevant information that may influence future earnings (Griffiths and Wall, 2004).

An alternative approach to rational expectations has been adopted. The hypothesis of rational expectations argues that a household possesses a model which is used to process relevant information so an expected future income is derived. Rational expectations are assumed not to be systematically different from realisations, with all errors being random and resulting from unexpected shocks (Griffiths and Wall, 2004). Rational expectations are thus identical to *the best guess of the future* which uses all available information and are the basis for the efficient market hypothesis (Beecham, 1994).

While expectations are at the core of macroeconomics most work has been done on price expectations rather than wage/earnings expectations (Gertchev, 2007; Campbell, 2009). There is an extensive literature that involves testing the rationality of price expectations; the previous studies suggest that expectations are neither completely rational nor completely adaptive (Campbell, 2009). On one hand, Evans and Gulamani (1984), Batchelor and Dua (1989), Roberts (1997), Thomas (1999), and Mankiw et al. (2003) find that expectations do not satisfy the criteria for rational expectations, as they show that forecast errors can be predicted by information available at the time of the forecast (e.g., money supply growth, unemployment, the budget deficit, interest rates, the output gap, and lagged inflation). On the other hand, the findings of Mullineaux (1980), Gramlich (1983), and Baghestani and Noori (1988) indicate that expectations are not purely adaptive. In addition, Fuhrer (1997) and Roberts (1998) demonstrate that expectations can be described as a mixture of rational and adaptive expectations.

Among economists a popular approach to students' expectation has been an assumption that students use a homogeneous expectations formation process (Manski, 1993; Brunello et al., 2004). However, 'there is little reason to think that all youth form their expectations in the same way' (Manski, 1993, p.45) since 'if experts can vary so widely in the way they infer the returns to schooling, it is reasonable to suspect that youth do, as well' (p.46). For instance some econometric studies (cf. Willis and Rosen, 1979; Manski and Wise, 1983) assume that young people condition their expectations on their ability, while other studies (cf. Freeman 1971; Murphy and Welch 1989) assume that they do not.

> Having chosen to make assumptions rather than to investigate expectations formation, economists do not know how youth infer the returns to schooling. If youth form their expectations in anything like the manner that econometricians study the returns to schooling, then prevailing expectations assumptions cannot be correct.
> (Manski, 1993, p.55)

In empirical studies of this question, researchers have assumed either myopic or rational students' expectations of future income (Manski, 1993). Freeman (1971) assumed that expectations formation is myopic while Willis and Rosen (1979) hypothesised that expectations are rational. In the former case, it is assumed that students enrolling in higher education form their expectations by looking only at the realised income distributions of earlier cohorts. In the latter case, students assess incomes for their cohort properly, by taking the repercussions caused by changing supply of and demand for skills into account (Brunello et al. (2004). In contrast to Freeman (1971) and Willis and Rosen (1979), Manski and Wise (1983) concluded that students 'do not necessarily know either the outcomes realized by earlier cohorts or the actual process generating outcomes' (p.44); rather they form their expectations as a function of the difference between their own prior achievement and the average prior achievement at the higher education institution where they enrol.

In all three cases students may have unconditional expectations – concerning the mean earnings of their cohort – or conditional ones, which relate more specifically to their own personal characteristics and abilities (Brunello et al., 2004). While conditional expectations are relevant for the personal career decisions of the prospective college student, unconditional expectations can be useful to test the respondent's general knowledge of the labour market and its developments (Manski, 1993). This study aims to ask students about their own conditional future earnings while assuming that students form their expectations homogeneously, and that students' expectations are formed rationally as well as adaptively.

Students are assumed to use available information about the labour market in terms of the demand for and supply of graduates to form their expectations rationally. Students' expectations have been found to be influenced by peers (Brunello et al., 2001), and by parental education and income (cf. Maani, 1991; Blundell et al., 1999; Oosteerbeek and van Ophem, 2000). These findings seem to suggest that students form their expectations based on observations of the outcomes of previous cohorts; therefore the expectations formation process in this study is assumed to be at least partially adaptive. To be able to use the same data collection instrument at all participating institutions in both countries, expectations need to be assumed to be formed homogeneously.

3.6 Finance theory and investment in human capital

This study regards higher education as an investment rather than a consumption good and thus returns to the investment in higher education will be estimated. There is a vast body of literature on investment in human capital with a particular focus on private and social returns to such investment. In addition, attempts have been made to compare investment in human capital to investments in other assets in terms of their returns. In the field of finance when evaluating investment in assets and/or portfolios expected returns are estimated in line with expected risk. Only a few studies, however, attempted to investigate investment in human capital in such a manner; moreover even fewer studies attempted to do so *ex ante* (Hartog et al., 2004; 2007). This study thus attempts to fill in this gap by combining finance theory with the theory of human capital in order to contribute to examining the relationship between risk and return to the investment in human capital particularly in form of higher education. The contribution is expected to be achieved by estimating the risk-return trade-off and by introducing a risk-free rate of return as an indicator that is complementary to risk-unadjusted rates of return normally used in literature on human capital.

Becker (1993) criticised his own work on human capital as he realised that he had not included risk when discussing returns on the investment in education. The idea of finance theory seems to be an appropriate mean of integrating the concept and completing the view and analysis of investment in human capital since finance theory is concerned with the allocation of funds to projects while considering the risk associated with them (Markowitz, 1952). There are several finance theories that offer separate approaches that can be adopted in order to achieve the goal of integrating the concept of risk of the investment in human capital. Those particularly useful for the purpose of this study are prospect theory and modern portfolio theory. When looking at the decision making process regarding investment in human capital rational choice theory may also be examined in conjunction with prospect theory and modern portfolio theory (Markowitz, 1952; Kahneman and Tversky, 1979; Begg et al., 2005).

Becker (1993) suggested adoption of the analysis of utility maximisation and the use variance in the rates of return as a measure of risk. Utility theory describes 'the way consumers choose among different consumption possibilities' and how consumers allocate their resources to those commodities that 'provide them with satisfaction' (Samuelson and Nordhaus, 2005, p.84). Based on utility theory, the theory of demand assumes that consumers maximise their utility, i.e. consumers make their decision based on the utility maximisation principle. When maximising utility, more units of a commodity are added at a diminishing rate, i.e. the law of diminishing marginal utility applies (Begg et al., 2005).

Utility theory has several assumptions such as that consumers' preferences are complete, reflexive and transitive. Preferences are considered to be complete when for a pair of choices A and B one and only one of the following statements can be claimed: A is preferred to B, B is preferred to A, or A and B are equally preferred. Preferences are reflexive when the following holds: if A is equally preferred to B then B is equally preferred to A. Finally, the assumption of transitive preferences assumes that if A is preferred to B and B is preferred to C then A is preferred to C. In addition to these assumptions the law of substitution is expected to be followed, i.e. consumers are willing to trade one choice for another. The measure that is used to demonstrate the effect of the law of substitution is the marginal rate of substitution, i.e. the quantity of A the consumer must sacrifice to increase the quantity of B by one unit without changing the total utility (Begg et al., 2005). The marginal rate of substitution is, like marginal utility, diminishing.

When these principles are applied to a risk and return scenario a consumer may be willing to take higher risks in order to get higher return, but only up to a certain point which is referred to as the saturation point (Griffiths and Wall, 2004). Once the risk has reached the saturation point, the decision maker would not be willing to take any more risk to increase return and therefore the marginal rate of substitution at this risk level would be zero (Begg et al., 2005). Thus the notion of utility maximisation shows a scope for the study of expected risk of the investment in human capital since clearly there is likely to be a point when investors are no longer willing to accept risk to increase their returns.

Markowitz (1952) rejected the hypothesis that an investor does or should maximise the discounted value of future returns when he introduced the Modern Portfolio Theory. Although he rejected the hypothesis in the context of portfolio diversification, which is not the focus of this study, the reason for his rejection was related to risk, presented by

Markowitz (1952) as variance in returns. Markowitz (1952) suggested that investment portfolios should be diversified in order to diversify/minimise risk. He stated that 'diversification cannot eliminate all variance' and continued that a 'portfolio with maximum expected return is not necessarily the one with the minimum variance. [However] there is a rate at which the investor can gain return by taking on variance, or reduce variance by giving up expected return' (Markowitz, 1952, p.79); he called this the 'expected return-variance of return rule' which suggested a relationship between the return and risk (p.87).

When looking at education as investment, while applying Modern Portfolio Theory, potential students, i.e. investors in their human capital will be interested in not only the expected returns on the investment but also in the risk associated with such investment, which may be the primary concern in the decision making process whether or not an individual should invest more in their human capital in the form of higher level of education (Hartog et al., 2004). Several sources of ex ante risk have been identified in the literature. Performance in education, i.e. uncertainty regarding the successful completion of the chosen educational level, uncertainty regarding the position in the post-education earnings distribution, and the market risk in terms of the future value of education based on the demand for and supply of those with the particular level of education (Hartog et al., 2004).

Although the differences in terms of the rates of return among individuals, levels of education and the fields of education have been stressed in the literature, the implications of the dispersion of the returns to education has often passed without further comment. This seems to be the reason for the lack of empirical focus on the risk associated with the investment in human capital (Hartog and Diaz-Serrano, 2007). This study attempts to assess ex ante perceived risk and returns based on a basic human capital investment model that compares two future earnings streams. The risk could be estimated by measuring the ex post variability of the ex ante returns. Ex post variability in expected returns is however not the same as the ex ante risk expected by an individual since the dispersion of the returns is likely to reflect individual heterogeneity (Hartog et al., 2004). If the unobserved individual heterogeneity were to bias the results, the likely possibility is that the risk estimated by ex post variation of the expected returns may be higher than the ex ante individual risk.

The ex ante perceived risk is estimated in this study by estimating coefficient of variation for each individual. Within-subjects design of the research allows this since each respondent serves as his or her control and thus eliminates the individual heterogeneity. Minimum, most likely and maximum earnings obtained from each respondent provide information about the expected variance in earnings for each individual. Using the individuals' mean and standard deviations the individual ex ante risk will be calculated.

Pereira and Martins (2002) studied the relationship between risk and returns to education using data from 16 countries. They found that there is a positive relationship between risk and return, as suggested by finance theory, and that the risk-return trade-off is rather large. They identified a compensation to face the risk associated with the investment in education to be a 1 percentage point (pp) increase in the average return to education for a 2 pp increase in risk (Pereira and Martins, 2002). Hartog and Diaz-Serrano (2007) examined effect of earnings risk on the demand for higher education using Spanish data. They found that returns have positive effect on demand for higher education and risk has a negative effect, i.e. the higher the risk the lower the investment in education. Moreover their results show that 'declining risk aversion reduces the impact of risk on university attendance' (Hartog and Diaz-Serrano (2007, p.25). 'A person is risk-averse when the displeasure of losing a given amount of income is greater than the pleasure of gaining the same amount of income', i.e. risk-averse people are those who avoid risk (Samuleson and Nordhaus, 2005, p.208).

Modern Portfolio Theory assumes that investors are risk-averse, i.e. given two portfolios that offer the same expected return investors will prefer the less risky one (Markowitz, 1952). Thus, an investor will take on increased risk only if compensated by higher expected returns. Conversely, an investor who wants higher expected returns must accept more risk (Markowitz, 1952). The exact trade-off will be the same for all investors, but different investors will evaluate the trade-off differently based on individual risk aversion characteristics.

Economists usually classify people, in terms of the level of their attitudes to risk, into three categories: risk-averse, risk-neutral and risk-loving (Begg et al., 2005). The major distinction between these categories depends on whether or not a person would accept a fair bet (bet with zero expected value). In the case of a risk-averse person a fair bet would have negative expected utility value because the utility of wining is less than utility of losing and thus a risk-averse person would not accept a fair bet (Samuleson and Nordhaus, 2005). People are generally risk-averse since they prefer certainty over uncertainty, and less uncertainty and higher value of consumption at the same time (Begg et al., 2005; Samuelson and Nordhaus, 2005).

In terms of the expected utility concept, risk aversion corresponds with the diminishing marginal utility of income with decision makers making their choices based on the change in final value of the outcomes of their choices, not whether the change is a gain or loss (Hogarth, 1987). Kahneman and Tversky (1979) criticised the expected utility theory as a descriptive model of decision making under risk and developed an alternative model called 'prospect theory', in which value is assigned to gains and losses, in a way that decision makers are more sensitive to losses than they are to gains (Hogarth, 1987). As a result, the prospect theory suggests that the individual's disutility caused by a loss is greater than the utility caused by a gain of the same size (Kahneman and Tversky, 1979). Thus a risk-averse person feels that the gain in utility achieved by getting an extra amount of income is less than the loss in utility from losing the same amount of income.

The combination of the concept of human capital, utility maximisation, risk-aversion and the Modern Portfolio Theory leads to the following: if there was no risk involved in the investment in human capital, the theory of human capital combined with the concept of utility maximisation would suggest that individuals base their choice of education solely on earnings maximisation. When however risk is included to reflect the investment environment more precisely, the decision making process becomes 'more complicated' (Diaz-Serrano and Hartog, 2006, p.353) and MPT suggests that the uncertainty of future returns (i.e. risk) on an investment should be compensated by higher expected returns assuming the investors are risk averse and rational. This is why in this study a relationship between risk and returns is examined to find out whether students act rationally as investors, i.e. whether there is a positive relationship between expected returns and risk.

3.7 Discussion and conclusions

The purpose of this chapter was to introduce the underlying theory of this research, i.e. human capital theory, the key contributors to its development, to outline main points of their work and to review recent research relevant to the study. In addition, finance theory was applied to the concept of investment in human capital in order to reflect risk associated with investment in higher education. In particular, prospect theory and modern portfolio theory were chosen as the most appropriate to integrate the concept of risk-return trade-off to investment in higher education.

Investments in human capital, like all investments, can be judged in terms of their rates of return. In addition, human capital, like physical capital, is acquired at a certain cost which can essentially be perceived as an investment in the capital. The theory of human capital suggests that it is schooling that increases human capital and thus that education and training are the most important investments in human capital (Becker, 1993). As a consequence, costs of education/training are essentially the costs of accumulation of human capital and as in any investment, a return is expected. Therefore individuals will only invest in their human capital if the costs are compensated by sufficiently higher future earnings (Blundell et al., 1999).

The evidence from labour economics suggests consistently that more educated individuals tend to have higher wages and thus that there are positive private rates of return to education (cf Nonneman and Cortens, 1997). The existence of positive rates of private returns to education justifies private investments in education and at the same time provides an incentive for individuals to invest in their human capital. Therefore, it is of interest to find out whether students surveyed in this study, i.e. those who decided to enter higher education, indeed act according to the theory of human capital and expect at least zero rate of return to their investment in higher education.

This study falls within the microeconomic area, as micro level approaches to investment in human capital have generally been concerned with evaluation of the returns which individuals and society as a whole obtain from investment in human capital, whether this investment is public or private in origin (Maani, 1991; Nonneman and Cortens, 1997; Wolter and Weber, 1999; Arrozola et al., 2003; Sakellariou, 2003). Most studies of returns to education at the macro level have demonstrated a positive association between investment and outcomes. The same is true for studies at the micro level although there are significant differences between the returns obtained from different levels and types of education with most studies showing higher levels of returns for primary education than for secondary education, which are in turn lower than those for higher education (Psacharopoulos, 1973; 1981; 1985; 1999; Barr and Crawford, 1998). The reason for this is the fact that education as an investment has, like any other investment, decreasing marginal returns, i.e. as investments increase, the expected returns decrease.

Although a link between education and productivity has been identified, the causality of such a relationship has been questioned (Arrow, 1973; Spence, 1973; Berg, 1970; Blaug, 1985; Gemmell, 1997). The theory of human capital assumes that the correlation between education and income is due to enhanced productivity through schooling (Nonneman and Cortens, 1997). However, an alternative view suggests that education (including higher education) may be no more than a screening device which allows employers to identify the more able potential employees from the rest (Arrow, 1973; Spence, 1973; Blaug, 1987; Gemmell, 1996).

The so called 'screening hypothesis' denies the economic value of education and claims that education makes no direct contribution to an individual's productivity (Layard and Psacharopoulos, 1974). It states that although additional education is related to higher income and financial benefits, education does not cause them and that education is only a signal of productivity (Brown and Sessions, 2006). Hence graduates' wages are higher because they are inherently more productive, for example because they work harder or have more innate ability, but not because they are better educated (Blundell et al., 1999). Hence education signals their pre-existing productive abilities. Since these abilities are non-observable, schooling is used as a proxy. Therefore if firms know that the more productive individuals will choose to go to university, they will select graduates in preference to non-graduates even if education has no effect on their productivity (Gemmell, 1997). Although in this study data on innate ability and prior achievement are not available[24], the relationship between expected earnings and level of education will be examined.

The significant influence of expectations on schooling decisions would suggest that there has been a vast body of economics literature on the subject of student perceptions and expectations. This, however, does not seem to be the case since, as Manski (1993) commented, 'the profession has traditionally been sceptical of subjective data; so much that we have generally been unwilling to collect data on expectations' (p.43). However, empirical studies have confirmed that students can estimate their future earnings and that, as a consequence, economists' reluctance to gather subjective data on expectations does not seem warranted.

Some studies have revealed a tendency to 'self-enhance' when compared with students' perceptions of average returns to schooling; other studies have discovered that female estimates were more accurate when compared to the actual returns suggesting men having tendency to overestimate their returns (Smith and Powell; 1990; Blau and Ferber, 1991). It has also been found that students from high-income families tend to overestimate their

[24] See section 3.8

returns and students in general tend to overestimate the effect of age (Carvajal et al.; 2000; Webbink and Hartog; 2004). Nevertheless, most studies have concluded that students are able to respond meaningfully to questions eliciting their earnings expectations, can make realistic estimates at both a group and an individual level and that there is a close association between perceived and actual rates of return to education (Williams and Gordon, 1981; Dominitz and Manski, 1996; Webbink and Hartog, 2004). In addition, it has been shown that generally students act according to the theory of human capital, that, by the end of their compulsory education pupils are aware of the relationship between educational qualifications and average earnings, as a consequence, that students are aware of the financial benefits of higher education and that information available to students regarding their future earnings are being used rationally (Dominitz and Manski, 1996; Menon, 1997; 2008; Wolter, 2000)

There is evidence of substantial heterogeneity in returns across disciplines; in case of some subjects, negative returns have been found (Finnie and Frenette, 2003; O'Leary and Sloane, 2005; Hussain et al., 2009). This study eliminated this particular source of variation by drawing the samples from one subject area[25] only. The rates of return at each level of education have also been found to vary by gender with females generally experiencing higher rates of return than males at all levels, i.e. there is a greater advantage for women to investing in a university education (Psacharopoulos 1985; 1999; Maani, 1991; Nonneman and Cortens, 1997; Blundell et al., 1999; Daoud, 2005). Blau and Ferber (1991) have found that at the time of graduation women tend to expect to earn as much as men, while later in their careers women's expected earnings profiles start to become flatter, which complies with the fact that indeed the gender pay gap tends to increase with age (Blau and Ferber, 1991). The evidence on differences between men and women in returns to education and earnings – both actual and expected – is the reason for this study's interest in the influence of gender on expected earnings and rates of return.

Becker (1964) found that education steepens age-earnings profiles, which Mincer (1974) found to be mainly a function of labour market experience. This suggests that more investment in human capital leads to a faster and further growth of earnings (Wasmer, 2001). Brunello et al. (2001) identified a significant trade off between expected earnings of university graduates at the time of labour market entry and ten years after. This suggests that students incorporate labour market experience in their expectations formation process.

[25] Business and Economics

Therefore, in this study the trade off between expected earnings at the point of graduation – from both secondary and higher education – and ten years later will be examined. As a result it will be determined whether students expect their earnings to grow faster and further, i.e. whether their investment in higher education is expected to lead to steeper earnings profiles.

There are basically two methods available to measure rates of returns to higher education, namely the elaborate method and the Mincerian earnings function (Psacharopoulos, 1973; Mincer, 1974; Lleras, 2004). From these two methods the so called 'short-cut method' was developed and is used to calculate the expected rates of return in this study (Psacharopoulos, 1981). The basic short-cut method formula is suitable for measuring rates of return to higher education in countries where the higher education is provided to students for free, such as in the case of public universities in the Czech Republic[26] (Psacharopoulos, 1981; Menon, 1997; 2008). In England however, tuition fees have been in place since 1998 and thus have to be accounted for in the calculations. Moreover, in 2006/2007 the tuition fee system changed the payment of the fees from upfront to being deferred until after graduation. Therefore further adjustments must be made so that the calculated rate of return reflects the respective conditions as accurately as possible.

Since this study perceives higher education as an investment rather than a consumption good, rates of return should be examined in relation to risk associated with the investment as is suggested by the modern portfolio theory and prospect theory (Markowitz, 1952; Kahneman, and Tversky, 1979). If students act rationally as investors a positive relationship between risk and returns should be identified since rational and risk-averse investors seek to minimise their risk by giving up returns or to increase returns by taking on risk (Markowitz, 1952). Diaz-Serrano and Hartog (2006) reported on the existence of a risk-return trade-off across educational choices in the Spanish labour market. Pereira and Martins (2002) identified a rather large compensation to be received to face the risk associated with the investment in education; for every 2 pp increase in risk there is a 1 pp increase in average rates of return. Hartog et al. (2007) simulated risk of investment in human capital and estimated ex ante risk in university education using coefficient of variation. Their best guess was the coefficient of variation of about 0.3, which they found to be comparable with that of randomly selected financial portfolio with some 30 stocks (Hartog et al., 2007). Given the scarce research on

[26] At the point of entry and when taught in the Czech language

risk of investment in higher education, this study estimates both the expected compensation for the expected risk, and ex ante risk in the form of the coefficient of variation.

In addition, this study combines the concept of human capital, utility maximisation, risk-aversion and the modern portfolio theory in order to find out whether students act rationally according to the theory of human capital, i.e. whether there are positive rates of return expected to the investment in higher education, and as investors according to finance theory, i.e. whether there is a positive relationship between expected returns and risk.

This study contributes to the body of research on investment in human capital by examining earnings expectations of business students, and attempts to fill in the gaps in the existing literature by analysing unique data from one English business school and four Czech faculties of economics, and by using the short-cut method to estimate ex ante rates of return to investment in higher education. The key issues arising from the literature are the influence of gender, age and socio-economic background on earnings expectations and their variation by country and place of study. Additionally, it is of interest to examine the effect of education and experience on expected earnings, and a relationship between risk and returns.

3.8 Research hypotheses

The focus of this section is to formulate hypotheses that will help to test the relationships developed from the theory of human capital and finance theory. Two main hypotheses will be tested; namely that students act according to human capital theory and that they act rationally as investors, i.e. that there are positive returns to higher education expected by students and that there is a positive relationship between returns and risk.

Finance theory suggests that investors consider expected risk and returns when assessing investment. They either take on more risk to gain higher returns or give up returns to reduce risk. Returns thus compensate for the expected risk, i.e. there is a positive relationship between risk and return. It is assumed that investment in human capital is perceived in the same way as investment in other assets and thus that students act rationally as investors.

The theory of human capital says that individuals will invest in their education if the costs associated with such investment will be compensated by higher earnings in the future (Becker, 1993). Brunello et al. (2001) identified a significant trade-off between expected earnings of university graduates at the time of labour market entry and ten years afterwards.

This suggests that both level of education and level of experience are related to earnings. In addition, returns and risk have been found to vary by subjects/disciplines studied, by level of education and by country (cf. Psacharopoulos, 1999; Pereira and Martins, 2002; O'Leary and Sloane, 2005). This study eliminates one source of variation, namely subject studied, since it is students of business and economics that are surveyed.

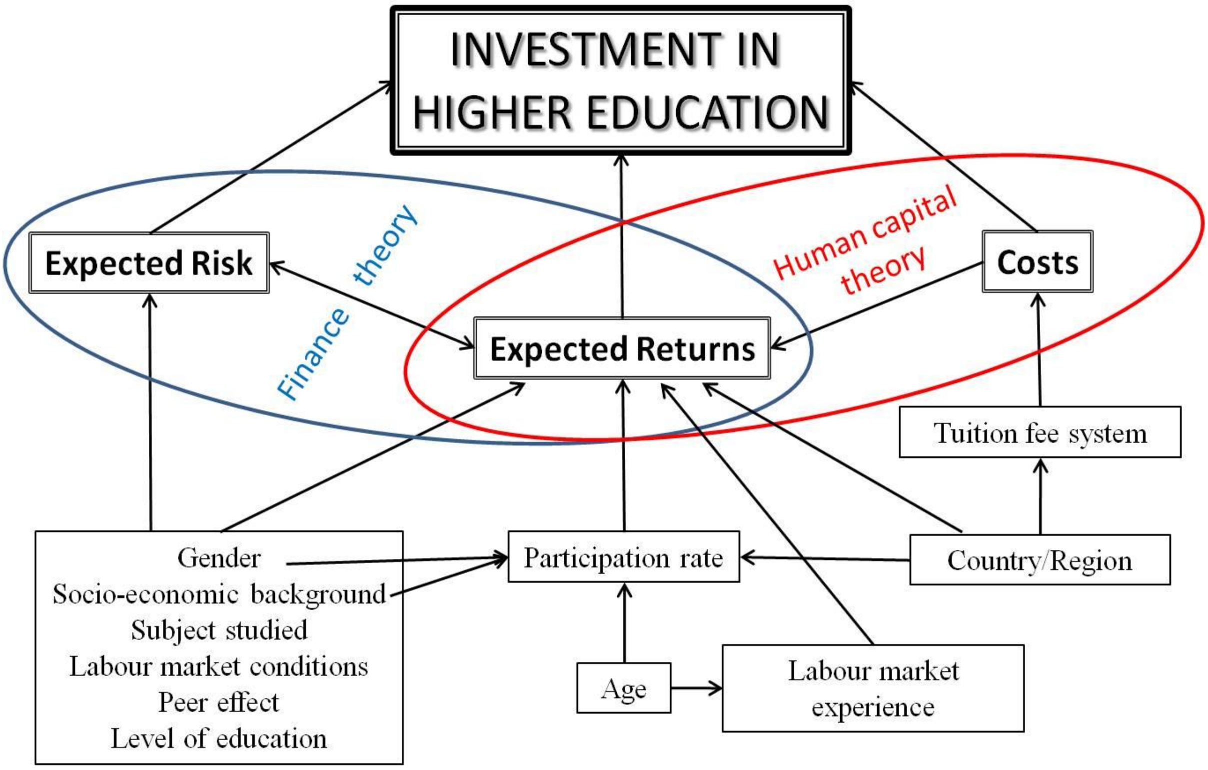
Students have been found to respond meaningfully to questions regarding their income expectations and to be realistic in their estimates (cf. Webbink and Hartog, 2004). This suggests that students are aware of not only the financial benefits of higher education but also of labour market conditions. It is therefore likely that country, place of study and location of a future job will be related to earnings expectations. Personal characteristics such as gender and age and a family socio-economic background have been found to have an influence on earnings, both actual and expected (cf. Maani, 1991; Blundell et al., 1999; Oosteerbeek and van Ophem, 2000; Brunello et al., 2001).

When examining the influence of socio-economic background on earnings one should control for innate ability and prior achievement (cf Blundell et al., 1999). In this research the official data on these variables were not available given the anonymity of the respondents. It was decided that students would not be asked about their innate ability (e.g. estimated by IQ) or prior achievement (e.g. UCAS points, maturita results) as there was a potential threat that students could overstate their results to be perceived in a better light (Saunders et al., 2003); this would bias the results of the analysis. Given the omitted variable on ability and prior achievement, the influence of the socio-economic background on earnings should be interpreted with caution. Nevertheless, in this study socio-economic background is represented by parental income and education, and 'parental education does also convey some information on ability' since 'students with more educated parents have on average higher cognitive ability' (Brunello et al., 2004, p.1120).

Participation rates have been found to vary between countries (cf. OECD, 2010). Moreover, it has been shown that increased participation in higher education influences negatively the returns to higher education (cf. Edin and Holmlund, 1993). The law of supply and demand applied to the labour market says that if demand stagnates, an increase in the supply of graduates with a particular level of schooling will reduce their wages, i.e. the returns to that particular level of schooling. However, the continuous technological development requires more and more educated and skilled labour, and thus offsets the excess supply and keeps the rate of return to higher education stable.

From the literature and previous research on investment in human capital a model (Figure 3.7) was developed to outline aspects that are likely to be taken into account by students when assessing investment in human capital and the factors that influence these aspects.

Figure 3.7 Model of investment in higher education



A number of hypotheses (Groups A, B and C) to be tested in Chapter 5 were developed from the existing literature and the investment in higher education assessment model to answer several research questions[27]. Previous research has identified that there is a relationship between qualifications and earnings (cf. Nonneman and Cortens, 1997). Such a relationship however has never been investigated in Huddersfield or in the Czech Republic. Therefore ‘Do business students in Huddersfield, Prague, Liberec and Pardubice expect a relationship to exist between qualifications and experience and expected earnings/returns?’(Group A). There is evidence of country and place of study effect on returns to education – both expected and actual (cf. Psacharopoulos 1981; 1985; 1994; Brunello et al., 2001; Botelho and Pinto, 2004). It is therefore of interest to find out whether there are differences in expectations of students

[27] It should be noted that the research questions and hypotheses are limited to the sample of this study.

at the institutions surveyed in this study. Hence,‘Do students expect different returns in different places?’ (Group B). Several personal characteristics, such as socio-economic background, age and gender, have been identified in previous research to have effect on earnings – both actual and expected (cf. Maani, 1991; Blundell et al., 1999; Oosteerbeek and van Ophem, 2000; Brunello et al., 2001; Daoud, 2005). Is this the case when it comes to the students at the institutions surveyed in this study? So that this can be determined one ought to find out ‘What personal characteristics influence expectations and how?’ (Group C).

Group A

H1A: Students expect their earnings to increase with level of education

H2A: Students expect their earnings to increase with level of experience

H3A: Students expect their university degree to be related to a faster and further growth of earnings

H4A: Students act according to the theory of human capital, i.e. students expect positive returns to higher education

H5A: Students expect to benefit from a university degree more in the medium term than immediately after graduation

H6A: Students act rationally as investors according to the finance theory, i.e. there is a positive relationship between expected risk and expected returns

Group B

H1B: Students’ earnings expectations differ by place of study

H2B: Expected rates of return differ by place of study

H3B: Students’ earnings expectations immediately after graduation are influenced by the graduate job location

H4B: Expected rates of return at the point of graduation are influenced by the graduate job location

Group C

H1C: There are gender differences in earnings expectations

H2C: There are gender differences in expected rates of return

H3C: Older respondents expect lower rates of return to higher education

H4C: Socio-economic background influences expectations of earnings and the rates of return

The investment in human capital assessment model attempted to combine the main aspects of finance theory and the theory of human capital relevant to investment in education, and to summarise the factors that were identified in the literature as influential of these aspects in terms of investment in human capital. The hypotheses developed from the model and the literature will be tested using unique survey data from four Business Schools in two countries. Methodology and the survey design will be described in the following Chapter 4. The methods of data analysis and the statistics used to test the hypotheses are outlined in that chapter (specifically Figure 4.6).

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

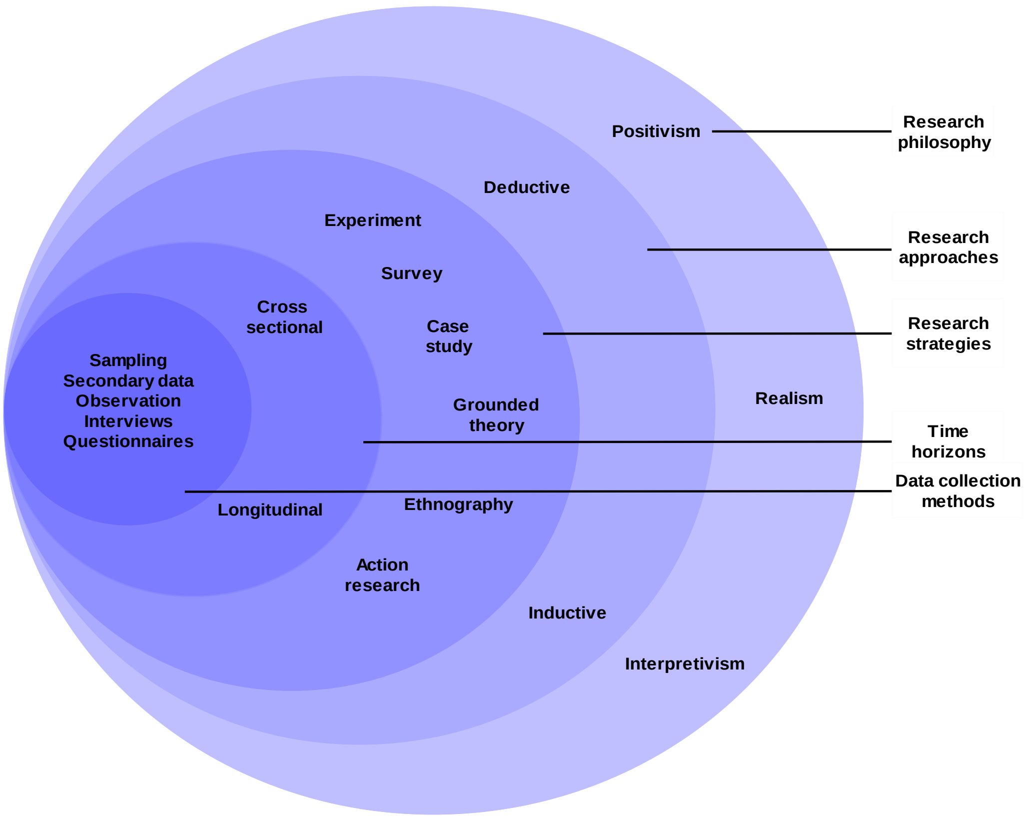
The main purpose of this study is to estimate expected private rates of return to higher education of first year business/economics students. It will be desirable therefore to examine factors influencing expectations of students and to investigate how these perceptions and expectations differ in relation to the personal characteristics of students and other external factors. Since it is the students' *expectations,* rather than their *actual* earnings, that are the focus of this study, individual data, both quantitative and qualitative, needed to be collected directly from students as there are no such data available from secondary sources, at least in the case of the Czech Republic.

This chapter discusses the research process, describes it in general and applies it to this research project. The focus of this chapter is on research philosophy and approach, distinction between purposes of the research and combination of different types of study, choice of the research strategy and appropriate methods of data collection and selection of appropriate sampling strategy and methods of data analysis. The structures of the samples from which the primary quantitative and qualitative data were obtained are presented in Table 4.1 and 4.2, respectively. The methods used for the data analysis in this research are summarised in Figure 4.6 according to the hypotheses groups, which were developed in chapter 3. The chapter also discusses justification for and limitations of the methodology adopted and the reliability and validity of the research, data and the data collection instruments.

4.2 Research process

The research design described in this chapter refers to the research questions, objectives and hypotheses defined and developed in Chapter 3. The sequence of the research design process is outlined in the Figure 4.1. Firstly, the question of which research philosophy should be adopted is raised. It is followed by the consideration of the research approach, the research strategy and the time horizons that were applied to the research. Finally, data collection and sampling methods are discussed.

Figure 4.1 Research process



Source: Saunders et al. (2003, p.83)

4.2.1 Research philosophy

Choosing the right philosophical attitude is the first step towards designing research (Bryman, 2008). The literature is dominated by three different, if not mutually exclusive, views on research process namely interpretivism, positivism and realism (Saunders et al., 2003; Proctor, 2005; Malhotra and Birks, 2007).

4.2.1.1 Positivism

Under positivism researchers seek law-like generalisations and are particularly concerned about highly structured methodology to ensure the possibility to replicate the research (Saunders et al., 2003). The assumption is that ‘the researcher is independent of and neither affects nor is affected by the subject of the research’ (Remenyi et al., 1998, p.33). Positivism is a theory of knowledge which only accepts statements that are based on empirical data (Juma’h, 2006). Therefore quantifiable observations that lead to statistical analysis are emphasised particularly within a positivistic philosophy (Gill and Johnson, 1997). According to positivist methodology assumptions do not need to be empirically true in order to have a valid scientific content Friedman (1953). All that a positivist economist might require from an assumption is to somehow yield an empirically useful prediction of future events (Gertchev, 2007). This research follows a hypothesis testing approach using assumptions and is concerned with expectations which are routinely embraced by positivist methodology (Gertchev, 2007). This work is therefore positivist in nature despite the boundaries to generalisation set by the limited sample.

Realism shares two features with positivism: a belief that the natural and the social sciences can and should apply the same kinds of approach to the collection of data and to explanation; and a commitment to the view that there is an external reality to which scientists direct their attention (Bryman, 2008). Contrary to positivism, realism is a research philosophy that recognises that people themselves are not objects to be studied in the style of natural science (Saunders et al., 2003).

Interpretivism is a research philosophy that is an alternative to positivist orthodoxy and requires the researcher to seek to understand the subjective reality and meaning of participants (Saunders et al., 2003). Contrary to positivists, interpretivists share a view that the subject matter of the social sciences – people and institutions – is fundamentally different from that of the natural sciences (Easterby-Smith et al., 1991; Juma'h, 2006). Thus it requires a strategy (i.e. different logic of research procedure) that respects the differences between people and objects of the natural science and therefore requires the social scientist to grasp the subjective meaning of social action (Bryman, 2008).

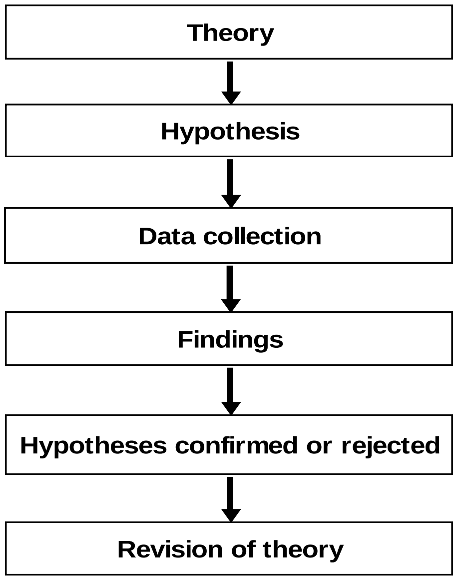
4.2.2 Research approach

The main question raised in this section is whether hypotheses are developed from an existing theory, and then a research strategy is designed to test these hypotheses to revise the existing theory (*deductive approach*), or whether data are collected and as a result of their analysis a theory is developed (*inductive approach*) (Saunders et al., 2003).

4.2.2.1 Deduction

The theory of human capital being a relatively new one, and the generally accepted need of testing theories before considering them valid and useful (Saunders et al., 2003), are the two notions underlying the logic behind the research approach adopted in this study. It is the deductive approach that is chosen to be appropriate as hypotheses developed from existing literature and theories are being tested in this research project. The primary data were collected and based on their analysis, the hypotheses, which were developed from the literature in Chapter 3, were accepted or rejected. This approach is linear in a sense that there are steps that follow one another (Bryman, 2008). The process of deduction is outlined in Figure 4.2.

Figure 4.2 Deduction process



Source: Bryman (2008, p.10)

The main difference between deduction and induction is then the sequence of the steps outlined in Figure 4.2 (Bryman, 2008). Deduction uses observations and findings to tests hypotheses developed from *existing* theories whereas induction uses findings and observations to develop *new* theories (Saunders et al., 2003). Thus, the inductive approach is usually adopted when a theory is the outcome of research, which is not the case in this study (Robson, 2002).

4.2.3 Type of study

Based on the purpose of a piece of research a threefold classification is widely used. One research project can have more than one purpose, which in addition may change over time (Robson, 2002). The three main types of study – exploratory, descriptive and explanatory – are described briefly and their application to this research project is explained in this section.

Exploratory studies tend to focus on seeking new insights and assessing new phenomena in a new light and on answering questions that clarify what is happening (Robson, 2002). A research problem may be explored by searching of the literature, talking to experts and/or conducting focus group interviews. Thus it is the initial stage at which a researcher decides whether or not it is worth pursuing the research. If the decision is positive, the initially broad focus becomes narrower as the researcher progresses (Saunders et al., 2003). Descriptive studies may precede or follow exploratory research. More often it is necessary to have a clear picture of the subject of the research prior to data collection. Descriptive studies are often not seen as an end; rather they are the means to get there (Saunders et al., 2003). Explanation of a situation or a problem may be the end which researchers want to reach. Thus very often explanatory studies aim to establish causal relationship between variables and explain the relationship between aspects of the phenomenon that is the subject of the research (Robson, 2002; Saunders et al., 2003).

This study is a combination of all three above described types. It *describes* in detail the contextual environment of the research in terms of educational systems and their current conditions and likely future developments. It goes on to *explore* the issue of investment in human capital. Although this study cannot fully *explain* why expectations vary by establishing a causal relationship between variables, it will examine the associations between expectations and personal characteristics of the respondents among the surveyed institutions.

4.2.4 Research strategy

A research strategy represents different ways of collecting and analysing data (Robson, 2002). The ways must be related to the purpose of the research as well as being appropriate to addressing research questions (Denscombe, 1998). Research strategies can be linked to either inductive or deductive approaches but should not be viewed as mutually exclusive (Saunders et al., 2003). Three main strategies which are used most commonly – experiment, survey and case study – will be introduced in this section.

Experiment is the classical form of research traditionally employed in natural sciences and is considered to have a very strong validity due to its robustness and the trustworthiness of its causal findings (Bryman, 2008). Case study is a strategy for conducting research ‘which involves an empirical investigation of a particular phenomenon within its real life context using multiple sources of evidence’ (Robson, 2002, p.178).

4.2.4.1 Survey

Perhaps the most widely used research strategy in the social sciences is survey (De Vaus, 2002; Saunders et al., 2003). Surveys allow the collection of a large amount of data from a sizeable population in a highly economical way. A survey is easily understood, provides a general and representative picture and thus is respected as a reliable and a solid research strategy by people in general (Bryman, 2008). A survey is not tied to any particular research philosophy and allows using different methods of data collection such as questionnaire, structured interview or structured observation and can be applied to both quantitative and qualitative research (Shaugnessy and Zechmeister, 1990; Saunders et al., 2003). In addition, data obtained by surveys are standardised and thus easy to compare (Shaugnessy and Zechmeister, 1990).

In surveys there is no attempt to manipulate variables or control conditions surrounding the researched phenomenon. Survey is the main approach to investigating changes over a period of time when the same things are measured at different points in time (Robson, 2002). Although survey research tends to comprise a cross-sectional design, it also allows to the description and examination of changes or development over time (Easterby –Smith et al., 1991; Bryman, 2008).

4.2.5 Time horizon

Cross-sectional studies focus on a particular phenomenon at a particular point in time (Saunders et al., 2003; Bryman and Bell, 2007). They are the most widely used research design, in which all measures are taken at the same time, or a short period of time (Robson, 2002). A cross-sectional design requires the collection of quantitative or quantifiable data on more than one case in connection with more than one variable, which are then examined to detect patterns of association (Bryman and Bell, 2007; Bryman, 2008). More than one case is required to ensure variation. The more cases are selected the more variation in variables is to be expected. To establish the variation between cases it is necessary to obtain quantitative or quantifiable data (De Vaus, 2002). In cross-sectional studies, only a relationship between variables can be examined. It is very difficult to establish causality of a relationship between variables; all that can be said is that the variables are related. The main reason for this is the impossibility of observing data through time as the data is collected more or less simultaneously (Bryman, 2008).

In longitudinal studies the same sample is surveyed at least twice over a period of time (De Vaus, 2002). They are concerned with improving the causal influences over time. Surveys conducted on a regular basis over a long period of time but on a different sample of people are not truly longitudinal studies. Rather they are repeated cross-sectional studies (time series surveys) and a *trend* design is used (Bryman, 2008). In time series surveys data are then collected at different points in time from different samples drawn from the same population under study. Time series surveys, as they do not follow the same individual over time, allow a shift from detecting individual change, i.e. gross change among individuals in a panel survey to one of aggregate change – the net effect of all changes (net change) of the population (Menard, 1991; Fife-Schaw, 1995; Bryman and Bell, 2007). Repeated cross-sectional studies are able to track changes but cannot address the issue of causality because the samples are different on each of the several occasions (Saunders et al., 2003).

Trend design was chosen as the most appropriate to investigate the development of and potential changes in expectations of students. It is not the purpose of this research to follow changes in expectations of *individuals* over time. Rather it is to detect any changes in expectations of *each cohort* of first year students over time.

4.2.6 Methods of data collection

Methods of data collection can substantially influence research results and thus it is very important to choose appropriate data collection instruments in order to achieve the aims and objectives of the research (Bryman and Bell, 2007). The main data collection methods used in survey research are interviewing, administering questionnaires and observation (Easterby-Smith et al., 1991; Robson, 2002; Saunders et al., 2003; Jankowicz, 2003). The choice of data collection method depends on the facilities available to the researcher, the extent of accuracy required, the time frame of the study, the costs associated with and resources available for the data collection (Sekaran, 1992). All methods have their advantages and disadvantages and so the choice of a method depends largely on the conceptual framework, research questions, research strategy and sampling criteria adopted in the research, along with the time and resources available (Shaughnessy and Zechmeister, 1990; Robson, 2002). To overcome the limitations of the data collection methods their combination is often appropriate. This is known as a multi-method approach or triangulation (Jankowicz, 2003; Bryman and Bell, 2007).

There has been a great deal of support for a multi-method research approach that combines the use of quantitative and qualitative research methods within the same study (Sekaran, 1992; Robson, 2002; Bryman and Bell, 2007). Such combination of research methods increases confidence in data validity since their weaknesses do not overlap and their strengths complement each other (Brewer and Hunter, 1989). A multi-method approach to research however is costly and time consuming and therefore sometimes not practicable (Brewer and Hunter, 1989; Sekaran, 1992; Robson, 2002).

This research project applies the multi-method approach, i.e. a combination of quantitative and qualitative methods of data collection which are used as complements rather than alternatives. Quantitative methods are used to study expected earnings and returns to higher education whereas qualitative methods are used to explore factors related to these expectations and the process of expectations formation. Questionnaire (quantitative method) and semi-structured interview (qualitative method) were used in this research project to achieve the aims and objectives and to answer the research questions.

4.2.6.1 Questionnaire

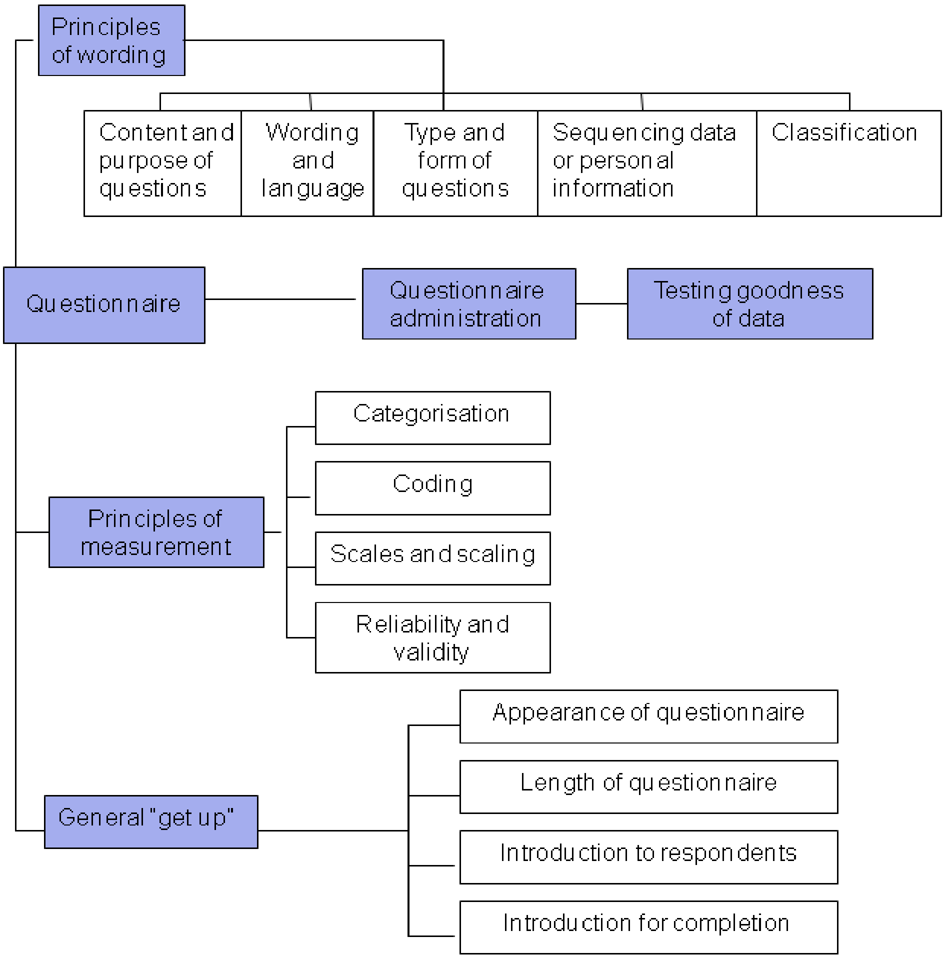
Questionnaire is probably one of the most widely used instruments of data collection in a survey research strategy. It is its simplicity, versatility, and data capture effectiveness that makes it such a popular tool (Moser and Kalton, 1971; Breakwell et al., 1995; Bryman, 2008). Using questionnaire and analysing coded responses is simple and thus adds to the popularity of the instrument (Sekaran, 1992). However, designing a questionnaire is not as simple as it may seem (Easterby-Smith et al., 1991). One of the difficulties of the questionnaire design lies in the fact that variables need to be defined, and the ways in which they will be measured need to be specified, before the questionnaire is designed (Oppenheim, 1992).

The principles of questionnaire design relate to how questions are worded, what they measure and how the entire questionnaire is organised. Although experience is very important when it comes to designing a good questionnaire there are some general rules that ought to be followed in order to minimise research bias (Shaughnessy and Zechmeister, 1990). The principles refer to the following areas:

- Purpose of the questionnaire
- Questionnaire administration
- Wording of questions
- Principles of measurement, i.e. how will variables be categorised, scaled and coded after the responses are received
- General appearance of the questionnaire
- Pilot testing (Sekaran, 1992; Saunders et al., 2003).

The principles of questionnaire design are summarised graphically in Figure 4.3 and their application to this study is outlined in the following parts of this subsection.

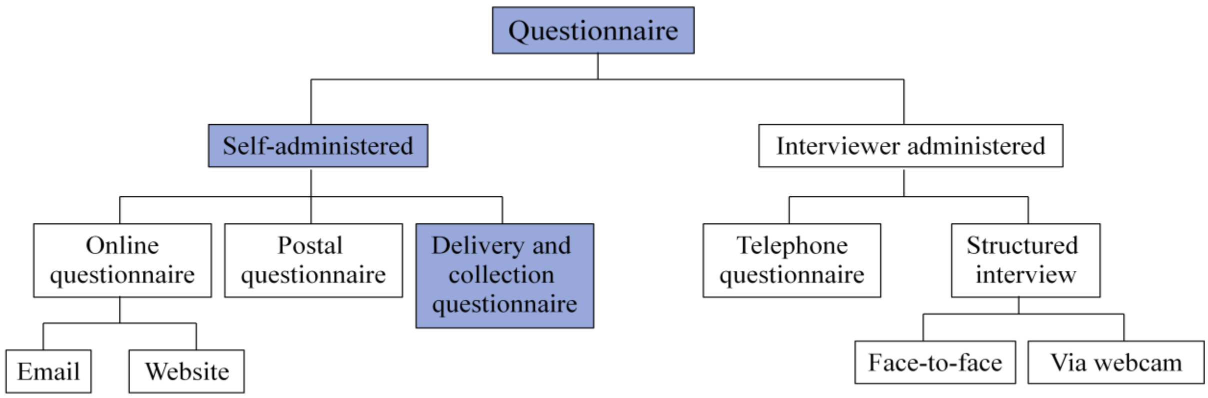
Figure 4.3 Principles of questionnaire design



Source: Sekaran (1992, p.202)

The design of the questionnaire differs according to how it is administered. A questionnaire can be self-administered or interviewer-administered using different means of distribution (Figure 4.4). For this research project a self-administered questionnaire was used, and responses were collected immediately after completion of the questionnaires. The questionnaire was not piloted by the researcher herself. The questionnaire had been in use for three years; such time period was considered to be sufficient for any required changes to have been implemented. Despite that, some changes were later suggested by the researcher and were implemented to improve the response rate to certain questions (see sections 5.3 and 5.4).

Figure 4.4 Types of questionnaire



Adapted from Saunders et al. (2003, p.282)

The population that this research project is concerned with is first year university students. This is why prior to data collection a large lecture with a high attendance rate was identified in cooperation with lecturers at each surveyed institution where the questionnaire was then distributed by the researcher herself or on her behalf by colleagues working at the surveyed institutions. The questionnaire was then administered to all students who attended the lecture and collected immediately after they had finished answering the questions.

The questionnaire began with demographic/personal characteristics questions relating to gender and age. These were chosen as explanatory variables as they have been found to influence earnings – both expected and actual (cf. Psacharopoulos 1985; 1999; Maani, 1991; Nonneman and Cortens, 1997; Blundell et al., 1999; Nerdrum and Erikson, 2001; Daoud, 2005). Similarly to Brunello et al. (2001), the second part of the questionnaire asked students 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. Students 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 to assess the probability of students' expectations. The expected earnings in the above outlined scenarios have been used as dependent variables, from which then the rates of return (another set of dependent variables) were calculated using the short-cut method (section 3.5.1.1.3).

The third part of the questionnaire was concerned with information regarding socio-economic background in the form of the respondents' parental education and income. These indicators of the socio-economic background independent variable have been identified in previous research as influential on earnings – both expected and actual (cf. Blundell et al., 1999; Oosteerbeek and van Ophem, 2000; Brunello et al., 2001; Webbink and Hartog, 2004). In addition, perception of their parental income was investigated by asking to what extent they agreed with the statement that their parents' income seemed high to them. The last part of the questionnaire aims to investigate respondents' future plans regarding the likely destination of their first job after graduation from the university, which are also hypothesised to be explanatory variables of earnings' expectations.

4.2.6.1.1 Types and forms of questions and data

Generally there are two types of questions – open-ended and closed questions. There were no open-ended questions in the questionnaire. Closed questions were used in the questionnaire because their answers were coded and thus easier to analyse and compare. The most common types of closed questions are single answer, multiple answer and Likert scale. Their brief description is as follows:

Single answer – the respondent is asked to choose one from a number of offered options

Multiple answer – there are several options and the respondent can choose none or more than one

Likert scale – is a kind of ranking where respondents indicate to what extent they agree with a particular statement (Sirkin, 2006)

Except for the semantic differential all the above mentioned types of closed questions were used in the questionnaire. The single answer type was used in questions 1 and 9-12, multiple answer in question 15 and Likert scale in questions 13 and 14. The rest of the questions asked the respondent to state a precise figure, such as their age and expected income.

Different types of data were collected using the questionnaire. Generally there are nominal, ordinal, cardinal, interval, ratio data. Except for ratio data all other types were obtained.

- Nominal Data – verbal variables; can be measured and compared with each other
    - Resulted from questions 1 and 15
- Ordinal Data – both verbal and numerical variables (their difference but not their ratio can be measured)
    - Resulted from questions 9, 10, 13 and 14
- Interval Data – variables where distances between categories are identical
    - Resulted from questions 11 and 12
- Cardinal Data – numeric data; their value can only be positive or equal to zero
    - Resulted from questions 2, 3-8

It is very important to distinguish between the types of data obtained from the data collection given that different types of data are subject to different types of analysis (see Figure 4.6).

4.2.6.2 Interview

Interview is probably the most widely employed method of data collection in qualitative research. Although interviewing, transcription of the interviews and analysing the transcripts is all very time consuming it is the flexibility of the interview that makes it so attractive and popular among researchers (Saunders et al., 2003). There are several types of interview and except for structured (or standardised) interview, which is very often associated with a survey research strategy and quantitative research in general, all other types are qualitative in nature.

Interviews are rarely used in quantitative research, and survey research in particular, because the absence of standardisation in the asking of questions and recording of answers makes respondents' replies difficult to aggregate and process (Bryman, 2008). In this research project the purpose of the use of the qualitative data is exploratory, i.e. they are used for clarifying and explaining issues that arise from the quantitative analysis, for exploring the issues in more detail and for shedding more light on the matters as to how students build their expectations.

In principle, there are three types of qualitative interviews; namely semi-structured, unstructured and focus group interviews (Saunders et al., 2003). Writers and researchers however differ in terms of terminology. Very frequently the term qualitative interview includes both semi-structured and unstructured interviews. Unstructured interview is sometimes referred to as in-depth or intensive interview (Jankowicz, 2003; Saunders et al., 2003). Focus group interview is a term used when a group of people discusses a specific issue that is relevant to them (Robson, 2002; Bryman, 2008).

Qualitative interview is more flexible than structured interview since there is no emphasis on standardisation of the way in which each interviewee is dealt with (Sirkin, 2006). In quantitative interviewing a pre-set question wording and order must be followed so the standardisation of the interview and consequently the reliability and validity of the measurement is not compromised (Jankowicz, 2003). In qualitative interview on the other hand interviewers can depart significantly from any guide that is being used in terms of questions asked, wording of the questions and their order (Saunders et al., 2003).

In qualitative interviewing detailed answers are desired by the researcher in contrast to quantitative interviews where the main aim is to generate answers that can be coded and processed quickly.

4.2.6.2.1 Semi-structured and in-depth interview

During an in-depth or unstructured interview only a brief set of hints, topics or issues or aide-memoires is used by the researcher. In its character, it is very similar to a conversation where a question is asked and the interviewee is allowed to answer freely with a researcher responding only to the points that seem worth being discussed in more depth (Jankowicz, 2003). The style of questioning is usually informal and the phrasing and sequencing of the questions will vary from interview to interview.

As its name suggests, a semi-structured interview has more structure than an unstructured interview. A researcher uses an interview guide which covers specific topics or a list of questions to be discussed but the answers are not standardised and the interviewee is allowed to respond freely. The sequencing of the questions does not have to be the same as outlined in the guide or as asked in the previous interview (Saunders et al., 2003). The researcher can pick up on things that an interviewee says and change a direction, skip a point and then come back to it later etc. Nevertheless all questions are asked and mostly a similar wording is used from interviewee to interviewee (Robson, 2002).

Both interview processes (semi-structured and in-depth) are flexible and in neither of them does a researcher follow strictly a specifically designed schedule/set of precise questions with pre-coded answers/fixed choice (Saunders et al., 2003; Sirkin, 2006). It depends on the interviewee 'what he/she views as important in explaining and understanding events, patterns and forms of behaviour' (Bryman, 2008, p.438). However, each of the two types of interview serves a different purpose. Unstructured interview is often used to explore a general idea in depth, to help formulate research questions and objectives and can be useful when it comes to developing fixed choice/closed question alternatives to an unstructured or semi-structured interview for instance in a form of a structured interview. Semi-structured interview is very useful when an explanation of certain issues is sought or if understanding of a relationship between variables is to be clarified (Jankowicz, 2003). Thus unstructured interview is more frequently used in exploratory research and semi-structured interview is more often employed in explanatory research (Saunders et al., 2003).

4.2.6.2.2 Focus group interview

Another way to differentiate between types of qualitative interview is related to the form of interaction between the researcher and the interviewee(s). Interviews may be conducted on a one-to-one or one-to-many basis. Conducting an interview one-to-many is referred to as a focus group interview process (cf. Bryman and Bell, 2007; Sekaran and Bougie, 2009). In group interviews there is a small number of people who participate in a discussion that is facilitated/moderated by the researcher. This type of interview tends to be relatively unstructured and fairly free-flowing, although there has to be a clear theme to be explored (Zikmund, 2000; Saunders et al., 2003).

Group interaction may lead to a highly productive discussion as interviewees respond to the researcher's questions and evaluate points as a group and is likely to lead to a rich flow of data (Saunders et al., 2003). This method provides a great opportunity to benefit from the participants discussing points among themselves and challenging each other's points of view. However, there is a risk that certain participants will tend to dominate the discussion (Bryman and Bell, 2007). It is up to the researcher to try to encourage all members of the group to participate in order to maintain the exploratory purpose of the interview. Thus a high level of skill is required so the researcher can conduct this type of discussion successfully.

Depending on the purpose of the group interviews they can be more or less structured with different levels of intervention from the facilitating researcher. If the purpose of the discussion is more specific, more focused and linked to exploration of a known theme or topic the group interviews are usually labelled *focus group* interviews (Sekaran and Bougie, 2009). These are characterised by a higher level of interviewer-led structure and intervention. On the other hand, if the purpose of the interview is not so specific the interview is then associated with a lower level of structure and less intervention by the facilitator (Saunders et al., 2003).

Focus group interview emphasises questioning on a particular fairly tightly defined topic and stresses interaction within the group and the joint construction of meaning and thus is more focused than a group interview (Bryman, 2008). Typically focus groups consist of four to eight people, sometimes up to ten, depending on the complexity of the issue that is to be explored (Saunders et al, 2003). If the discussion is on a more emotionally oriented topic then the groups will tend to be smaller. If on the other hand the focus of the discussion is more practically oriented then the groups may be larger.

4.2.7 Justification for the methodology chosen

A purely longitudinal study would not be an appropriate approach as it is not the purpose of the study to monitor changes in the perceptions of the same individuals over time. Rather every year it is the 'new' first year students' expectations at several universities that are of interest and thus the cross-sectional survey is the right research strategy. It was the aim of this research to follow the development of the new cohorts' expectations and to detect potential changes over time, hence the repeated cross-sectional survey.

Questionnaire is a very cost-effective research tool that allows collection of a large amount of data relatively quickly while covering a wide geographical area (Bryman and Bell, 2007). It also ensures anonymity of all respondents and confidentiality of their responses; this is particularly important since sensitive questions, such as those related to parental education and income, were asked (Saunders et al., 2003). In addition, questionnaire is particularly useful when data needs to be collected in different places at the same time (Sekaran and Bougie, 2009). This was achieved successfully and all data have been collected during the first term of every academic year, during the time period of 2004/2005 – 2009/2010, in an attempt to eliminate any potential influence of the different timing of data collection on the findings.

To collect qualitative data a one-to-one semi-structured interview was chosen as the most appropriate method for this research project. Initially focus groups were considered; however given the complexity of the issue, the time constraints regarding availability of all participants at the same time, the sensitivity of some questions asked during the interview and the need to gain answers from each and every individual separately led the researcher to choose one-to-one interviews rather than focus group interviews.

The purpose of the interview was to shed more light on the expectations formation of the respondents. Students were asked what their reasons were for choosing to study at a university, what was their expected outcome in terms of their future job and on what basis they formed their expectations. Students were also asked about their knowledge of average earnings in their region of origin, in the region of their university and in the capital.

A semi-structured interview offers the possibility of asking open-ended questions while allowing for flexibilities in terms of the order of the questions. Structured interviews would require the respondents to answer questions in a precise order and to fit their answers to pre-coded fixed choices (Sirkin, 2006). This was not desirable since exploring certain issues in more depth was the aim of the interviewing process and the order in which the points were discussed did not matter. In-depth interviews would not require any structure at all; the preliminary quantitative analysis however revealed several points that were desired to be explored in more depth and thus a structure was developed and followed during the semi-structured interviews.

4.2.8 Sampling strategy

Sampling strategy is an important aspect of a research design as it is closely related to the external validity of collected data (Robson, 2002; Saunders et al., 2003). How well the results can be generalised depends on how well the sample mirrors the population, i.e. whether the sample is representative (Bryman and Bell, 2007). The choice of a sampling strategy depends on the nature of the population studied, the complexity of the research design, the type of measurement used in the research and the resources available (Fife-Schaw, 1995). The accuracy of the findings is closely related to a sample size; the larger the sample the lower the likely error in generalising to the population as a whole. However, the sample size tends to be a matter of judgement and a compromise between accuracy, the type of analysis and the amount of time and money invested in collecting and analysing data (Saunders et al., 2003). The sample size also depends on the variability in the population; the more variability there is in a population the larger should be the sample size (Robson, 2002).

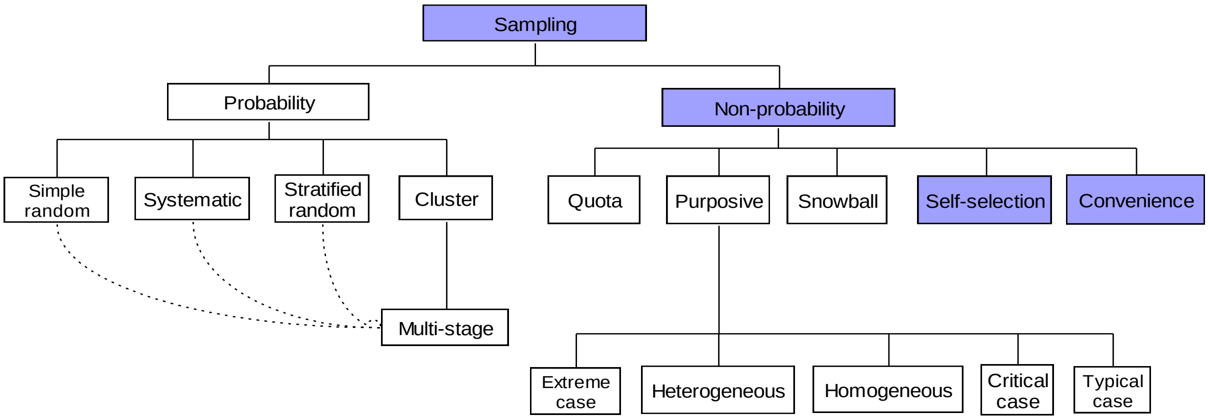
Either probability or non-probability sampling can be used in a research. Probability sampling is often associated with a survey-based research because this type of sampling allows estimating statistically the characteristics of the population from the sample (Saunders et al., 2003). The probability of a case to be selected is known and usually equal for all cases. In non-probability sampling on the other hand the probability is not known. Consequently although generalisation from non-probability sampling is possible, it is not possible to do so on statistical grounds (Bryman, 2008). There are several types of non-probability sampling that are outlined in Figure 4.5.

The population studied in this research project is first year business school students in England and in the Czech Republic. Four institutions – three Czech and one English university – are the subject of the study; namely three Czech faculties of economics[28] - at the Technical University of Liberec, the University of Economics in Prague and the University of Pardubice - and the University of Huddersfield Business School.

[28] In the Czech Republic, Faculties of Economics correspond to UK Business Schools.

It was not possible to obtain a sampling frame, i.e. a complete list of those who were eligible and thus probability sampling method could not be used in this study. Consequently non-probability sampling was chosen as an alternative method (Robson, 2002).

Figure 4.5 Sampling methods



Source: Saunders et al. (2003, p.153)

Convenience sampling was employed to select students that were going to participate in the survey and to whom the questionnaire was going to be distributed. A convenience sample is one that is available to the researcher by virtue of its accessibility. This type of sampling is usually used in pilot research. Although the data will not allow definitive findings to be generated, because of the problem with generalisation, it could provide a basis for further research or allow links to be forged with existing findings in the research area. Despite the criticism, convenience sampling plays a more prominent role than probability sampling in organisational studies and social research (Bryman, 2008).

In this research project the questionnaire was distributed to, and completed by, all first year business students[29] who attended a major lecture and collected by the researcher or a member of teaching staff. This way of distributing the questionnaire ensured a very high response rate among those students to whom the questionnaire was administered. A possible issue might be the fact that potential absentees were unable to answer the questionnaire. Nevertheless, it is reasonable to assume that those who were absent from the lecture did not significantly alter the findings of this particular research since the students had not known before the lecture

[29] Students completed the questionnaire in Czech (see Appendix 4.1) (Prague, Pardubice and Liberec) or English (see Appendix 4.2) (Huddersfield).

that the data collection was going to take place and thus the non-responses were random and therefore unlikely to influence the findings of the study.

Identifying the degree programmes and the lectures from which the samples were obtained was purposive rather than random hence the convenience sampling. These procedures however represent a very good attempt to generate a varied sample (Lukas, 1997; Bryman, 2008). In the Czech Republic, to reduce the selection bias and to increase the representativeness of the sample, students from several universities were chosen. The universities were chosen using a purposive (or judgemental) sampling which enables a researcher to use their judgement to select cases that will be particularly informative and information-rich (Neuman, 2000; Patton, 2002). This sampling is often used when working with very small samples (Saunders et al., 2003). In purposive sampling, cases are judged as typical of some category of cases of interest to the researcher (De Vaus, 2002).

In the Czech Republic one capital city university and two regional universities located in different regions were selected since one of the objectives of the study is to determine whether or not there are any differences in students' expectations that could be explained by their place of study. In other words, do students studying at different universities in different regions have different expectations? This question however cannot be answered in the case of the English students since there is only one institution representing the sample.

The structure of the sample of respondents who filled out the questionnaire is presented in Table 4.1. The table shows which universities were selected, the years during which the data collection took place and the gender make up of the sample (expressed as both proportions and absolute numbers) as well as the total number of respondents (*Grand total*). The respondents were first year students at the business schools and economic faculties of the University of Huddersfield (*Huddersfield*), the University of Economics in Prague (*Prague*), the Technical University of Liberec (*Liberec*) and the University of Pardubice (*Pardubice*).

The existing literature suggests that there are gender differences in both actual and expected earnings (cf. Maani, 1991; Psacharopoulos, 1994; Blundell et al, 1999). Thus the results are likely to reflect the gender make up of a sample. Given the uneven gender distribution of the sample across the surveyed universities all the data are analysed separately by gender in an attempt to separate out any gender influence on the findings. The reasons for the varied sample sizes are explained in the limitations of the methodology (section 4.2.12).

Table 4.1 Sample structure - questionnaire

Gender	Huddersfield	%	Prague	%	Liberec	%	Pardubice	%
Male	551	59%	545	38%	263	28%	196	23%
Female	384	41%	882	62%	689	72%	653	77%
Total	**935**	100%	**1427**	100%	**952**	100%	**849**	100%

Finally, interviewees were chosen using a self-selection sampling technique. Such a method allows an individual to identify their desire to participate in the research. The researcher publicises a need for cases, either by advertising through appropriate media or by asking the cases to take part and then collects data from those who respond (Saunders et al., 2003). This sampling technique is appropriate where non-probability sampling methods are adopted and the purpose of the investigation is just exploratory. This is the case for the qualitative part of this research project and thus the technique is satisfactory.

At three universities students were asked in person during seminars or lectures if they were willing to participate in the research project by attending an interview and were offered a monetary reward to encourage their participation. Where possible, i.e. where more than required number of students expressed their interest, volunteers were selected in an attempt to construct a reasonably gender balanced sample. At one university students were contacted by email, instead of being asked in person, which may have been the reason for a low response rate. Because of the low interest, even after a second follow up email, all those who responded were asked to participate without any further selection. The sample structure of the interviewees is presented in the table 4.2. The reasons for the different sample sizes and their uneven gender distribution are explained in the limitations of the methodology (section 4.2.12).

Table 4.2 Sample structure – interview

Gender	Huddersfield	Prague	Liberec	Pardubice
Male	6	3	2	2
Female	6	1	5	6
Total	**12**	**4**	**7**	**8**

4.2.9 Reliability and validity

The task of questions is to measure a particular variable (Oppenheim, 1992). Measurement of variables is thus an important aspect of research design (Sekaran, 1992; Fife-Shaw, 1995). Measurement of variables was defined by Stevens (1951) as an assignment of numbers to objects, events or observations according to rules. To assess how well each question measures a particular variable, the concepts of reliability and validity was derived from measurement theory (Carmines and Zeller, 1979; Breakwell et al., 1995).

The reliability and validity of data depend to a large extent on the design of the questions and on the rigour of pilot testing (Saunders et al., 2003). Reliability is concerned fundamentally with issues of consistency of measures (Saunders et al., 2003; Bryman, 2008). Validity tests how well an instrument measures what it is intended to measure (Carmines and Zeller, 1979; Sekaran, 1992; Saunders et al., 2003).

There are three prominent factors that should be considered when assessing whether a measure is reliable; these are stability, internal reliability and inter-observer consistency (Bryman, 2008). Stability is concerned with whether or not a measure is stable over time, i.e. the results of the measure do not fluctuate over time. The underlying point to this factor is that there will be a little variation over time in the results obtained (Bryman and Bell, 2007). However, there is no easy way to determine whether changes in results are caused by the lack of stability in the measure or by the real changes in people’s opinions, or by political or economical circumstances. Internal reliability applies to multi-indicator measures and the main issue here is whether the indicators are consistent (Robson, 2002). The last but not least issue in reliability is inter-observer reliability, which is concerned with the consistency of decisions made by different researchers and consequently with the possibility of replicating the research (Bryman, 2008). In other words, if a great deal of subjective judgement is involved in the recording or in the translation of data each researcher may do it differently and thus the reliability can be threatened.

A test or scale is reliable when repeated measurements conducted by it under constant conditions will give stable results. The greater the reliability, the greater the accuracy (Breakwell et al., 1995). Reliability and consistency is concerned with stability and consistency; there are methods to measure both. Test-retest and parallel-form methods measure stability and inter-item consistency, split-half and interrater reliability methods estimate internal consistency/reliability of measures.

The most widely used measure of reliability is Cronbach's coefficient alpha which measures internal reliability of the multiple-item measures (Bryman, 2008) and is considered to provide the most accurate estimate of reliability (Breakweell et al., 1995). It essentially calculates the average of all possible split-half reliability coefficients and varies between 0 (no internal reliability) and 1 (perfect internal reliability). Thus the higher the correlation between items, the greater the internal reliability (Breakwell et al., 1995; Bryman, 2008). Alpha equal to 0.6 and 0.7 is generally considered as a good and a satisfactory level of reliability, respectively (Bryman, 2008).

Validity is concerned with whether the findings are really about what they appear to be about. In other words is the relationship between two variables a causal relationship? (Saunders et al., 2003). Although it is easy to explain what is meant by validity, it is exceedingly difficult to measure it in practice (Moser and Kalton, 1971). There are several ways of establishing validity. These can be grouped into the following approaches that are used to measure validity:

- Content validity (face validity)
- Criterion-related validity (concurrent and predictive validity)
- Construct validity
- Convergent validity (Moser and Kalton, 1979; Sekaran, 1992; Breakwell et al., 1995, Cooper and Emory, 1995; Robson, 2002; Bryman, 2008)

Content (or face) validity is a subjective evaluation of whether a measure apparently reflects the content of the concept in question. Criterion validity involves testing a hypothesised relationship of the test with an external criterion. Concurrent validity can be assessed by employing a criterion on which cases are known to differ and are relevant to the concept in question. In contrast, predictive validity uses a future criterion measure rather than a contemporary one to test the validity (Bryman, 2008). Construct validity shows how well the test of measures links with theoretical assumptions (Oppenheim, 1992; Cooper and Emory, 1995). Finally validity of a measure can be assessed by comparing it to measures of the same concept developed through other methods e.g. a validity of a questionnaire measure can be examined by tracking the phenomenon by a structured observation (Bryman, 2008).

4.2.9.1 Reliability and validity of the questionnaire

To ensure the validity of the questionnaire, literature on student expectations was studied and used as a methodological device. To assess the reliability of measures used to investigate student perceptions and expectations, the reliability coefficient Cronbach's alpha was used. The reliability test results showed that the average alpha was 0.676 (see Appendix 4.3 for details), which is considered to be a satisfactory level of reliability (Bryman, 2008).

4.2.9.2 Reliability and validity of the interview

Reliability in interviews is concerned with interviewer and interviewee biases (Easterby-Smith et al., Saunders et al., 2003). Interviewer bias is related to the comments or non-verbal behaviour of the interviewer and to how responses are interpreted and recorded by the interviewer. Interviewee bias may be caused by perception about the interviewer and/or the unwillingness of the interviewee to reveal/discuss certain aspects of the topic in question. Moreover, the requirements of the interview process in terms of time may also reduce the willingness of respondents to participate in the interview and thus bias the sample (Robson, 2002; Saunders et al., 2003). A high reliability of response may be ensured by piloting and based on that by presenting all participants with the same carefully worded, standardised questions (Robson, 2002).

Validity refers to the extent to which the researcher gained full access to the knowledge and meanings of the respondent (Easterby –Smith et al., 1991). It can be further improved by investigating the topic in question from different angles, asking clear questions and probing the meanings (Saunders et al., 2003).

All these aspects have been taken into account and an effort has been made to minimise the biases in order to increase the reliability and validity of the interviews. The interviews were conducted on a one-to-one basis in a room dedicated only to the interviews in order to ensure privacy and minimise the unwillingness to discuss sensitive topics such as parental occupation, education and income etc. The interviewees were assured that the main focus of the research was on their perceptions and expectations and thus there were no right or wrong answers and their responses were going to remain confidential. The interviewees were asked for their permission to record the interview using audio-visual technology before the interview started. The questions were clearly phrased in the native languages of the interviewees to ensure proper comprehension and understanding of the questions asked.

4.2.10 Research ethics

Ethical concerns emerged during the research planning, when seeking access to organisations and to individuals, collecting, analysing and reporting data (Saunders et al., 2003). Research ethics refers to the appropriateness of a researcher's behaviour in relation to the rights of those who become the subject of the research or those who are affected by it (BERA, 2004). Thus it is important to consider ethical issues throughout the research and to remain sensitive to the impact of the research on those who are approached to participate and to help, those who provide access and cooperation and those affected by the results of the research project (Robson, 2002; Saunders et al., 2003).

Ethical issues that affect the research process generally include the privacy of potential and actual participants, the voluntary nature of participation, the right to withdraw partially or completely from the research process, consent and possible deception of participants, maintenance of confidentiality of data and anonymity of participants, effects on participants of the way the data is used, analysed and reported, and the behaviour and objectivity of the researcher (Saunders et al., 2003). Thus, several general ethical principles need to be adhered to, namely privacy and anonymity of participants, objectivity of the researcher and confidentiality of the data collected (BERA, 2004).

The data collection stage is particularly associated with a range of ethical issues. Some are common for all data collection methods and some are method specific (Robson, 2002; Saunders et al., 2003). The ability to explore data or to seek explanations through qualitatively based methods means that there will be greater scope for ethical and other issues to arise in relation to this approach to research (Easterby-Smith, 2002).

During interviews over zealous questioning and a pressing participant for a response and asking questions that could be in any way demeaning to the participant should be avoided since such a way of conducting the interview could make the situation stressful for the participants (Robson, 2002). The right not to respond to any question should be made clear to the interviewee (Cooper and Schindler, 1998). Additionally, the time schedule needs consideration; the agreed length of time should be adhered to and interviews should be conducted at a reasonable time of the day (Zikmund, 2000).

To ensure all ethical principles were followed each individual respondent that became a subject of the research project was notified of the purpose of the research, the methods used for data collection, the history of the research, the confidentiality of data collected, the voluntary nature of their participation and their right to withdraw from the research process at any time. This information was presented to all participants by the researcher herself or by those authorised to collect the data. Neither the name or student number of those who answered the questionnaire is known to the researcher which ensures the anonymity of the respondents.

Those who participated in the interviews gave consent to their name being used during the interview and to using email or telephone communication; so that appropriate arrangements regarding the interview could be made. The interviewees were assured that their name was used for identification during the research only and that their responses would remain confidential and be used for the research purposes only.

4.2.11 Data collection

Two hypotheses underlying this research project are that there are positive financial returns to higher education, and that students, in both the Czech Republic and England, are aware of these and thus perceive higher education as an investment opportunity. The main objective then is to calculate the expected rates of return to higher education. To estimate the rate of return that is expected by students who decided to enter higher education, the earnings they expect after high school and after university needed to be obtained. Therefore the population of interest in this study is all first-year full-time undergraduate British and Czech students. The reason for this is that their decision to go to university had been a recent one and thus they are likely to be able to realistically assess the returns to higher education by estimating their earnings both as high school and university graduates.

The quantitative data have been collected using a questionnaire at all four surveyed universities on an annual basis since the academic year 2004/2005. A great effort has been made to ensure the data were collected at all universities as early as possible during the first term to avoid potential bias of the results caused by different timing of the data collection. The questionnaires were administered in Huddersfield by either the researcher herself or by her supervisor and in the Czech Republic by colleagues at the respective universities.

The qualitative data were collected in February and March 2009 in Huddersfield and in March and April 2010 in the Czech Republic. Since the interviews were conducted for exploratory and explanatory purpose, the timing difference does not influence the results obtained. All the interviews were designed, conducted and transcribed by the researcher herself.

4.2.12 Limitations of the methodology

As with any research, the methodology adopted in this research has its limitations. The main limitations of this research lie in the sampling strategies that were adopted. The sampling strategies used in this study have their limitations mainly in terms of the generalisability of the findings since all samples were selected based on non-probability rather than probability sampling methods.

The universities were selected using a purposive (judgmental) sampling strategy in an attempt to select cases that would be particularly informative and information-rich while the number of institutions that were willing to participate was limited. The selection of lectures during which the questionnaire data were collected was purposive rather than random and the convenience sampling strategy was adopted (Saunders et al., 2003). A major and a well attended lecture was identified a priori to ensure that a large amount of data could be collected at any one time given the time and money constraints within which the research had to fit. The issue with this is the impossibility to collect data from all first year students of the particular selected courses and thus the sample size varies over time depending not only on the size of cohorts but also on the attendance rate of the students and the access to lectures by the researcher or her colleagues.

Self-selection method was used to obtain the sample of interviewees. The research was introduced to a group of potential volunteers and those interested then self-selected. Two ways of asking students to participate in the research were used; in person during a lecture or seminar and secondly via email. The latter did not prove to be an efficient way as even after a second follow up email only four students volunteered despite the monetary reward offered for participation. In future this issue could possibly be overcome by either ensuring a personal contact with the students or by increasing the monetary reward for participation. However, given the time and money constraints neither of the options was possible on this occasion.

Although an effort was made to ensure that not too detailed information regarding the precise topics that were to be discussed was not known to the interviewees a priori, the research had to be introduced to ensure the ethicality of the process and the confidence of the interviewees in the research. The interviewees were told that it was their expectations regarding their future income that was going to be the main focus of the interview and that no special or specific knowledge was needed prior to the interview. Contrary to the questionnaire data collection, when students had not known before the lecture that the survey was going to take place, the interviewees could search for information and think about their responses in advance and thus not give as spontaneous answers as were desired. Nevertheless the information provided by the interviewees does not suggest that any preparation in terms of searching for information was performed.

Another limitation lies in the availability of interviewees. Although a fixed schedule was agreed upon with the interviewees in advance, last minute disruptions such as part-time work or illness caused the interviewees not turning up to the interview in several cases. This could have been to a certain extent overcome by asking some members of the groups from which the sample was self-selected to be substitutes for those who would potentially not be able to attend the interview. However, given that the time availability of students and of the researcher was limited and that nobody could anticipate who would not turn up to which time slot, even this way might not have been able to overcome the issue.

4.2.13 Methods of data analysis

This subsection discusses data processing and the methods of data analysis used to prepare and analyse data obtained by the survey. The steps related to the processing and analysis of the data are presented in Figure 4.6. The data were analysed using statistical softwares PASW 17.0.2 SPSS 15[30], Statgraphics Centurion XVI and Statgraphics Centurion XV.

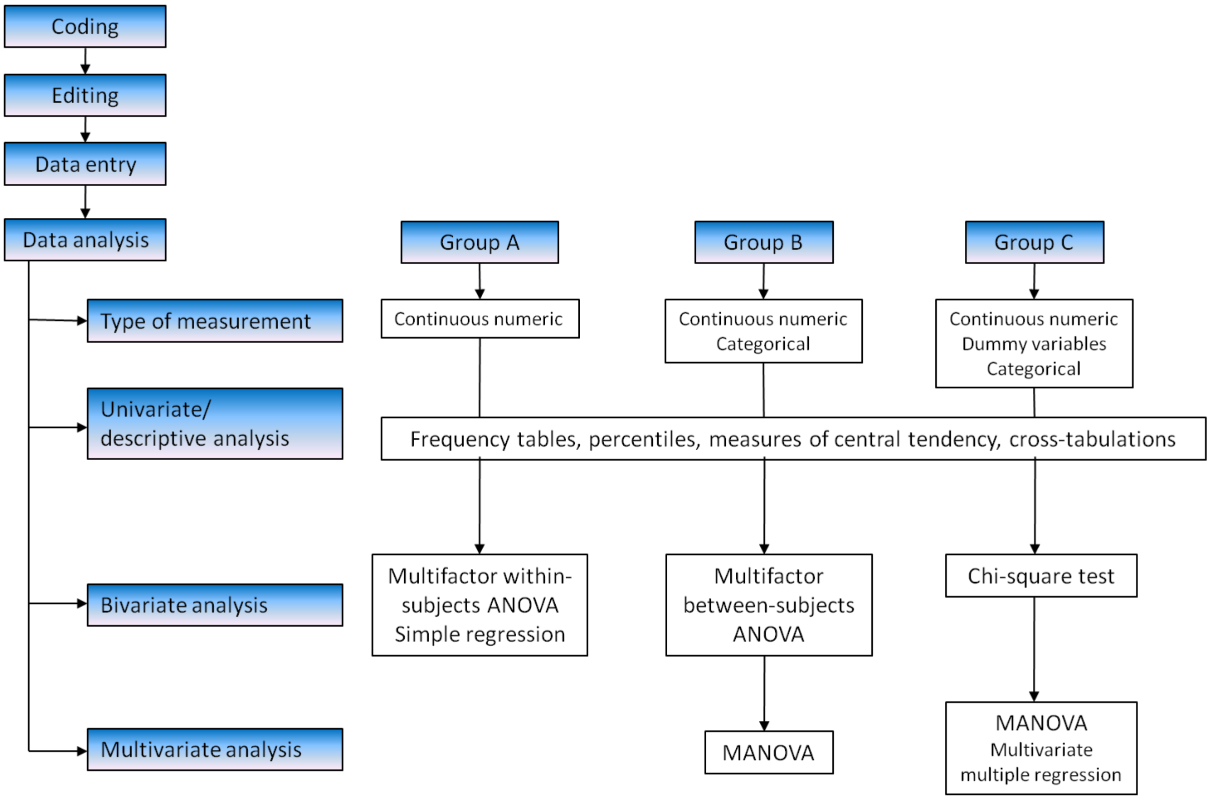
Data processing included editing, entering coded data into a computer, verifying the data and creating variables and data files for analysis (Sekaran, 1992; Zikmund, 2000). It should be stressed that all questions in the questionnaire were closed-ended questions with pre-coded response categories. Answer categories were designed to be exhaustive and mutually exclusive and to make it easy for the respondents to select appropriate options. As with response categories, the codes were designed to be exhaustive, mutually exclusive, meaningful, consistent and easy to use in the data analysis. Missing data were not coded since PASW, SPSS and Statgraphics Centurion software allow the performing of analysis with missing data.

Before the questionnaire data were input into the computer they were edited and checked for errors and omissions, to ensure reliability of the data, and then manually keyed into the PASW, SPSS and Statgraphics Centurion software. Data were organised into a data matrix, in which columns represented variables and rows represented records for individual cases, i.e. individual students. Variables reflected questions in the questionnaire and were put in the same order.

The methods of data analysis used in this study were selected according to the nature of the data, i.e. type of measurement, research questions, objectives and hypotheses (Group A, B, C – developed in chapter 3), and the number of variables used in the analysis. The methods of data analysis are outlined in Figure 4.6.

[30] Statistical Package for the Social Sciences

Figure 4.6 Methods of data analysis



Univariate and descriptive analyses were used for better understanding and correct interpreting of the findings of the research. The calculations of percentage distribution, frequency tables, means and cross-tabulations were used to summarise the data, get descriptive information and understand the nature of the relationship by making relative comparisons. Bivariate analysis was used to test the significance of the differences and to measure association between variables. Parametric hypothesis tests were used for interval-scaled data, and non-parametric statistical procedures were applied to nominal- and ordinal-scaled data. For simultaneous investigation of more than two variables, multivariate analysis was conducted. In particular, multivariate multiple regression analysis and MANOVA were used to identify the factors influencing students' expectations.

4.3 Summary

This chapter has dealt with the methodology underlying this research and developed a research process designed to meet the objectives of the study and answer the research questions. It has discussed the methodological approach, research and sampling strategies and methods of data collection and data analysis used in the research. Considering the positivist nature and the deductive character of the study, and the need to obtain a large amount of primary data at a trans-national level that are not available from secondary sources, a survey with multi-method approach was considered to be the most appropriate for this research project.

A repeated cross-sectional survey using a questionnaire was used to collect the data on students' perceptions and expectations regarding their future income and thus returns to higher education. Two one-shot surveys using semi-structured interviews were conducted to explore the factors influencing students' expectations and to explain some issues associated with them, particularly in terms of gender differences, future job location and information availability. In addition, limitations of the methodology were discussed and possible ways to overcome these in the future were suggested. In the final section of the chapter methods of data analysis were summarised graphically in a neat framework. The methods of data analysis were identified, based on the nature of the data and the number of variables used in the analysis, so the hypotheses developed from the literature can be tested and thus research questions answered and research objectives met.

CHAPTER 5

EXPECTED EARNINGS AND RATES OF RETURN: *empirical evidence from English and Czech students*

FINDINGS OF THE STUDY

5.1 Introduction

This chapter presents the findings of a study on future earnings and the rates of return to the investment in higher education expected by English and Czech students.

Chapter 3 reviewed the literature in terms of the theory of human capital and the previous research on rates of return to education, both actual and expected. It was discovered that most of the work conducted on the rates of return dealt with actual rates of return. This study attempts to contribute to fill in the gap in the literature by estimating rates of return *ex ante*. Chapter 4 presented the research methodology adopted to collect and analyse data from first-year undergraduate home students in England and the Czech Republic. The cross-sectional survey was repeated every academic year between 2004/2005 and 2009/2010.

In addition, in Chapter 4, hypotheses which will be tested in this chapter were developed to answer the research questions and to meet the objectives of the study. It also suggested the methods of data analysis to be used in this chapter, which were summarised in a framework (Figure 4.6). A variety of statistical techniques are employed to analyse the primary data, to test differences and to measure association between variables. These range from descriptive statistics and univariate/bivariate analysis to more sophisticated techniques such as multivariate multiple regression and multivariate analysis of variance. Sections 5.2 – 5.5 are dedicated to descriptive analysis of the data at an aggregate, country and institution level. Sections 5.6 – 5.11 use bivariate and multivariate techniques to test the relationships which are suggested by the descriptive analysis results.

Univariate and descriptive analyses were conducted to understand and summarise the primary data. Univariate analysis using frequency tables was conducted to provide a better picture regarding the structure and shape of the samples by presenting absolute and cumulative frequencies. The descriptive analysis was conducted using several descriptive statistical techniques such as distributions, means, percentiles and cross-tabulations. These were used to summarise the data and to identify similarities and differences between and within samples, which were then subjects to statistical testing by bivariate and multivariate analytical techniques.

5.2 Descriptive analysis of aggregate data

This subsection summarises the data collected at all four surveyed institutions on all six occasions, i.e. every year between 2004/2005 and 2009/2010. Table 5.1 presents the structure of the sample by year and place of study as well as the gender distribution at each institution and at each point in time. This is further summarised graphically in Figure 5.1 which presents the relative proportions of men and women in the samples and their respective populations for all years at each surveyed institution.

In total there were 4,163 respondents distributed across two countries and four business schools/faculties of economics. All valid cases, summarised in Table 5.1, were home students in their respective countries of study. In total there were 935 British and 3,228 Czech students in the sample. The Czech sample is further divided into three parts based on the universities where the data were collected. 1,427 students filled out the questionnaire in Prague over the surveyed years. In addition, there were 952 and 849 respondents in Liberec and Pardubice, respectively.

Every year each sample was of a statistically suitable size; only on 4 out of 24 occasions was the sample smaller than 100 respondents and when split by gender, 6 out of 48 were smaller than 30, which is a threshold for using t-test statistics for testing differences between variables. In such cases z-test will be used as it is suitable for small samples.

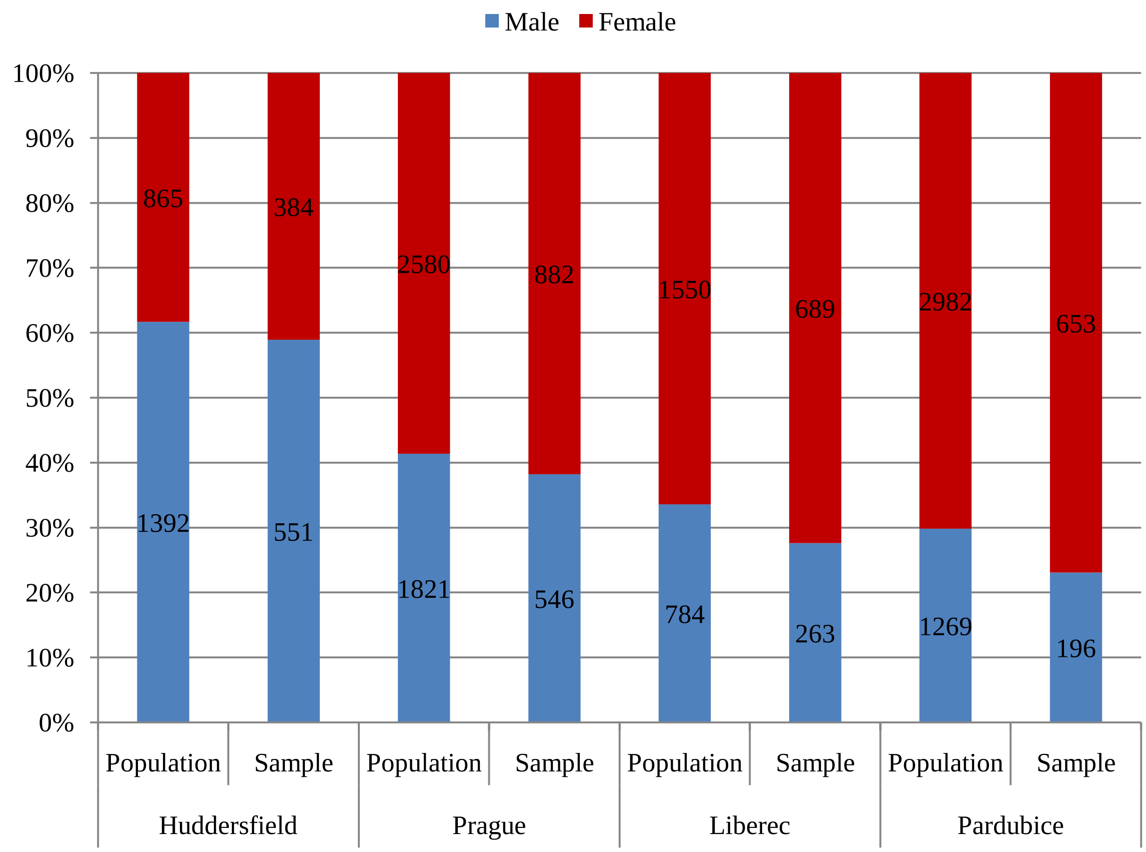
Table 5.1 Structure of the sample by gender, year and place of study

Year	Gender	Huddersfield	%	Prague	%	Liberec	%	Pardubice	%
2004/2005	Male	103	60	84	41	41	35	36	17
	Female	68	40	121	59	75	65	175	83
	Total	**171**	100	**205**	100	**116**	100	**211**	100
2005/2006	Male	46	69	160	39	29	27	21	18
	Female	21	31	252	61	80	73	94	82
	Total	**67**	100	**412**	100	**109**	100	**115**	100
2006/2007	Male	33	46	125	37	59	29	41	29
	Female	38	54	213	63	144	71	99	71
	Total	**71**	100	**338**	100	**203**	100	**140**	100
2007/2008	Male	105	60	34	29	20	32	13	14
	Female	69	40	85	71	43	68	82	86
	Total	**174**	100	**119**	100	**63**	100	**95**	100
2008/2009	Male	124	57	97	43	52	29	16	13
	Female	94	43	128	57	127	71	110	87
	Total	**218**	100	**225**	100	**179**	100	**126**	100
2009/2010	Male	140	60	45	35	62	22	69	43
	Female	94	40	83	65	220	78	93	57
	Total	**234**	100	**128**	100	**282**	100	**162**	100
All years total		**935**		**1427**		**952**		**849**	
Grand Total				**=**			**4,163**		

From Table 5.1 average proportions of men and women in the sample were extrapolated and graphically summarised in Figure 5.1. Along with presenting graphically the relative proportions of men and women it shows total absolute numbers for each gender at each institution across all six surveyed academic years. In addition, Figure 5.1 demonstrates that the samples are representative given the similar gender distribution of the samples and of the populations the samples were drawn from. The gender distribution is not even across the surveyed institutions. Overall, in Huddersfield the majority of the sample is formed by men, whereas in the Czech Republic men are in a minority at all three surveyed universities. In Huddersfield on average 60% of respondents were men and 40% were women. In Prague the ratio was the other way around – nearly 40% were men and over 60% were women. The overrepresentation of women is larger in Liberec and even more so in Pardubice.

Previous research in the area of actual and expected earnings suggests that there are gender differences. Therefore it is likely that if the data were to be analysed without the gender specification the results would be biased. The literature shows that women earn and expect to earn less than men. The consequence then could be that the expected earnings of students in Pardubice would be disproportionately low when compared to Prague for instance and it would not be possible to determine whether the difference was to be attributed to gender only or whether there were other influential factors. Given the uneven gender distribution within each sample and the different proportions of men and women between the samples, the data will be analysed for men and women separately in order to eliminate any potential gender bias.

Figure 5.1 <u>Average proportions of men and women in the samples and their respective populations</u>



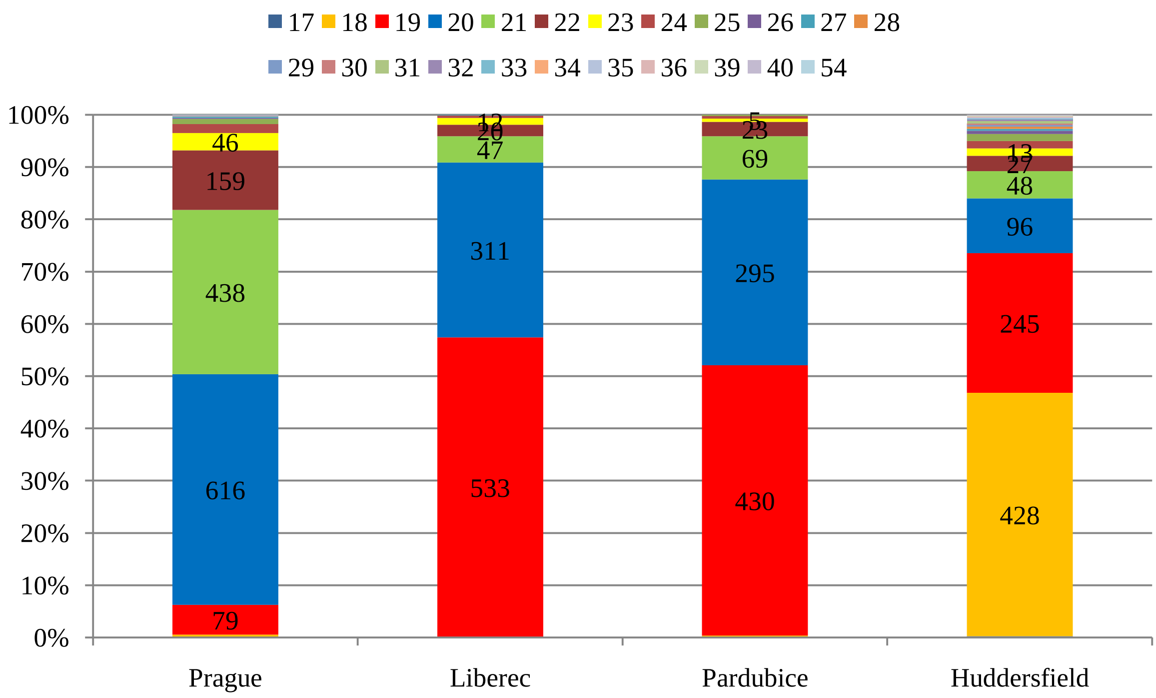
In previous research, age has been found to have a significant influence on the rates of return to higher education (cf. Blundell et al., 1999; Brunello et al., 2001; Maani, 1991, Oosteerbeek and van Ophem, 2000). The older are the students when they enter higher education, the lower are their rates of return. The reason for this is the level of foregone earnings, which form a major part of the costs of higher education. Earnings have been found to be positively correlated with years of experience. Older first-year students are likely to have had a job after finishing secondary/high school. Thus the longer they had worked before entering higher education the more their pre-university earnings were likely to be higher. As a result their foregone earnings are higher than of those who went to a university directly from high school, and consequently their rates of return are likely to be lower.

Multiple regression analysis will show whether or not the age of respondents has any significant effect on their expectations in terms of earnings and the rates of return. On average students in the Huddersfield sample are the youngest (nearly 50% are 18 years old) and students in the Prague sample are the oldest (50% are up to 20 years old). Students in Liberec and Pardubice are on average of very similar age and just over 50% of respondents are 19 and about 90% are up to 20 years old (Figure 5.2). The explanation for this is that the 'usual' age for entering higher education is different in England to that in the Czech Republic. Students in the Czech Republic normally pass their maturita exam at the age of 19, whereas in England students pass their A-levels at the age of 18. When it comes to Prague, another factor needs to be added. Generally, to be accepted to a university in the Czech Republic, competitive entrance examinations have to be passed. Their competitiveness depends on the demand for the particular course/university. The higher is the demand, the more competitive is the exam.

The University of Economics in Prague is perceived as a very prestigious institution. So much indeed that students are willing to keep repeating the exams for a couple years and thus postponing their studies. Every year the demand for studies there exceeds the capacity of the university e.g. in 2009 more than 11,000 applicants submitted more than 16,000 applications[31] and just over 6,000 were accepted (VŠE, 2010). This seems to be the likely explanation for the age difference of respondents between Prague and the other Czech institutions surveyed.

[31] Applicants can apply to more than one faculty and for more than one course

Figure 5.2 Age distribution by respondents' place of study



In the literature, socio-economic background has been found to have an influence on education attainment, attitudes to schooling and thus on returns to education. In this study the socio-economic background of respondents is approximated by their parents' education and income. The distribution of parents across the education spectrum is summarised in Figure 5.3.

Figure 5.3 Parental level of education by respondents' place of study

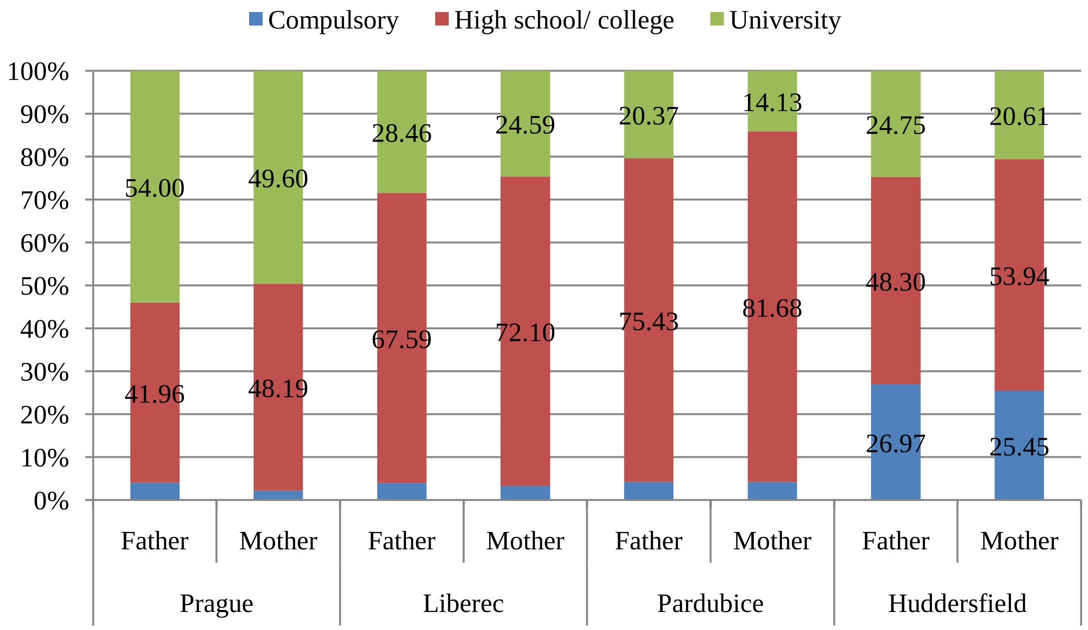


Figure 5.3 shows that the largest proportion of university educated parents is in Prague (more than half) and the lowest in Pardubice (less than a quarter). Only a very small proportion of parents of Czech respondents completed compulsory education only. The major difference in the distribution of parental education is then in high school and university education. It is also apparent from Figure 5.3 that fewer mothers than fathers are educated to university level at all surveyed institutions.

To examine the effect of the level of parental education as one of the predictors of students' earnings expectations and to find out what are the expectations of students from different educational backgrounds a multiple regression analysis will be conducted in section 5.11. Based on the literature it is hypothesised that students whose parents are better educated are more likely to expect higher earnings than those coming from less educated families.

Another variable of interest, when it comes to the socio-economic background of respondents, is their parental income. Based on the literature, it is hypothesised that parental income has a positive influence on students' expectations, i.e. the higher the earnings of parents the higher the expectations of students. Mothers' and fathers' earnings are presented and examined separately.

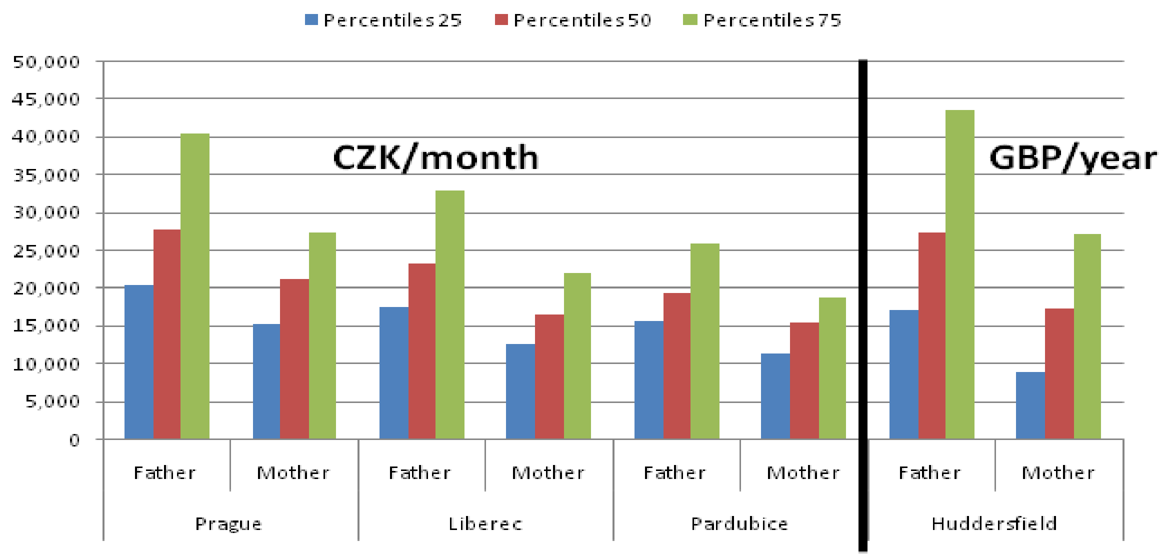
Figure 5.4 presents average parental income calculated from all surveyed years together expressed in quartiles to demonstrate the differences between surveyed institutions and between parents themselves, i.e. differences between earnings of mothers and fathers of students in Prague, Liberec, Pardubice and Huddersfield. It shows that fathers earn on average more than mothers in all samples and that parents of students in Prague have higher earnings than those of students from Liberec, who in turn have higher income than parents of students in Pardubice. Breaking down the averages to the 25th, 50th and 75th percentile illustrates the distribution of parental income.

It is necessary at this point to stress the differences in ways of expressing earnings in England and the Czech Republic. The Czech income is expressed in Czech Koruny (CZK) per month and earnings in England in Pound sterling (GBP) per year, which are the traditional ways in the respective countries. Students were asked to estimate their income in the questionnaire using the ways that are usual for the country where the data were collected in order to increase reliability of the estimates. Using different ways of expressing earnings has no influence whatsoever on calculating the rates of return; thus there is no need to use one format only. Figure 5.4 emphasises the fact that in Prague, Liberec and Pardubice the earnings are expressed in CZK/month, and in Huddersfield in GBP/year.

A percentile is the value of a variable below which a certain percent of observations fall. Thus the 25th percentile (also known as the first quartile) is the value below which 25% of the observations may be found. For example in Prague, 25% of respondents answered that their father's income is below 20,500 CZK/month or in Huddersfield 50% of students' mothers earn below 17,333 GBP/year[32].

Using percentiles is particularly useful for describing the distribution of observations in a sample. Using first, second (also known as median) and third quartile (75th percentile) shows that the parental income is fairly evenly distributed although positive (right-hand) skewness is larger at fathers' income suggesting that there are more extreme data at the upper end of the distribution, i.e. there are more high-earners amongst fathers than amongst mothers.

Figure 5.4 Average parental income - quartiles



In the following sections, Czech and English data will be presented separately and individually for each surveyed institution. Except for the variables that have been introduced

[32] On average from all years

in this section, expected earnings and rates of return will be reviewed and a descriptive analysis of these will be conducted. Students' expectations will be presented at three levels, as respondents were asked to estimate their minimum, most likely, and maximum expected earnings, in two situations as students were asked to estimate their income with two different levels of education, i.e. secondary and university, and at two points in time as the respondents estimated their earnings for the time immediately after graduation and ten years later.

All levels, situations and points in time of students' earnings expectations from all years, at all surveyed institutions are presented in Appendix 5.1 and the expected rates of return are summarised in Appendix 5.3. In addition, both are accompanied with standard deviations.

In Appendix 5.1, earnings expectations are presented as an arithmetic mean with standard deviation. It shows that the further in the future are the estimates of earnings made the larger is the standard deviation and the lower is the probability of earning the expected salary the larger is the standard deviation. The colour coding[33] of the results helps identify the size of the standard deviation. Given the size of the standard deviations, it was decided that a trimmed mean rather than the arithmetic mean should be used in the descriptive analysis[34].

The mean is the sum of observations divided by the number of observations and thus it can be heavily influenced by extreme values of a variable. The trimmed mean is a method of averaging which compensates for this by eliminating a small percentage of the largest and smallest values before calculating the mean. Thus, the trimmed mean looks to reduce the bias effects of outliers on the calculated average. A trimmed mean is presented as a mean trimmed by x%, where x is the sum of the percentage of observations removed from both the upper and lower bounds e.g. when calculating 5% trimmed mean, 2.5% of values will be removed from each tail of the distribution of a variable. The trimmed mean gives a much more robust estimation, i.e. an estimation not greatly affected by outliers of the average, than the arithmetic mean (Arltová et al., 2001).

[33] Red – std. deviation is equal or larger than the expected earnings; Purple – std. deviation is larger than 50% of the expected earnings; Green – std. deviation is larger than 1/3 of the expected earnings.
[34] See Appendix 5.2 for earnings expectations presented by 5% trimmed mean

Although variance is a well-known measure of dispersion/variation, standard deviation or the coefficient of variation are equally useful and have the same predicative value (Hanke and Reitsch, 1991; Anderson et al., 2010). In finance, standard deviation is a representation of the risk associated with a given security or the risk of a portfolio of securities (Markowitz, 1952). Risk determines the variation in returns on the asset and/or portfolio and gives investors a mathematical basis for investment decisions since standard deviation shows how much variation there is from the mean; a low standard deviation indicates that the data tend to be very close to their mean, whereas a high standard deviation indicates that the data is spread out over a large range of values (Arltová et al., 2001). In Appendix 5.3 the average expected rates of return are accompanied by the average standard deviations.

It is not in the scope of this section to analyse the expected earnings and rates of return and the risk associated with these in an aggregate way like the above described variables. Nevertheless Table 5.2 presents the total number of the respondents who expect positive, zero and negative rates of return. It is apparent that on average nearly 94% of students expect positive returns and over 97% at least 0% rate of return to the investment in their higher education which suggests that the absolute majority of students act according to the theory of human capital by expecting at least as much as they invested.

Table 5.2 Distribution of positive and negative rates of return

Variables	RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max	Average proportions
Number of Positive Values	3839	3833	3595	3781	3820	3641	
Proportion of Positive	94.16%	94.74%	90.10%	94.17%	95.76%	93.79%	93.79%
Number of Zeros	169	127	193	142	97	140	
Proportion of zeros	4.15%	3.14%	4.84%	3.54%	2.43%	3.61%	3.62%
Number of Negative Values	69	86	202	92	72	101	
Proportion of negative	1.69%	2.13%	5.06%	2.29%	1.80%	2.60%	2.60%
Number of missing values	86	117	173	148	174	281	
Total	**4163**	**4163**	**4163**	**4163**	**4163**	**4163**	**100.00%**

Despite the clear indication that students expect positive returns to their investment in higher education, the qualitative interviews revealed that the positive returns are not the only benefit students expect to obtain. This is in line with Davies et al. (2010) who found that only 19% of their sample indicated that salary was a very important motivation in their subject choice. In this study, 9 out of 19 respondents in the Czech Republic indicated higher future earnings as a reason why they went into higher education. Other motivators were family tradition, social status, escape from a labour market and extending student life. In addition, students in the Czech Republic agreed with their peers in Huddersfield when they stated that a degree would increase their chances of getting any job at all and that it would also enable faster career progress. Interviewees in Huddersfield seemed more concerned about getting any job at all with A-levels only. Thus, though indirectly, the monetary motivator seems to be present.

Given the complexity of the data, the expected earnings and rates of return will be analysed descriptively in the following sections for each surveyed institution individually. In addition, regression analyses will be conducted in section 5.10 to determine the link between expected rates of return and expected risk, and a coefficient of variation will be calculated to estimate individual ex ante risk associated with the investment in higher education.

5.3 Descriptive analysis of the Czech data

Descriptive analysis is the focus of this section where the Czech data will be analysed individually for each surveyed institution (subsections 5.3.1 – 5.3.3). Frequency tables, percentiles, means, standard deviations and cross tabulations will be used to summarise and interpret the data. The subsections are further divided into parts that reflect variables which are of interest as predictors of expectations. From the literature some variables were identified as significant when it comes to earnings and rates of return. Respondents were asked to answer questions regarding the explanatory variables and their answer will then be analysed in section 5.11 using multivariate regression analysis. However, before a regression model is developed, it is important to understand the data first so that the results of the multiple regression can be interpreted accurately and explained in the right context.

The explanatory variables of particular interest are gender, parental income and parental education. In addition, location of a graduate job is expected to have an influence on the earnings expectations at the point of graduation from a university, and thus is described as well. These explanatory variables as well as the earnings expectations and the expected rates of return will be described in the following subsections starting with Prague (5.3.1), followed by Liberec (5.3.2) and Pardubice (5.3.3).

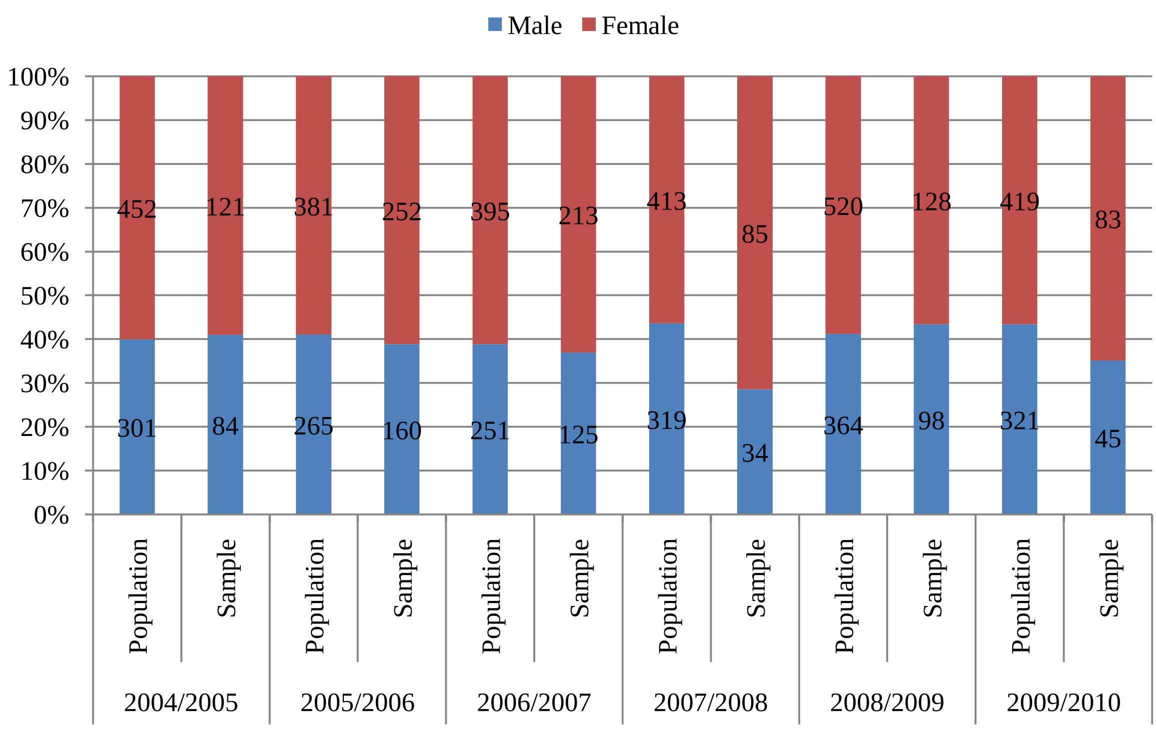
5.3.1 Prague

The data have been collected at the Faculty of Finance and Accounting at the University of Economics in Prague, which is the largest public economically focused higher education institution in the Czech Republic (more than 19,000 students in 2009/2010). As noted earlier, it is perceived to be a very prestigious university. It consists of six faculties, one of which, the Faculty of Finance and Accounting, was used to draw a sample which in this study will represent the population of first year business students in Prague. It should be noted that in Prague there are the highest earnings to be found in the Czech Republic.

5.3.1.1 Gender and expected graduate destinations

Figure 5.5 presents the gender distribution of the sample of students in Prague. It shows that men have been underrepresented in all surveyed years with women forming a majority of around 60%. This reflects the recent development in the gender make up of the student body in the Czech Republic. In addition, our sample reflects the actual gender distribution of students at the University of Economics in Prague and thus is considered to be representative.

Figure 5.5 Gender distribution – Prague population and sample



It has been shown in the literature that students are well informed and can use the information available regarding the labour market rationally. Thus, since there are differences in actual earnings depending on a location (regional/country difference), it is hypothesised that an intended location of a graduate job has an influence on earnings expectations. Figures 5.6 and 5.7 present findings as to where students intend to work after graduation from university for males and females, respectively. Students were given a list of options from which a maximum of two could have been chosen. The question was first asked in the Czech Republic in 2008/2009, i.e. the results are from the data collected in the last two years of the research. The data are analysed together rather than separately by year since a limited time period is available for the analysis of the development of the intentions regarding graduates' destinations over time.

'Pie in pie' charts were chosen for graphical presentation. Those categories that represent below 5% of responses are classified as 'other' and a separate pie is constructed to show their proportions in the sample.

Figure 5.6 Expected graduate job destinations – Prague males

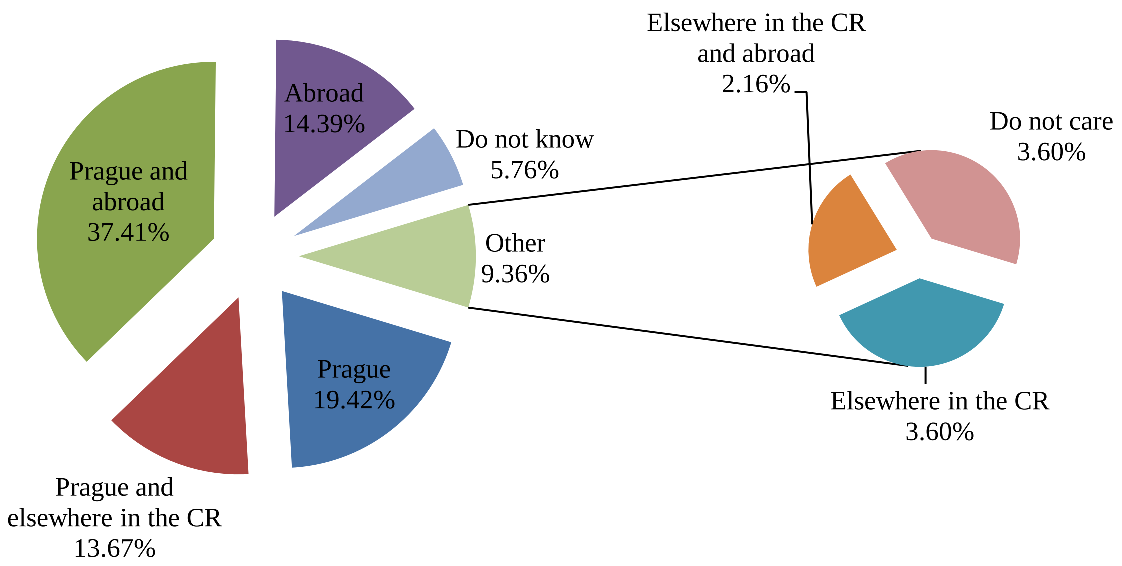
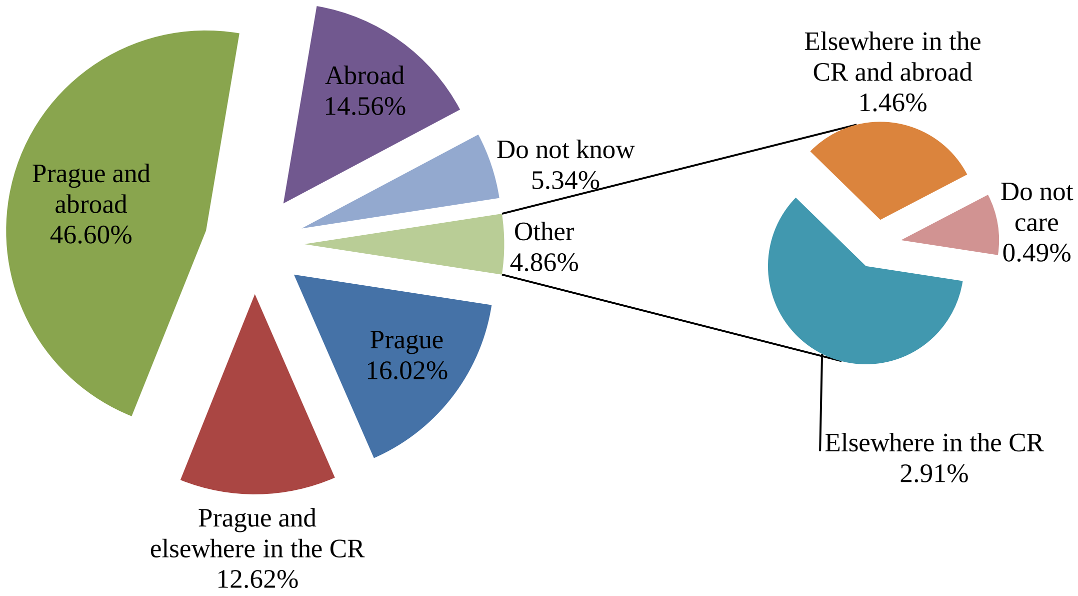
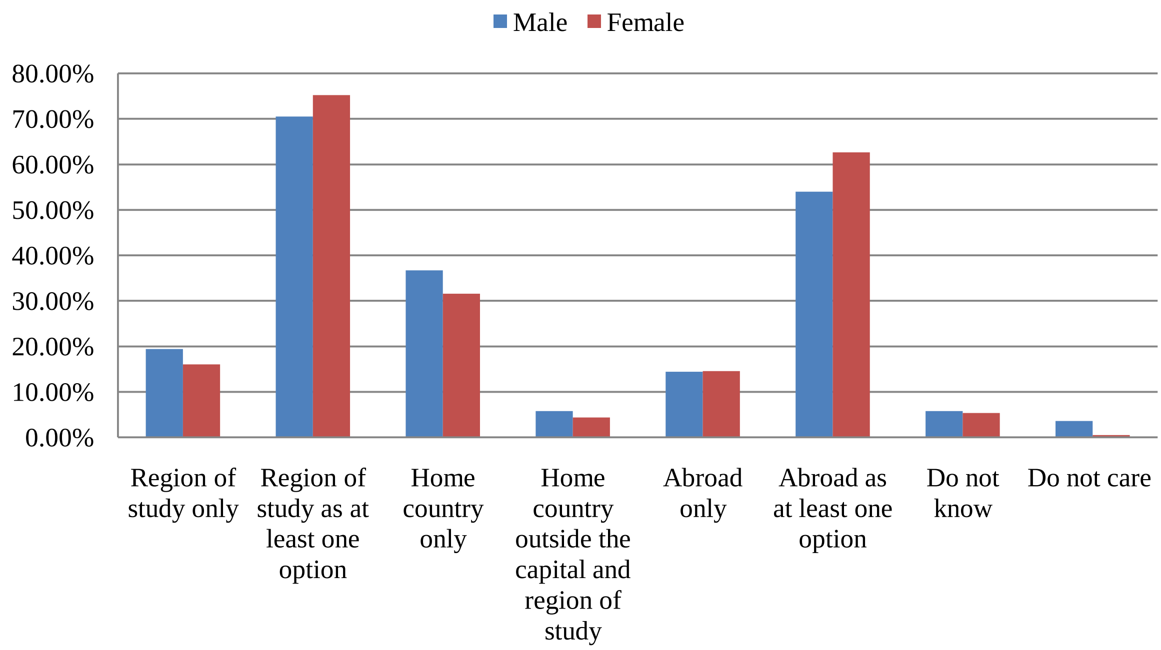


Figure 5.7 <u>Expected graduate job destinations – Prague females</u>



The figures show that majority of both males and females representing the Prague sample intend to work in Prague as at least one option. Prague was a sole option for nearly 20% of men and 16% of women. Nearly 37% of men and 31.5% of women want to work in the Czech Republic only (including Prague as a sole option). Approximately 54% of men and 63% of women selected choices outside the Czech Republic as at least one option. Working abroad was a sole option for just less than 15% of both men and women. Less than 10% of men do not know or do not care where they want to look for their graduate job. Those who do not know form over 5% and nearly 4% of men do not care. It is interesting to note that, when compared to women, more men 'do not care' where they will work once they graduate. A similar number of women do not know; however, a significantly lower proportion of women do not care about it (0.5%). These findings are presented graphically in Figure 5.8.

Figure 5.8 Graduate destinations: gender comparison – Prague sample



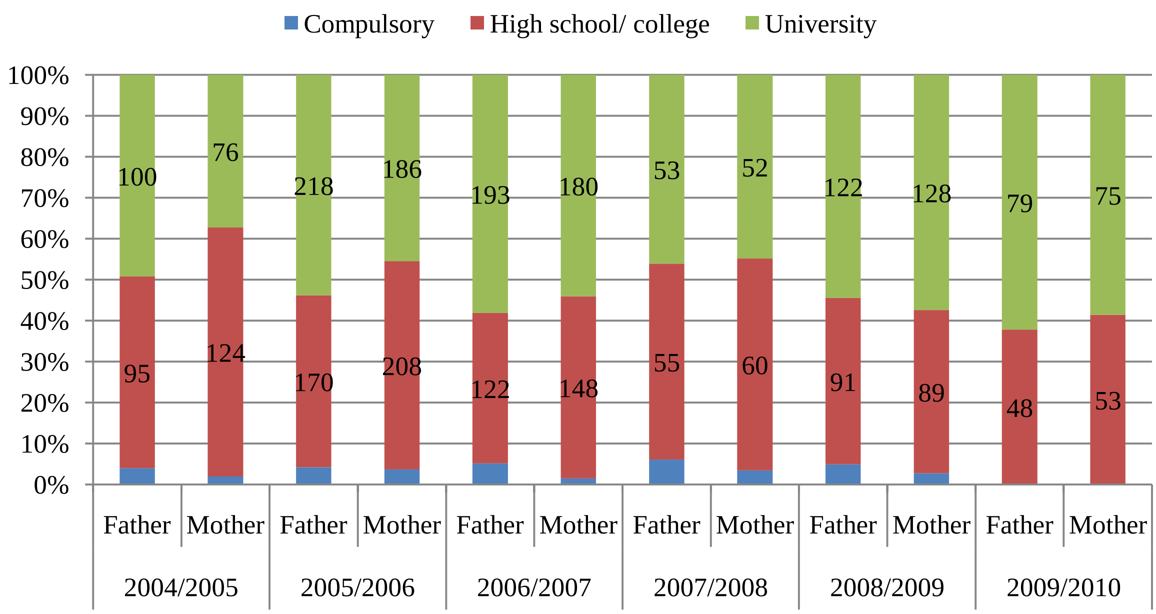
The qualitative data suggest that the option 'elsewhere in the Czech Republic' is likely to represent the home region of the respondents if they live outside the capital or the place of study. The information as to where the respondents come from however is not available; a question regarding respondents' region of origin was not asked and it is proposed that it is incorporated in the questionnaire in future research. Then all three regional factors (location of the university, graduate job destination and home region) can be assessed in terms of the extent to which they influence the earnings expectations and thus a conclusion can be made as to which one is the most influential. Whether or not the expected graduate job location has any influence on the students' earnings expectations will be determined in section 5.9.

5.3.1.2 Parental education

Figure 5.9 presents the highest achieved level of education of the respondents' parents. Mothers and fathers are treated separately to see if there is any difference between their schooling attainments. Figure 5.9 shows graphically the proportions of parents with different levels of education; namely basic, secondary and university, which are coded as compulsory, high school and university, respectively, so that the same coding terminology can be used for both the Czech and British samples. Absolute numbers of parents with any particular level of education is stated inside each column.

Every year there were more university educated fathers than university educated mothers (except for the academic year 2008/2009). The number of parents educated to a compulsory level only has been fractional over the years. Moreover, in 2009/2010 there were no parents educated to a basic level only.

Figure 5.9 Parental education – Prague sample



5.3.1.3 Parental income

The question in the questionnaire that asked students about their parents' income was modified in 2008/2009. A low response rate to the question was the reason for changing the format of the question. Originally the question asked the respondents to state their mother's and father's income as a precise figure. However, when students were not sure about the exact amount of money their parents earned, they seem rather to have chosen not to provide an answer. However, for this research project it is not particularly important to have a precise figure; rather an approximate idea about the level of income is required so that the socio-economic background of students can be established.

This is why seven intervals were offered as it was hypothesised that students would be more likely to be comfortable fitting their answers to a suggested range which allows for a margin of error from their side but does not influence the findings of the research in a negative way. The success of this change is apparent from Tables 5.3 and 5.4, where valid and missing cases are presented. Before 2008/2009 the non-response rate ranged from 13% to 18% whereas from 2008/2009 it ranged from 7% to 12%.

Tables 5.3 and 5.4 present estimates of the central tendency for both fathers and mothers, respectively. A comparison of these shows that respondents' fathers earn more than their mothers since the arithmetic mean, median and mode are either the same or lower for mothers than for fathers. In addition, by comparing mean, median and mode the distribution can be determined. If all three estimates of the central tendency are equal then the distribution of observations is normal. The sample of parents of students in Prague is positively skewed since the mean is larger than the median, which suggests that there are more people earning below average than above average.

Comparing the means and medians in tables 5.4 and 5.5 suggests that both distributions are positively skewed and that men earn more than women. This is also apparent from the 75th percentile, which shows that the threshold below which three quarters of fathers earn is higher than that below which three quarters of mothers do. This is also demonstrated by the histograms with a normal distribution curve in Figures 5.10, 5.12 and 5.11, 5.13 for fathers and mothers, respectively. Given the change in methodology the histograms are presented separately for the period before (Figure 5.10 and 5.11) and after the change which occurred in 2008/2009 (Figure 5.12 and 5.13). It is apparent, particularly from figures 5.12 and 5.13, that there are more high-earners amongst fathers than amongst mothers.

Table 5.3 Father's income – Prague sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	178	27	27890	25000	30000	15000	25000	31250
2005/2006	352	60	38286	25000	20000	18000	25000	40000
2006/2007	299	39	40023	30000	30000	20000	30000	45000
2007/2008	101	18	37436	27000	25000[a]	20000	27000	40000
2008/2009	210	15	33357	25000	25000	25000	25000	40000
2009/2010	114	14	35197	35000	35000	25000	35000	46250

[a] – multiple modes were found; the lowest is presented

Table 5.4 Mother's income – Prague sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	179	26	20894	17000	20000	12000	17000	25000
2005/2006	354	58	23461	20000	20000	15000	20000	28000
2006/2007	301	37	24623	20000	20000	15000	20000	25000
2007/2008	100	19	24730	20000	15000	15000	20000	25750
2008/2009	207	18	25012	25000	25000	17500	25000	25000
2009/2010	119	9	26912	25000	25000	17500	25000	35000

Figure 5.10 Fathers' income distribution prior to 2008/2009 – Prague sample

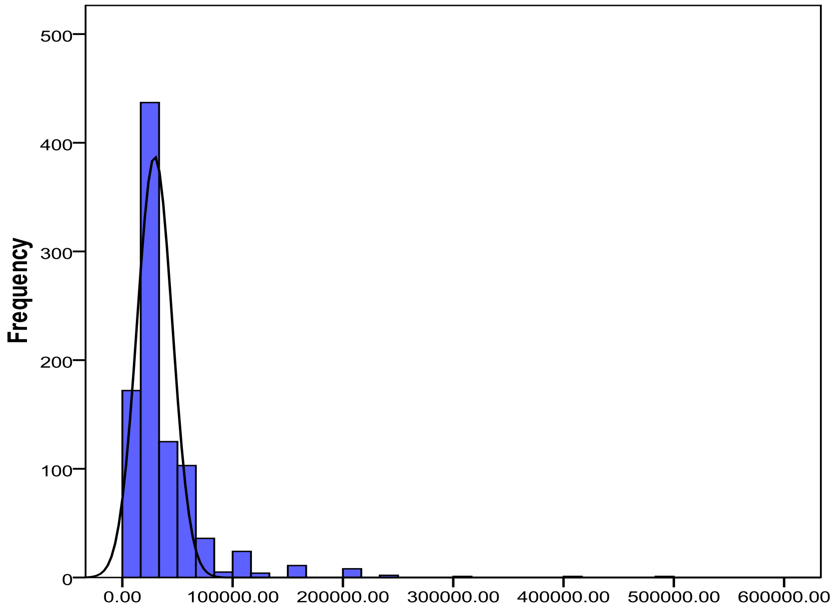
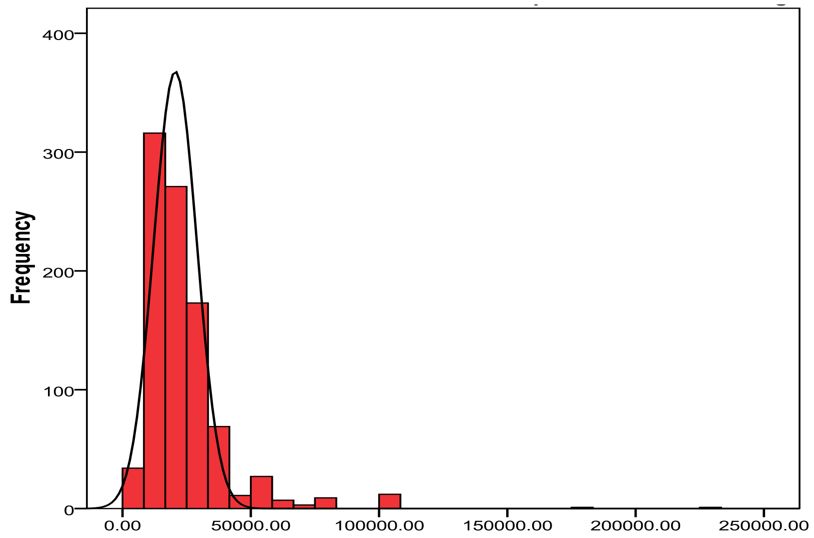


Figure 5.11 Mothers' income distribution prior to 2008/2009 – Prague sample



A difference is apparent between the histograms presenting the distributions of both fathers' and mothers' income before and after the change occurred. Using the intervals rather than precise figures caused the distribution to be more normal-like. It however seems that the last/highest interval could be split into more intervals, given the number of fathers that fit into the interval that proposed monthly earnings of 50,000 CZK or more (Figure 5.12). This does not seem to be a major issue when it comes to mothers, which once again suggests that there are more high-earners amongst fathers than amongst mothers.

Figure 5.12 Fathers' income distribution after 2008/2009 – Prague sample

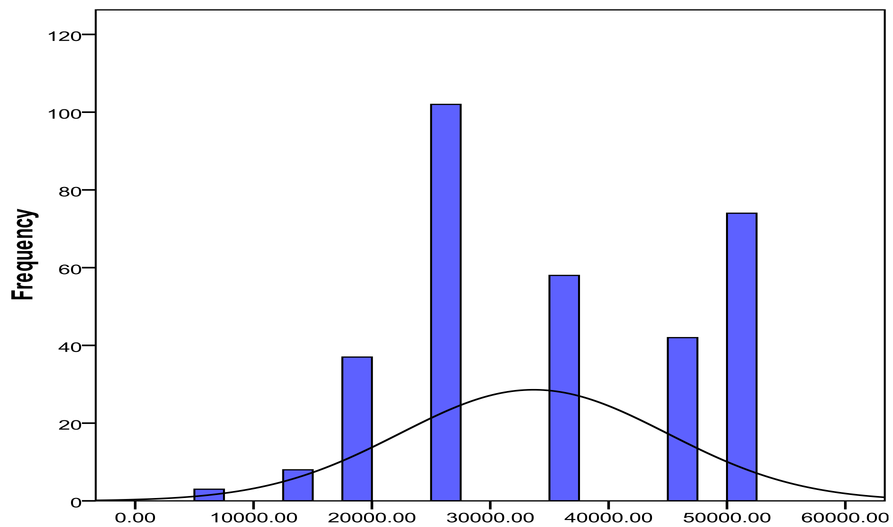
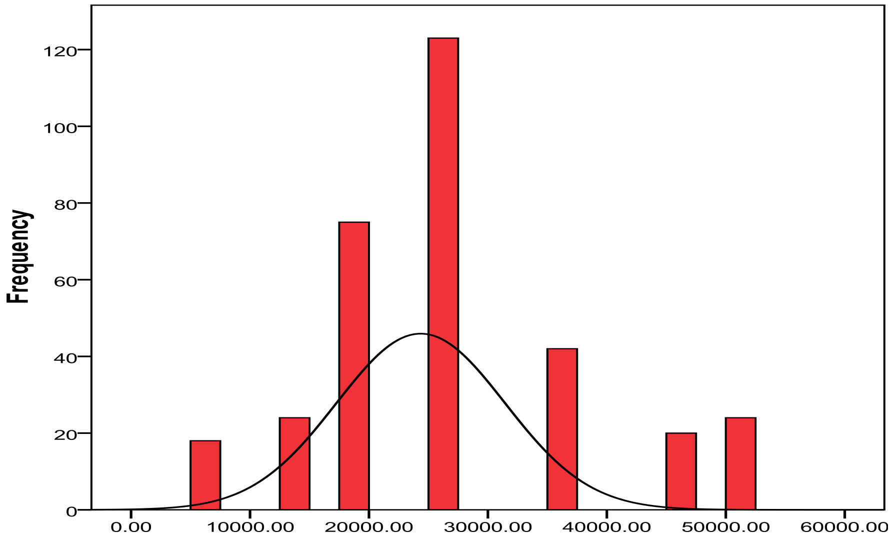


Figure 5.13 Mothers' income distribution after 2008/2009 – Prague sample



5.3.1.4 Perceptions of parental income

The respondents were asked to what extent they perceived their parental income to be high. The findings are summarised in a cross tabulation (Table 5.5 and 5.6 for fathers' and mothers' income respectively) which presents centres of intervals of parental income and the Likert scale regarding students' perceptions, which were both offered to the respondents in the questionnaire. Spearman correlation coefficient is also noted to show the strength of the relationship between the parental income and students' perceptions of its level. In addition the coefficient is flagged with asterisk if it is statistically significant at 5%.

Essentially Table 5.5 and Table 5.6 show to what extent students agree with the statement that they perceive their parents' income to be high, and the number of respondents in each given parental income interval. For example 74 respondents stated that their father's income was above 50,000 CZK/month and 39 of those, i.e. more than 50% strongly agreed or agreed that they perceived such an income to be high. On the other hand fathers of 48 respondents earned less than 20,000 CZK/month and 25, i.e. more than 50% of their children strongly disagreed or disagreed with the statement that they perceived their father's income to be high. The correlation coefficient (0.58 and 0.562 for fathers' and mothers' respectively) shows a (moderately) strong positive relationship between the level of parents' income and the perception of its largeness, i.e. the higher is the parent's income the more likely are the students to perceive their parent's income to be high.

It has been expected a priori that the higher is the income the higher it will be perceived. The analysis thus shows meaningfulness and thus validity of the data, i.e. the cross tabulation and the correlation coefficient show consistency of the responses and thus establish validity. The strength of the relationship however is weaker than one might expect. This can be explained by the qualitative analysis.

Students were asked about the basis of their answer to the question about the perception of their parents' income. The most often heard answer was based on their parents' job and the time they spend at work. Thus although a parent has a relatively high income (compared to the national average[35]) but has to invest plenty of time and energy to earn the income the students are more likely to disagree with the statement that their parents' income is high, and vice versa. For example four students disagreed with the statement although their fathers earned more than 40,000 CZK/month; similarly three respondents disagreed or strongly disagreed although their mother's income was above 40,000 CZK/month. By contrast, one respondent strongly agreed that his/her mother's income was high although she earned less than 10,000 CZK/month. This was also discussed during the qualitative interviews and it was uncovered that the reason for this is the likelihood of the mother being either unemployed or a housewife and thus given the circumstances the respondents may feel that the income is appropriate/high.

Table 5.5 Crosstabulation of father's income and perceptions of its level

		I perceive my father's wage to be high					Total
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	
Father's wage	5000	3	0	0	0	0	3
	12500	2	2	4	0	0	8
	17500	3	15	19	0	0	37
	25000	1	32	65	3	0	101
	35000	0	9	42	7	0	58
	45000	0	1	24	17	0	42
	50000	0	3	32	30	9	74
	Total	9	62	186	57	9	323

Spearman Correlation coefficient = 0.58**

[35] National average income in the third quarter of 2009 was 23,350 CZK/month (ČSÚ, 2010)

Table 5.6 Crosstabulation of mother's income and perceptions of its level

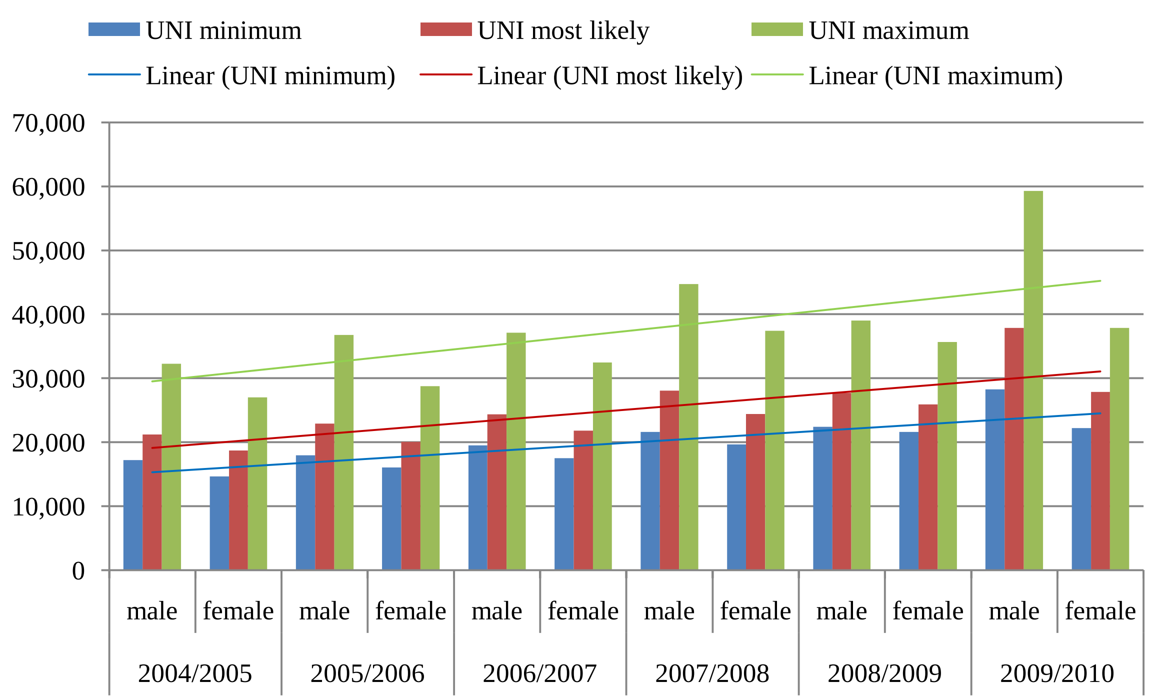
		I perceive my mother's wage to be high					
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	Total
Mother's wage	5000	8	6	2	0	1	17
	12500	9	14	1	0	0	24
	17500	11	36	27	0	0	74
	25000	3	45	70	4	1	123
	35000	0	9	28	5	0	42
	45000	1	1	13	4	1	20
	50000	0	1	12	10	1	24
Total		32	112	153	23	4	324

Spearman Correlation coefficient = 0.562**

5.3.1.5 Earnings expectations

It was already determined in section 5.2 that the 5% trimmed mean would be used in the descriptive analysis of the expected earnings as the best and most robust estimator of the variable. The reasons for using the trimmed mean were outlined in that section too. In this section the data will be graphically presented using the trimmed mean to summarise it.

Figure 5.14 Expected earnings immediately after university graduation – Prague sample



The trend lines plotted through the earnings estimates presented in Figure 5.14 show an increasing trend, i.e. expectations increase from year to year. In addition, Figure 5.14 suggests that men in the Prague sample expect higher earnings than their female counterparts every surveyed year at all three levels, i.e. minimum, most likely and maximum. It also seems that men expect to earn significantly more than women when estimating the maximum level of income. This seems to be the case in the other three hypothetical situations, i.e. point of graduation from secondary education and ten years after that, and ten years after graduating from university (see Appendix 5.4 for graphical presentation of the three scenarios). In the literature, men have been found to overestimate their earnings/returns and women have been found to be more realistic in their estimates when compared to the actual earnings.

Figure 5.15 Averaged expected earnings across years – all levels and points in time – Prague sample

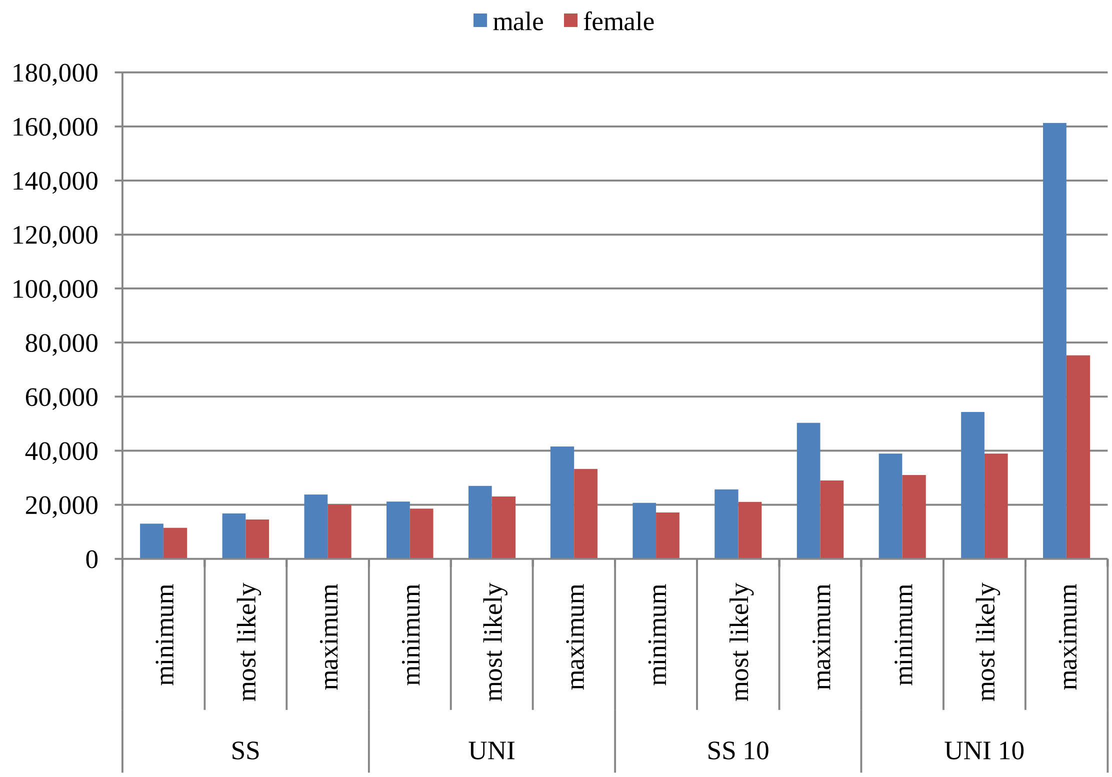


Figure 5.15 seems to suggest that the further in the future is the estimate of the earnings made, and the higher is the level of education, the larger is the difference in expected earnings between men and women. In other words, at the point of graduation, whether from a university (UNI) or from high school (SS), the gender difference is expected to be smaller than later in the respondents' working lives. Indeed, the literature suggests that male and

female age-earnings profiles are similar at the beginning of a career and that it is later in their working lives when female age-earnings profiles become flatter.

Moreover, it seems that the lower the level of probability[36] of obtaining the expected income, the higher the difference in expectations between men and women. Figure 5.15 also implies that the higher is the level of schooling the higher are the expected earnings, and that expected earnings increase with experience. To be specific, students seem to expect the lowest wages after finishing secondary education (SS) and the highest wages ten years after graduating from university (UNI 10). Interestingly, earnings expected at the point of graduation from the university (UNI) seem to be similar to those expected ten years after graduating from high school (SS 10).

Figures 5.16 and 5.17 present the development of earnings expectations in time for men and women, respectively. Expected earnings immediately after finishing secondary education is used as an example (see Appendix 5.5 for the development of earnings expectations in the other three scenarios for both genders). It is apparent from Figures 5.16 and 5.17 and Appendix 5.5 that earnings expectations increase in time for both men and women; the trend lines show nearly perfect linear development at all three levels of expectations, i.e. minimum, most likely and maximum. This suggests consistency of the findings and thus validity and reliability of the data and the research as a whole.

The steady and continuous growth is to be expected a priori. The empirical evidence suggests that students are well informed about the labour market conditions, can use information available to them rationally, and that there is no systematic difference between expected and actual earnings. It is thus likely that, when observed over time, expected earnings follow the trend of actual earnings and thus that the rate of growth of expectations is similar to that of actual earnings. Given that the average actual earnings have been growing in Prague, as well as in the Czech Republic[37] as a whole, it was to be expected that so would the average

[36] Minimum is the most probable and maximum is least probable;

[37]

Czech Republic average national income in CZK/month					
2004	2005	2006	2007	2008	2009
17,738	18,833	19,968	21,470	23,144	23,350

The figures represent the average national income in the third quarters of each year regardless of gender, education, occupation or sector (ČSÚ, 2010) students' expected earnings. Though certainly interesting and worth exploring in more detail by future research, it is not the aim of this study to compare expected and actual earnings.

Although women appear to expect lower income than men, the rate of growth (indicated by the trend line) in the Prague sample seems to be very similar for both genders. This is also to be expected a priori since there is no reason to believe that the information regarding the labour market conditions and earnings are not available to both genders equally.

Figure 5.16 Development in time of earnings expected at the point of graduation from high school – males, Prague sample

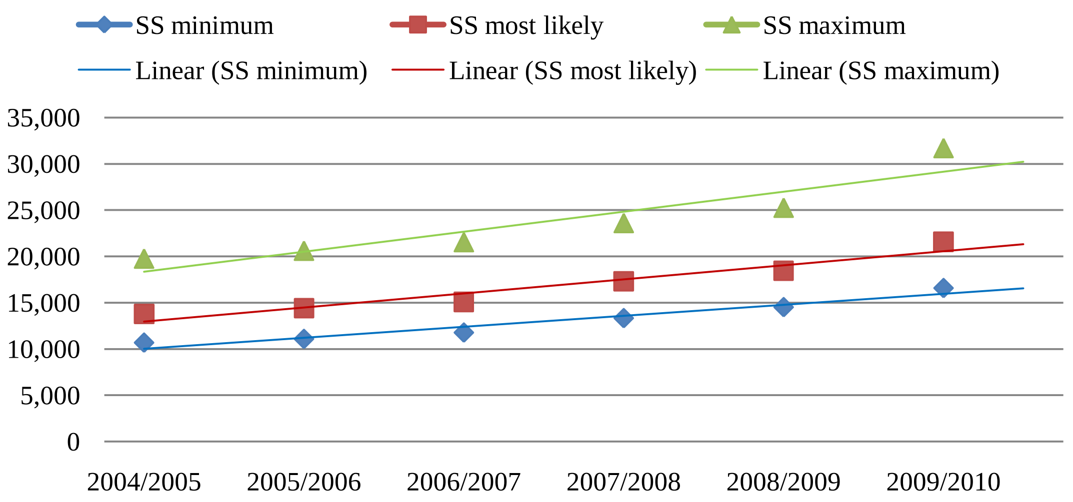
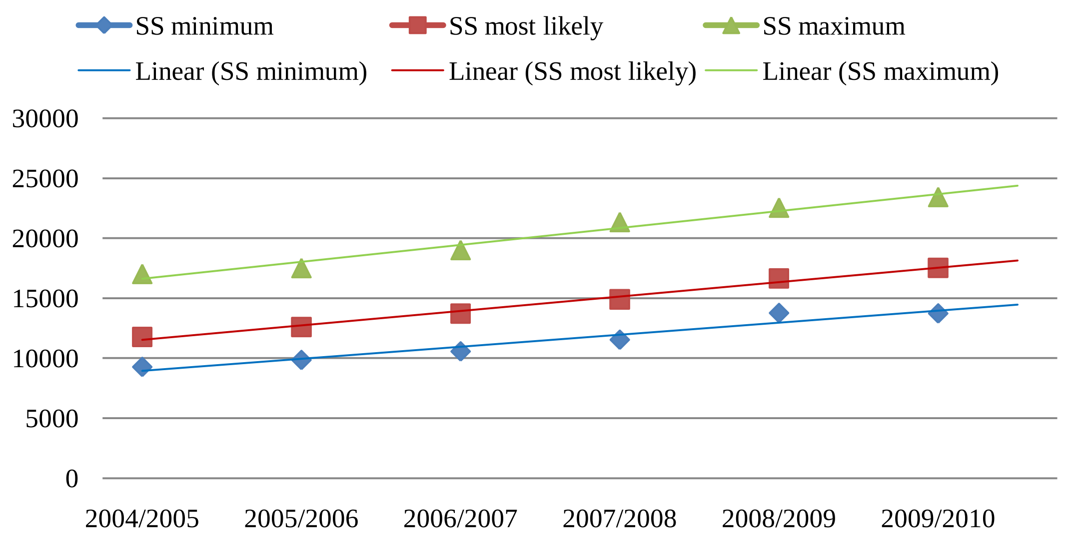


Figure 5.17 Development in time of earnings expected at the point of graduation from high school – females, Prague sample



The graphical presentations of the expected earnings in Appendix 5.5 show a similar trend of continuous growth for all three scenarios for both genders in the Prague sample.

Figures 5.18 and 5.19 show the distribution of the expected earnings with and without a university degree at both points in time, i.e. at graduation and ten years later. The distributions are similar in terms of its shape, i.e. kurtosis and skewness but the distribution of earnings expectations with a university degree is shifted more towards the right hand side for both points in time suggesting that students expect to earn more with a university education than with high school education regardless of their labour market experience.

Figure 5.18 Expected earnings' distribution at the point of graduation from high school and university – Prague sample

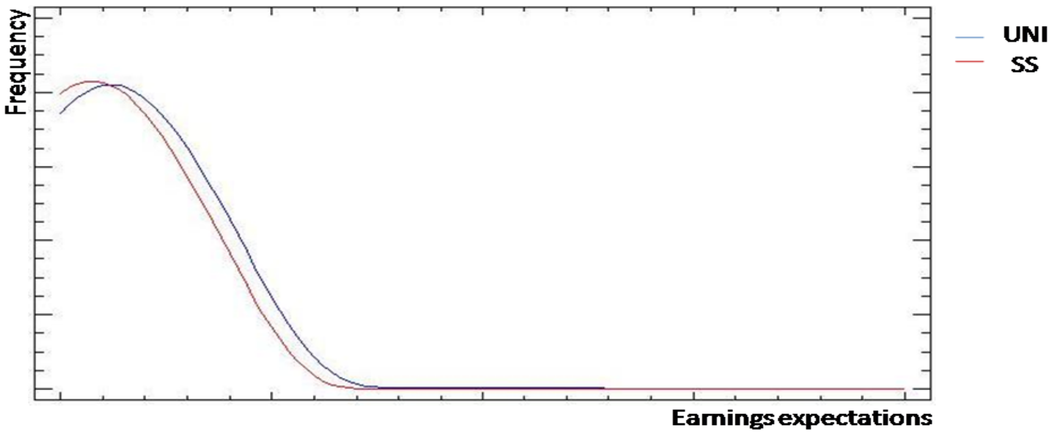
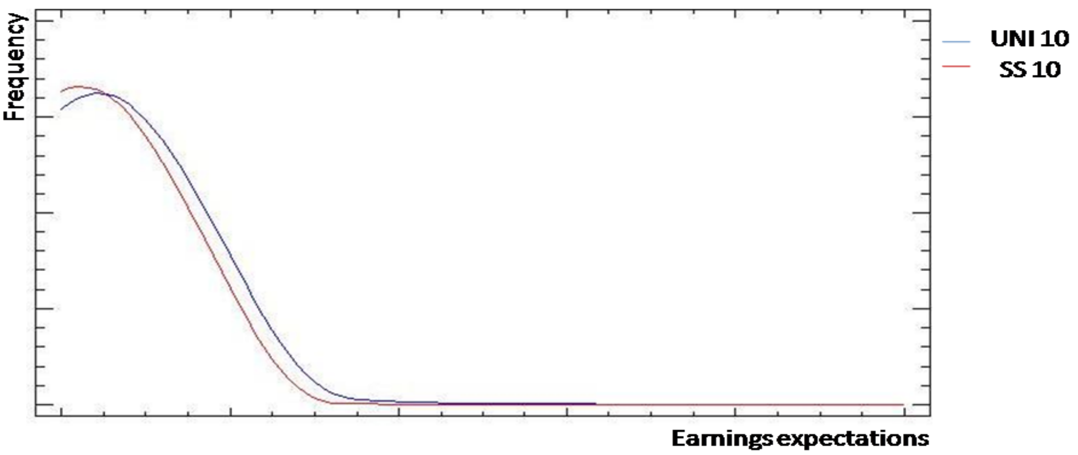


Figure 5.19 Expected earnings' distribution ten years after graduation from high school and university – Prague sample



5.3.1.6 Expected rates of return

Figure 5.20 shows the rates of return as an average of all surveyed years for men and women. It is interesting to see that the most likely expected rates of return are closer to the minimum than to the maximum of the expected rates of return for both genders. What is also noticeable is the difference in the maximum average expected rates of return between men and women at the point of graduation and ten years later; men expect the maximum rates of return to their higher education to be much higher than those of women.

Figure 5.20 tends to suggest that men expect a further and faster growth than women. However, this seems to be caused by the differences between men and women in the maximum rates of return estimates at both graduation and ten years after. This reflects the previous findings from the descriptive analysis of the expected earnings where men were found to be more likely to expect substantially higher income at the maximum level. This can be attributed to the notion that men tend to overestimate their returns to higher education whereas women have been found to be more realistic in their estimates. Indeed, when comparing the most likely expected rates of return at both points in time, no difference between men and women is apparent; the same applies to the minimum expected rates of return.

In addition, Figure 5.20 tends to suggest that students in Prague, both male and female, expect higher returns ten years after graduation. In other words, it seems that students in Prague expect, on average, to benefit from their university studies more in the medium term than immediately after graduation.

Figure 5.20 Gender differences in expected rates of return – by situation, Prague sample

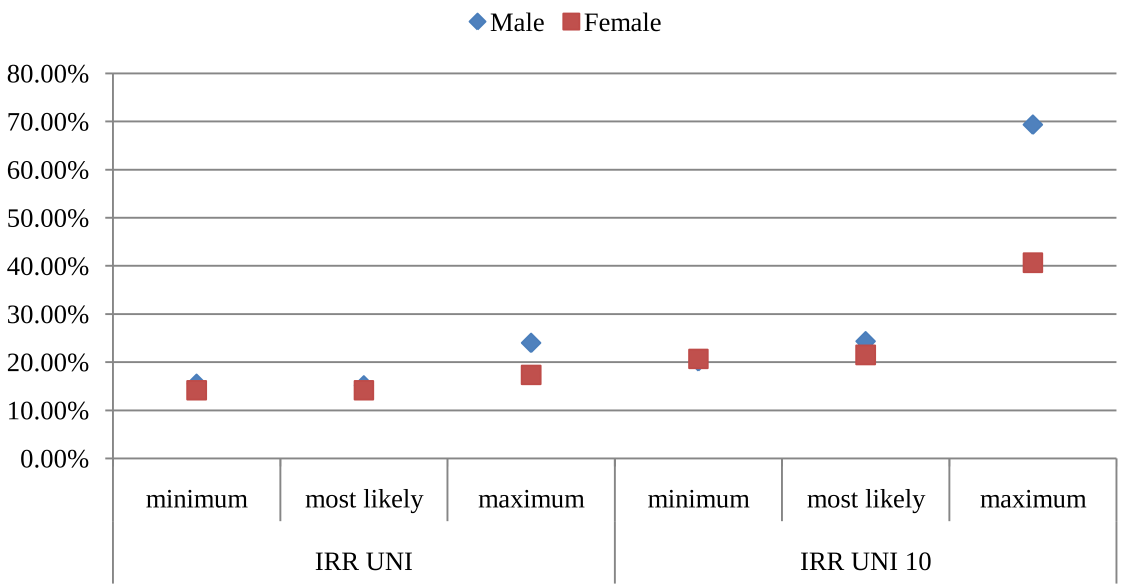
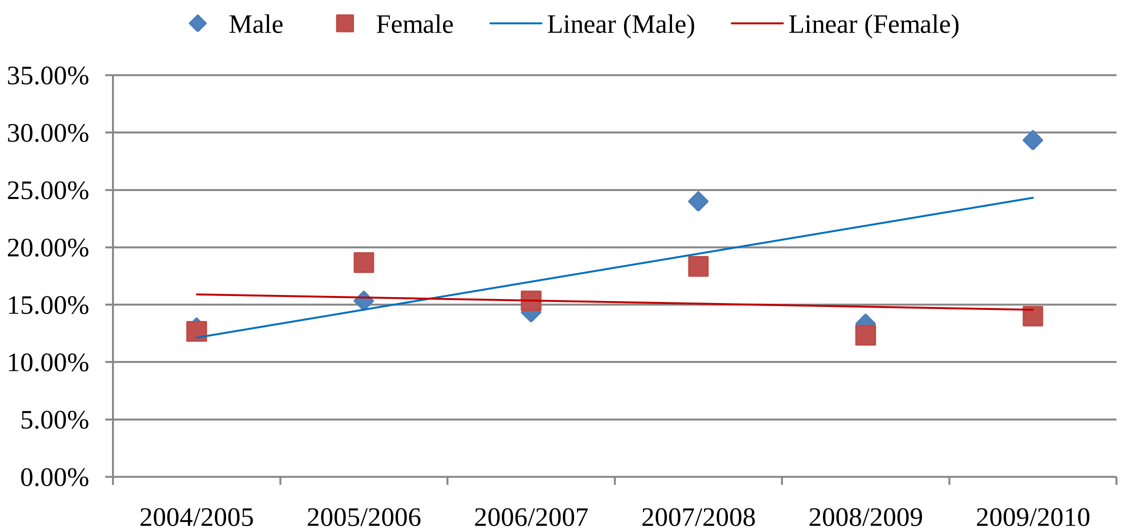


Figure 5.21 presents gender differences in expected rates of return by year. The average of the minimum, most likely and maximum rates of return expected at the point of graduation was used to show the development over time. It is not stable nor is steadily increasing or decreasing; rather a zigzag pattern can be observed for both men and women. The trend line however smoothes the pattern and as a result shows a slightly decreasing trend for women and an increasing trend for men.

Figure 5.21 Gender differences in expected rates of return at graduation – by year, Prague sample



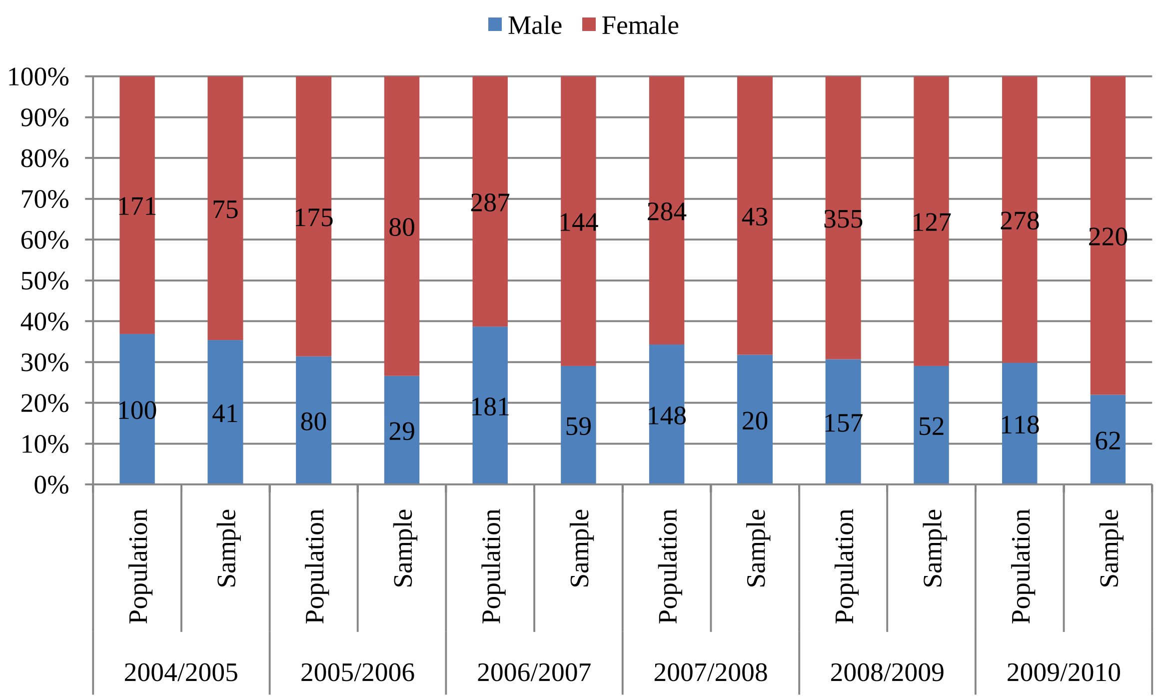
5.3.2 Liberec

The data were collected at one of six faculties of the Technical University of Liberec, which had a population of over 8,000 students in 2009/2010 and is the only university in the Liberec region. The sample drawn from the first year students at the Faculty of Economics will represent the population of first year business students in Liberec.

5.3.2.1 Gender and expected graduate destinations

Figure 5.22 presents the gender distribution of the sample of students in Liberec. It shows that men have been in a minority in all surveyed years with women forming a majority of around 70% and that the sample reflects the actual gender distribution of students at the Faculty of Economics at the Technical University of Liberec and thus is considered to be representative.

Figure 5.22 Gender distribution – Liberec population and sample



Figures 5.23 and 5.24 show where students intend to work after graduation from university, for males and females respectively. As in the case of Prague, the data collected in Liberec are not analysed separately by year. The intentions regarding graduates' destinations have been

observed for two years, which is not sufficient to make conclusions regarding their development over time.

Except for areas outside the Czech Republic, such as the EU and North America, students were offered regions in the Czech Republic as options for their graduate job locations - one of which was always the region of study and one was the capital city Prague. When analysing the Prague sample the capital city and the region of study was the same; thus the students' responses were split into eight rather than twelve categories, which is the case for Liberec. As in the case of Prague, 'pie in pie' charts were chosen for graphical presentation of the findings. Those categories that represent below 5% of responses are classified as 'other' and a separate pie is constructed to show their proportions in the sample.

Figure 5.23 Expected graduate job destinations – Liberec males

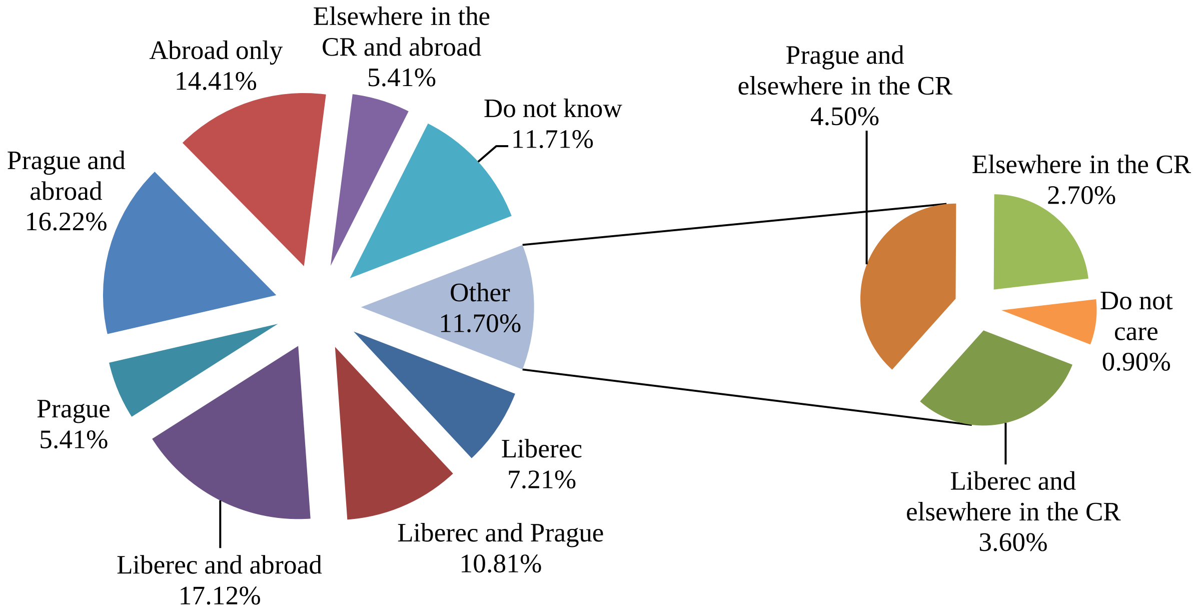
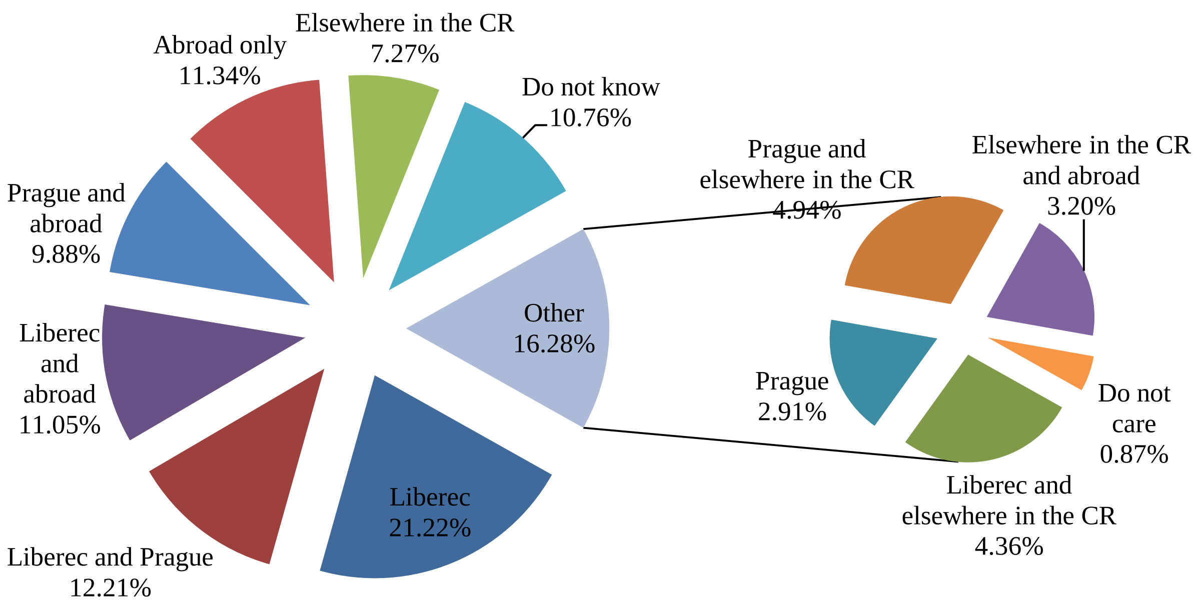
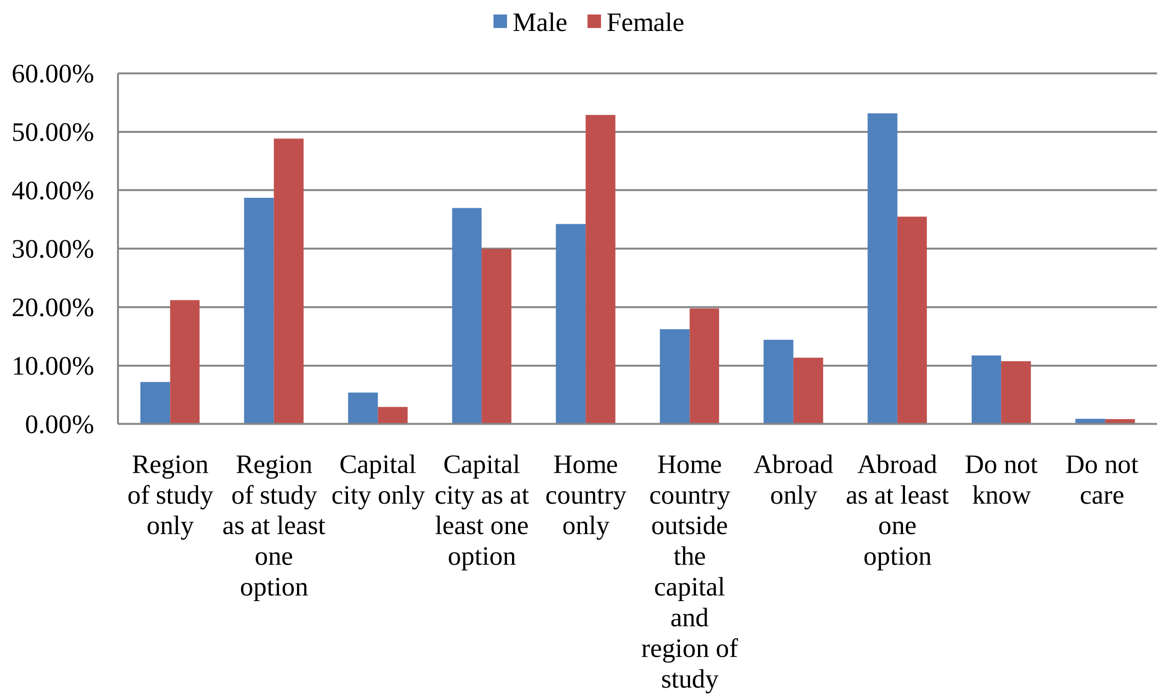


Figure 5.24 Expected graduate job destinations – Liberec females



Figures 5.23 and 5.24 show that 38% of males and 49% of females in the Liberec sample intend to work in the Liberec region as at least one option. Liberec was a sole option for just over 7% of men and 21% of women. 26% of men and nearly 30% of women intend to work in Prague as at least one option; Prague was a lone option for 5.41% of men and 2.91% of women. Working outside the region of study and the capital was chosen as at least one option by 16% of men and nearly 20% of women. Just over 34% of men and 31.5% of women intend to work in the Czech Republic only whereas approximately 53% of men and just over 35% of women selected choices outside the Czech Republic as at least one option. Working abroad was a sole option for just below 15% of men and just over 11% of women. Nearly 12% of men and less than 11% of women do not know and less than 1% of respondents, both male and female, do not care where they will find their graduate job. The gender differences are presented graphically in Figure 5.25.

Figure 5.25 Graduate destinations: gender comparison – Liberec sample

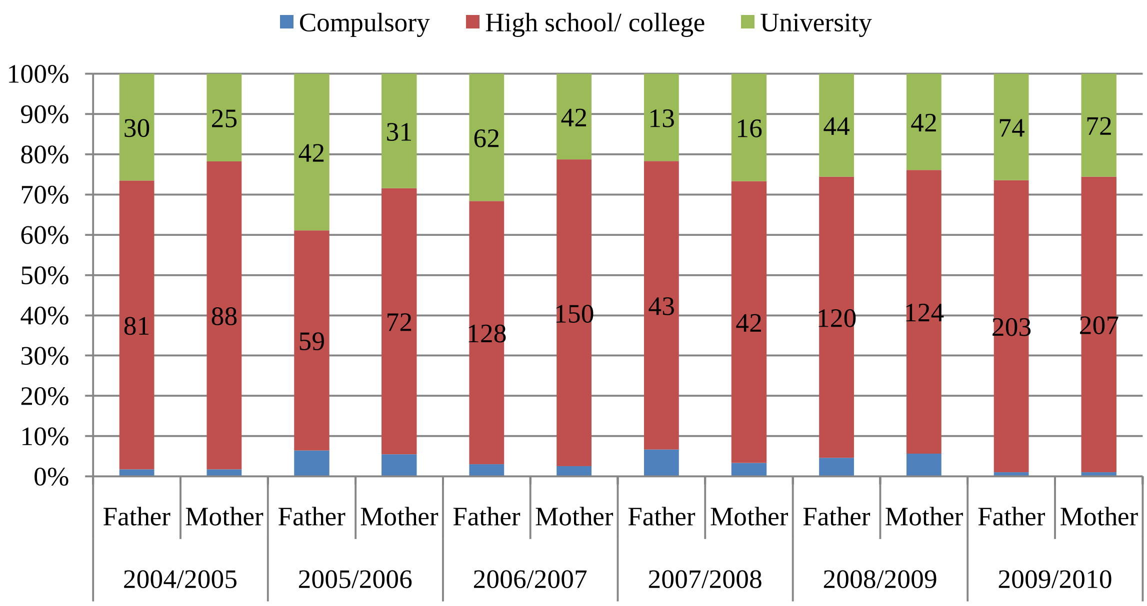


A similar proportion of respondents in Prague and Liberec intend to work in the Czech Republic only. The proportion of men in Prague who intend to work abroad as at least one option is similar to that in Liberec. However, when it comes to women, nearly twice as great a proportion of them in Prague intend to work abroad (as at least one option) when compared to those in Liberec. Similarly working abroad as a sole option was chosen by 15% of men in both Prague and in Liberec whereas a four percentage points higher proportion of women in Prague chose this option when compared to those in Liberec. Approximately twice as many respondents in Liberec than in Prague are unclear about their intentions regarding their graduate job location. More men in Prague do not care about the job location when compared to men in Liberec. On the other hand smaller proportion of women in Prague responded that way when compared to women in Liberec.

5.3.2.2 Parental education

Figure 5.26 presents the highest achieved level of education of the respondents' parents. It shows graphically the proportions of mothers and fathers with different levels of education. Every year there were more university educated fathers than university educated mothers (except for the academic year 2007/2008). The number of parents with compulsory education only is very low and the most common education level of both parents is secondary education. When compared to the parents of students in the Prague sample, it is apparent that a smaller proportion of parents in the Liberec sample are educated to a university level.

Figure 5.26 Parental education – Liberec sample



5.3.2.3 Parental income

Like in Prague, in 2008/2009 the questionnaire underwent a change in the question regarding the parental income of the respondents. Asking students to estimate their parents' income by selecting an appropriate range rather than stating a precise figure helped improve the response rate in Liberec too. After the change, the non-response rate was as little as 2.7%, whereas prior to 2008/2009 it was as high as nearly 24%.

Tables 5.7 and 5.8 present the estimates of the central tendency for both fathers and mothers, respectively. A comparison of these shows that respondents' fathers earn more than their mothers since the arithmetic mean, median and mode are either the same or lower for mothers than for fathers. In addition, the 75th percentile shows that the threshold below which three quarters of fathers earn is higher than that below which three quarters of mothers do, which, along with the median and the first quartile, implies that fathers earn more than mothers.

Table 5.7 <u>Father's income – Liberec sample</u>

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	103	13	27641	22000	20000	17000	22000	30000
2005/2006	90	19	25556	22500	20000	16750	22500	30000
2006/2007	164	39	25497	20000	20000	17000	20000	30000
2007/2008	53	10	28245	25000	40000	20000	25000	37500
2008/2009	159	20	26837	25000	25000	17500	25000	35000
2009/2010	267	15	27369	25000	25000	17500	25000	35000

Table 5.8 <u>Mother's income – Liberec sample</u>

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	108	8	17824	15000	12000	12000	15000	20000
2005/2006	94	15	18484	16000	20000	12000	16000	20000
2006/2007	169	34	17828	15000	20000	12000	15000	20000
2007/2008	54	9	20565	18500	20000	14750	18500	22500
2008/2009	169	10	19970	17500	17500	12500	17500	25000
2009/2010	275	7	18973	17500	17500	12500	17500	25000

By comparing mean, median and mode the distribution can be determined. The Liberec sample is positively skewed since mean is larger than median, which suggests that there are more parents, both mothers and fathers, earning below average than above average. When compared to Prague, mothers and fathers of students in Liberec have lower incomes than those of students in the Prague sample.

The distribution of parental income is graphically demonstrated by the histograms with a normal distribution curve in Figures 5.27, 5.29 and 5.28 and 5.30 for fathers and mothers, respectively. Given the change in methodology the histograms are presented separately for the period before (Figure 5.27 and 5.28) and after the change which occurred in 2008/2009 (Figure 5.29 and 5.30).

Figure 5.27 income distribution prior to 2008/2009 – Liberec sample

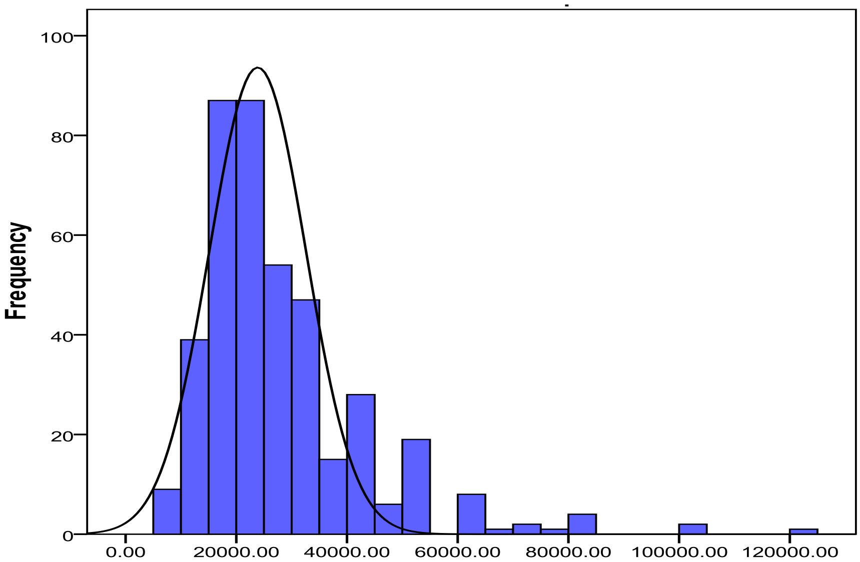
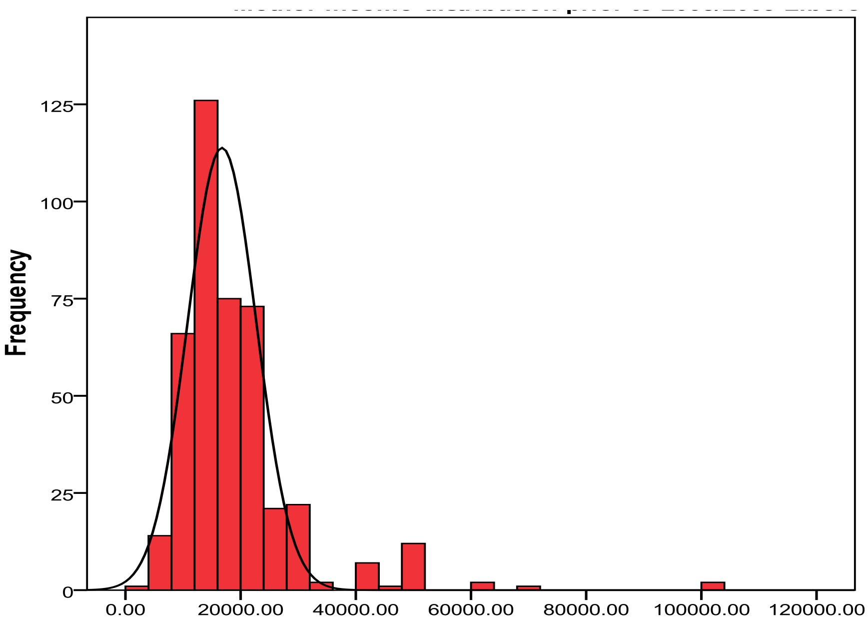


Figure 5.28 Mothers' income distribution prior to 2008/2009 – Liberec sample



A difference is apparent between the histograms presenting the distributions of both fathers' and mothers' income before and after the change occurred. Using the intervals rather than precise figures caused the distribution to be more normal-like. Like in Prague, it seems that the last interval could be split into more, given the number of fathers that fit into the category of monthly earnings above 50,000 CZK (Figure 5.29). This does not seem to be a major issue when it comes to mothers, which once again suggests that there are more high-earners amongst fathers than amongst mothers.

Figure 5.29 Fathers' income distribution after 2008/2009 – Liberec sample

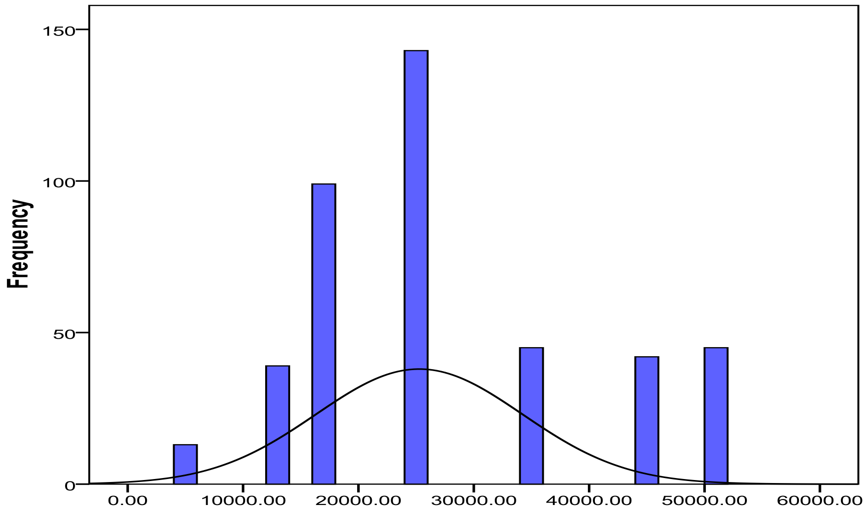
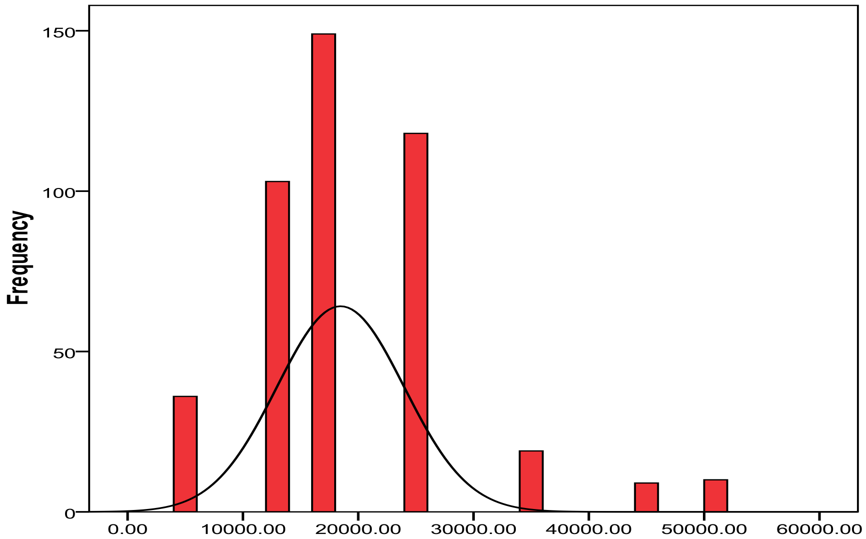


Figure 5.30 Mothers' income distribution after 2008/2009 – Liberec sample



5.3.2.4 Perceptions of parental income

The respondents were asked to what extent they perceived their parental income to be high. As in the case of Prague, the findings are summarised in a cross tabulation (Table 5.9 and 5.10 for fathers' and mothers' income respectively) with Spearman correlation coefficient noted to show the strength of the relationship between the parental income and students' perceptions of its level.

Tables 5.9 and 5.10 show to what extent students agree with the statement that they perceive their parents' income to be high, and the number of respondents in each given parental income interval. The correlation coefficient (0.68 and 0.6 for fathers and mothers, respectively) is slightly higher than in the case of Prague and thus also shows a strong positive relationship between the level of parents' income and the perception of its level, i.e. the higher is the parent's income the more likely are the students to perceive their parent's income to be high. The cross tabulations and the correlation coefficients show consistency and meaningfulness of the responses and thus establish validity of the data. The strength of the relationship can be explained by the qualitative analysis in the same way as in the case of Prague, i.e. even if a parent has a relatively high income (as compared to a national average) but has to invest plenty of time and energy to earn the income the students are more likely to disagree with the statement that their parents' income is high, and vice versa.

Table 5.9 Crosstabulation of father's income and perceptions of its level

		I perceive my father's wage to be high					Total
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	
Father's wage	5000	8	4	1	0	0	13
	12500	6	24	9	0	0	39
	17500	2	26	70	1	0	99
	25000	0	12	110	18	0	140
	35000	0	1	27	16	1	45
	45000	0	1	18	20	3	42
	50000	0	2	7	28	8	45
	Total	16	70	242	83	12	423

Spearmen's correlation coefficient = 0.683**

Table 5.10 Crosstabulation of mother's income and perceptions of its level

		I perceive my mother's wage to be high					Total
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	
Mother's wage	5000	21	13	1	0	0	35
	12500	16	70	17	0	0	103
	17500	8	54	83	2	0	147
	25000	1	26	84	6	0	117
	35000	0	2	13	3	1	19
	45000	0	2	5	2	0	9
	50000	0	0	5	5	0	10
	Total	46	167	208	18	1	440

Spearmen's correlation coefficient = 0.603**

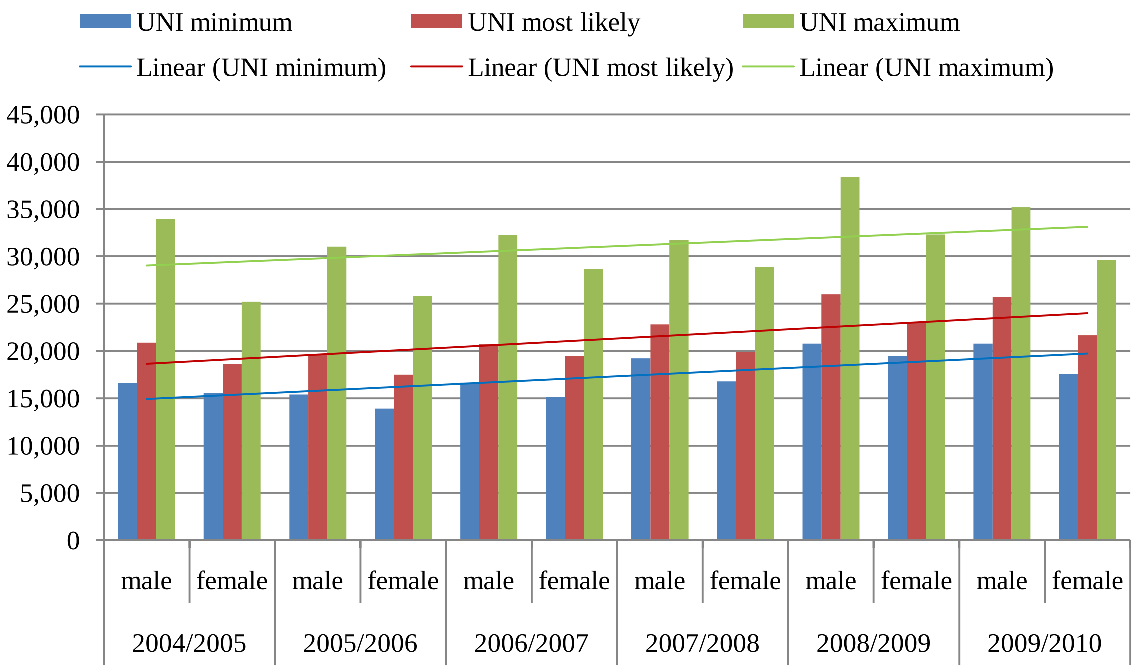
When compared to Prague (37.96%), a smaller proportion of mothers in Liberec earn between 20,000 and 30,000 CZK/month (26.60%); most mothers of respondents in Liberec earn between 15,000 and 20,000 CZK/month (33.41%). A higher proportion of students disagree with the statement in the 20,000 – 30,000 CZK/month interval in Prague (33.33%) than in Liberec (12.68%). When it comes to fathers, a higher proportion of fathers earn 15,000 – 30,000 CZK/month in Liberec (56.50%) than in Prague (42.72%) and a higher proportion of fathers earn 20,000 – 40,000 CZK/month in Prague (49.23%) than in Liberec (43.73%). As in the case of mothers, a higher proportion of students disagree with the statement when fathers earn 20,000 – 30,000 CZK/month in Prague (46.48%) than in Liberec (13.95%).

This finding not only suggests that parental earnings are higher in Prague than in Liberec but also that students in Prague are more demanding in terms of their parents’ salaries, i.e. that students in Prague will agree with the statement at a higher level of parental earnings when compared to students in Liberec. This may imply that students in Prague will have higher demands in terms of their own salary when compared to students in Liberec. Indeed, the following section will show that students from Prague expect to earn more than their peers in Liberec.

5.3.2.5 Earnings expectations

Figure 5.31 suggests that men in the Liberec sample expect higher earnings at the point of graduation than their female counterparts in every surveyed year at all three levels, i.e. minimum most likely and maximum. It also seems that men expect to earn substantially more than women when estimating the maximum level of income. This seems to be the case in the other three hypothetical situations, i.e. point of graduation from secondary education and ten years after that, and ten years after graduating from university (see Appendix 5.6 for graphical presentation of the three scenarios for the Liberec sample). In addition, the trend lines plotted through the earnings estimates presented in Figure 5.31 show an increasing trend, i.e. expectations tend to increase from year to year.

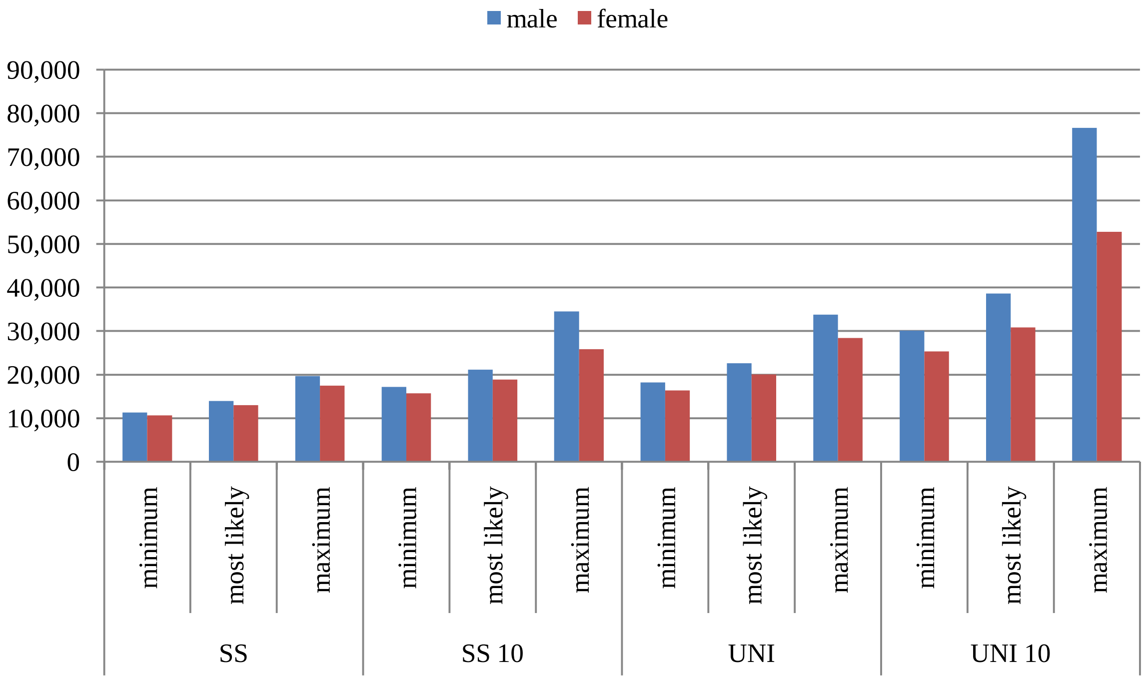
Figure 5.31 Expected earnings immediately after university graduation – Liberec sample



The data presented in Figure 5.32 show that the difference between men and women is least apparent in estimates at the point of finishing high school and seems to be the largest ten years after graduating from university, i.e. the data suggest that the gender differences in earnings expectations tend to increase with level of education and experience. In other words, the further in the future is the estimate of earnings made, and the higher is the level of education, the larger is the difference in expected earnings between men and women, i.e. at the point of graduation, whether from a university or from high school, the gender difference is expected to be smaller than later in the respondents' working lives.

Indeed, the literature suggests that male and female age-earnings profiles are similar at the beginning of a career and that it is later in their working lives when female age-earnings profiles become flatter (cf. Smith and Powell, 1990; Blau and Ferber, 1991). Moreover, it seems that the lower is the level of probability of obtaining the expected income the higher is the difference in expectations between men and women. Figure 5.32 also implies that the higher is the level of schooling, the higher are the expected earnings, and that expected earnings tend to increase with experience. To be specific, students seem to expect the lowest wages after finishing secondary education (SS) and the highest wages ten years after graduating from university (UNI 10). It is noteworthy that, as in the Prague sample, earnings expected at the point of graduation from the university (UNI) appear to be similar to those expected ten years after graduating from high school (SS 10).

Figure 5.32 Averaged expected earnings across years – all levels and points in time – Liberec sample



Figures 5.33 and 5.34 present the development of earnings expectations in time for men and women, respectively. Earnings expected immediately after finishing secondary education are, like in Prague, used as an example (see Appendix 5.7 for the development of earnings expectations in the other three scenarios for both genders). It is apparent from Figures 5.33 and 5.34 that earnings expectations of both men and women in the Liberec sample increase in time in a steady and continuous manner. The trend lines plotted through the data in Figures 5.33 and 5.34 show a nearly perfect linear development at all three levels of expectations, i.e. minimum, most likely, and maximum. This suggests consistency of the findings and thus validity/reliability of the data/research. In addition, as in the case of Prague, it suggests that students are indeed well informed of the labour market conditions and earnings.

Earnings expected at the point of graduation from high school as well as their rate of growth during the surveyed years (indicated by the slope of the trend line) in the Liberec sample seems to be very similar for both genders. Indeed, there is no reason to expect any differences since the information regarding the labour market is available to both genders equally.

Figure 5.33 Development in time of earnings expectations immediately after graduation from high school – males, Liberec sample

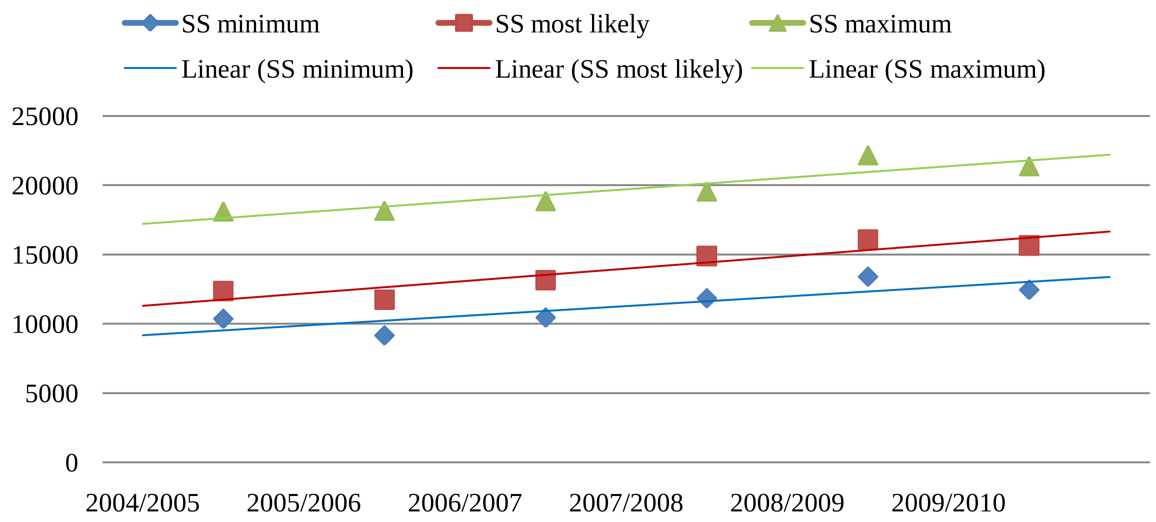
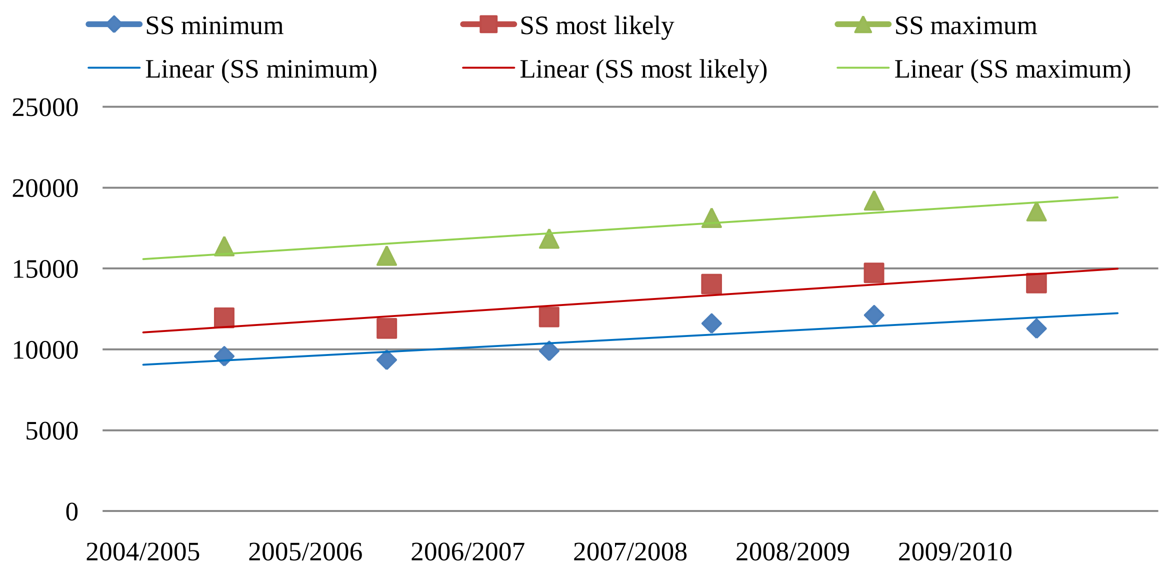


Figure 5.34 Development in time of earnings expected at the point of graduation from high school – females, Liberec sample



Figures 5.35 and 5.36 show the distribution of the expected earnings with and without the university degree at both points in time, i.e. at graduation and ten years later. The distributions are similar in terms of its shape, i.e. kurtosis and skewness but the distribution of

earnings expectations with a university degree is shifted more towards the right hand side for both points in time, suggesting that students expect to earn more with a university education than with high school education regardless of the labour market experience. Moreover, the left hand side of the distributions shows that lower earnings are expected by students on fewer occasions with a university education than with a secondary education; this is particularly evident from Figure 5.35.

Figure 5.35 Expected earnings' distribution at the point of graduation from high school and university – Liberec

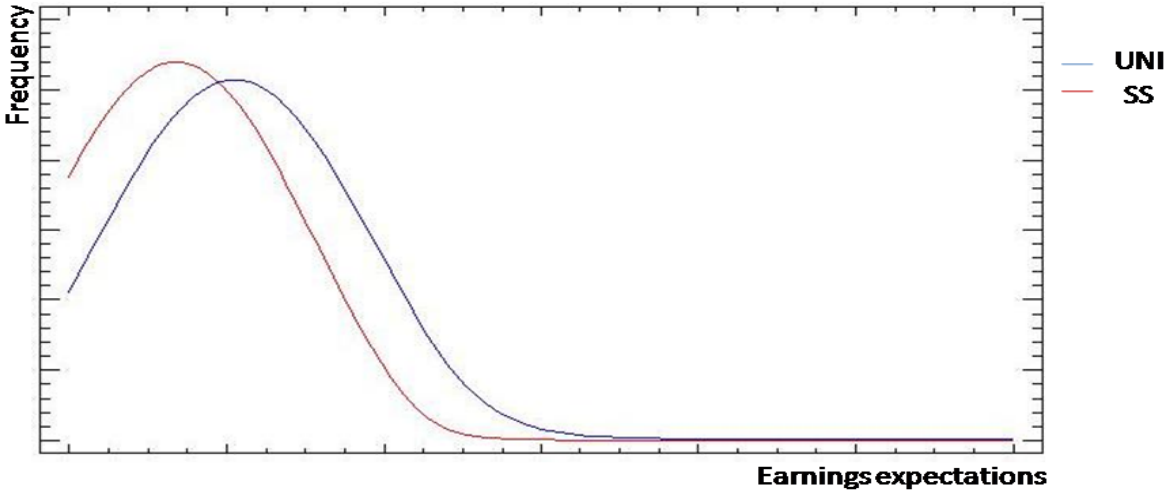
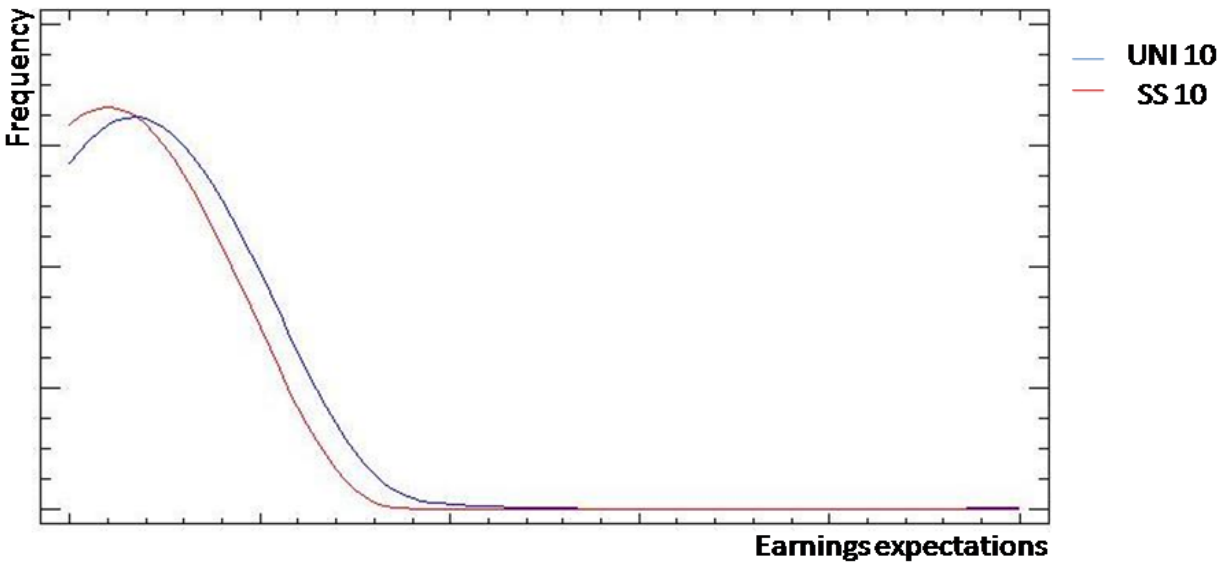


Figure 5.36 Expected earnings' distribution ten years after graduation from high school and university – Liberec



5.3.2.6 Expected rates of return

Figure 5.37 shows the rates of return as an average of all surveyed years for men and women. What is noticeable is the difference in the maximum average expected rates of return between men and women ten years after graduation from university, with men expecting the maximum rates of return to their higher education to be much higher than those of women. Figure 5.37 tends suggests that men expect a further and a faster growth than women. However, this seems to be caused by the differences between men and women in the maximum rates of return estimates at both graduation and ten years after. Indeed, when comparing the minimum and the most likely expected rates of return at both points in time, the difference between men and women is not as large as at the maximum level. Nevertheless women seem to expect lower rates of return on all occasions.

Figure 5.37 tends to suggest that students in Liberec, both male and female, expect higher returns ten years after graduation. In other words, it seems that students in Liberec, like students in Prague, expect, on average, to benefit from their university studies more in the medium term than immediately after graduation.

Figure 5.37 Gender differences in expected rates of return – by situation, Liberec sample

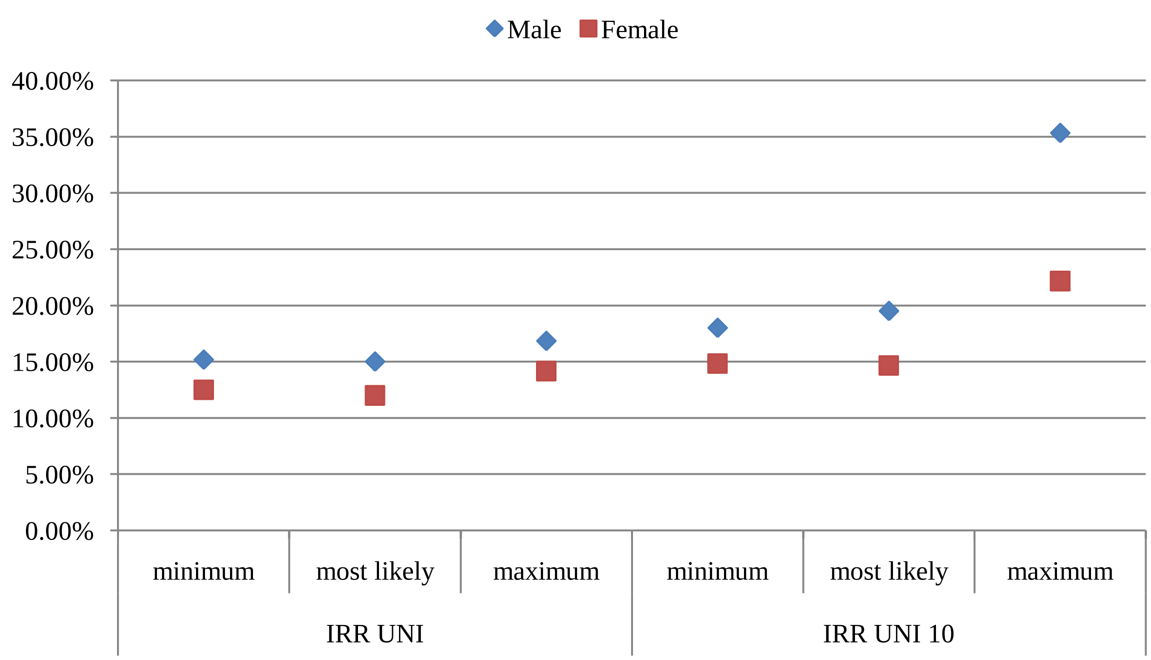
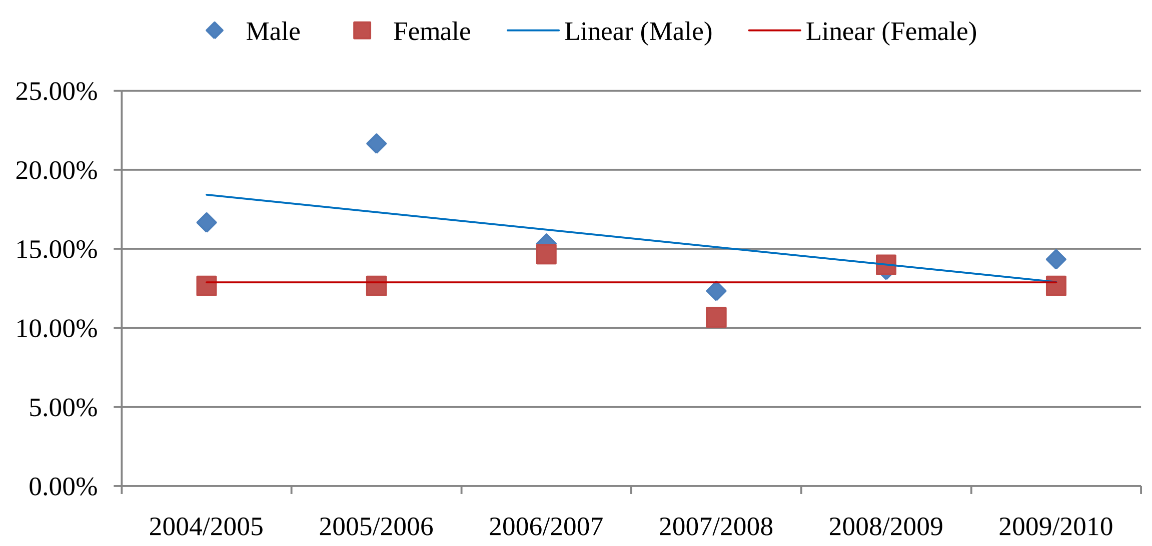


Figure 5.38 presents gender differences in expected rates of return by year. The average of the minimum, most likely and maximum rates of return expected at the point of graduation was used to show the development over time. It has been fluctuating for both genders; however more variation over time was found among the expected rates of return of men. The trend line however smoothes the pattern and as a result demonstrates the development of expected rates of return for women to be stable over time and shows a decreasing tendency for men. This implies that on average the difference between men and women in terms of their expected rates of return has been narrowing down. Indeed the gender differences in 2004/2005 and 2005/2006 were much larger than in the more recent years of the survey.

It will be tested in section 5.7 whether or not there are any statistically significant gender differences in earnings expectations and in the expected rates of return. The development of earnings expectations and the expected rates of return over time will be subject to multiple regression analysis in section 5.11.

Figure 5.38 Gender differences in expected rates of return at graduation – by year, Liberec sample



5.3.3 Pardubice

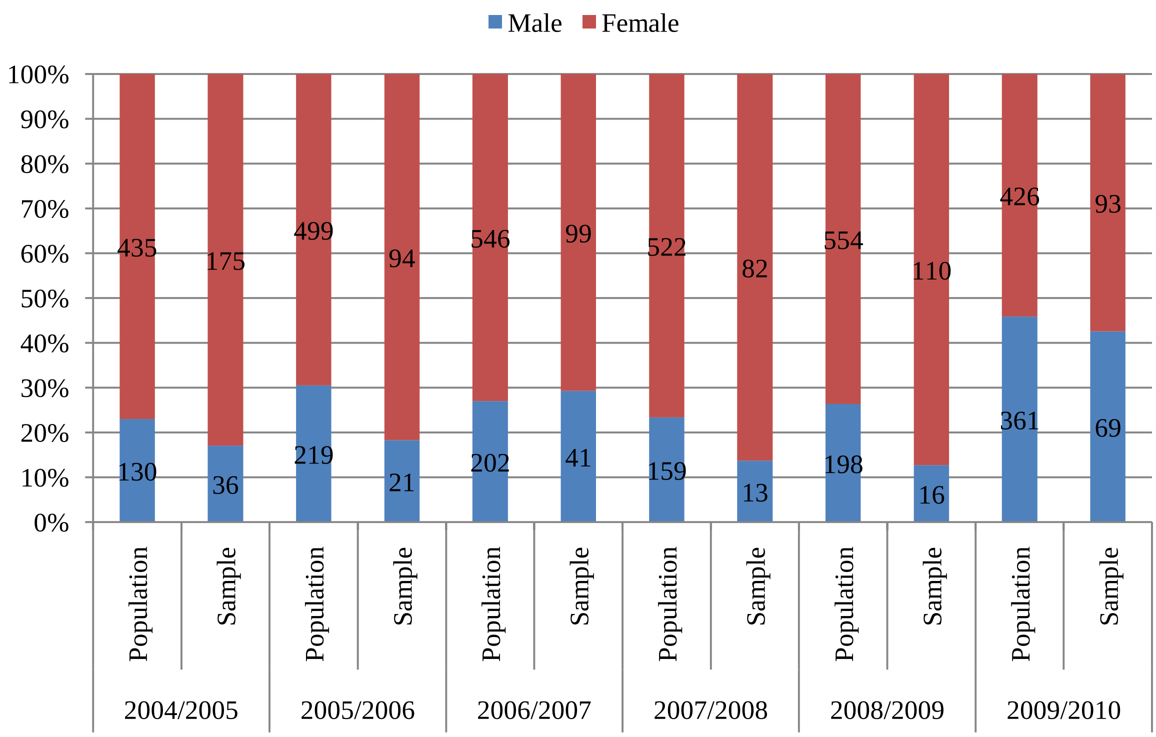
The data that are used in this study to represent first year business students in Pardubice were collected at the Faculty of Economics and Administration. It is one of seven faculties at the

University of Pardubice, which is the only university in the Pardubice region and had more than 10,000 students studying there in 2009/2010.

5.3.3.1 Gender and expected graduate destinations

Figure 5.39 presents the gender distribution of the sample of students in Pardubice. It shows that men have been a minority in all surveyed years with women forming a majority of around 80% (except for 2009/2010, when the proportion of men increased significantly, although men still remained under represented). Even though such a high proportion of women is not usual at Czech Faculties of Economics, it has been relatively stable over time in the Pardubice sample and the sample tends to reflect the actual gender distribution of students at the Faculty of Economics and Administration. The sample therefore can be considered to be reasonably representative of the population of first year business students in Pardubice.

Figure 5.39 Gender distribution – Pardubice population and sample



Figures 5.40 and 5.41 present findings concerning students' intentions in terms of graduate job location for males and females, respectively. Students were given a list of options from which a maximum of two could have been chosen. As in Prague and Liberec the data are analysed together rather than by year since a limited time period is available for the analysis of the development of preferences regarding graduates' destinations over time. As for Prague and Liberec, students were offered regions in the Czech Republic as options for their graduate job locations, one of which was the region of study and one was the capital city, as well areas outside the Czech Republic, such as the EU and North America. Thus students' responses were split into twelve categories which are presented in the 'pie in pie' charts in Figures 5.40 and 5.41.

Figure 5.40 Expected graduate job destinations – Pardubice males

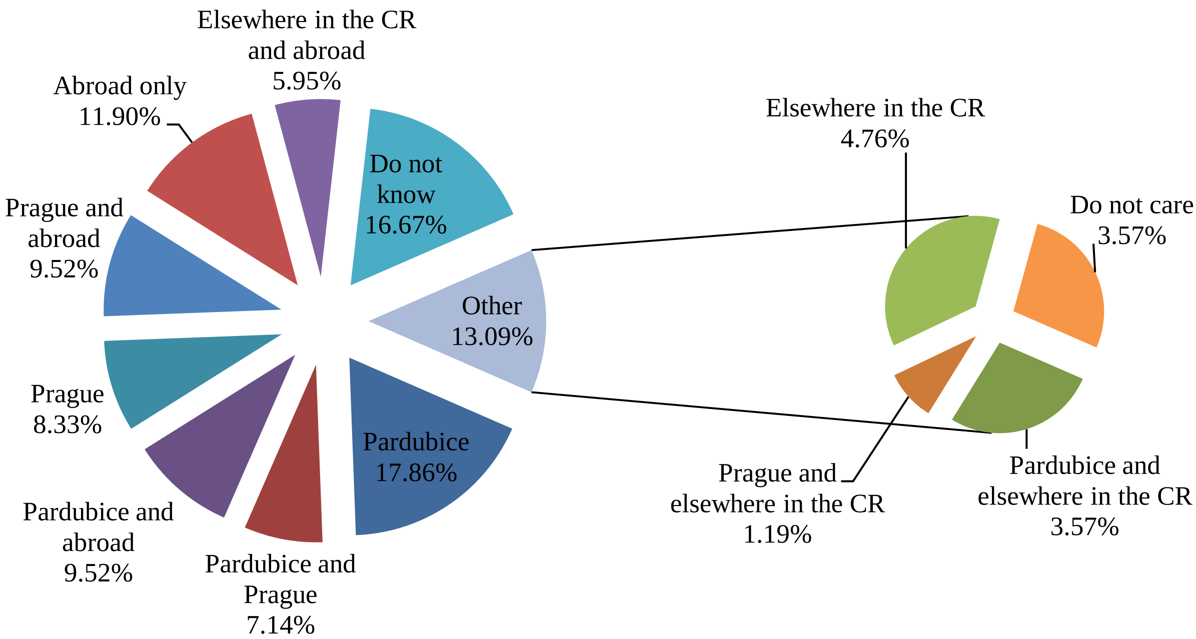
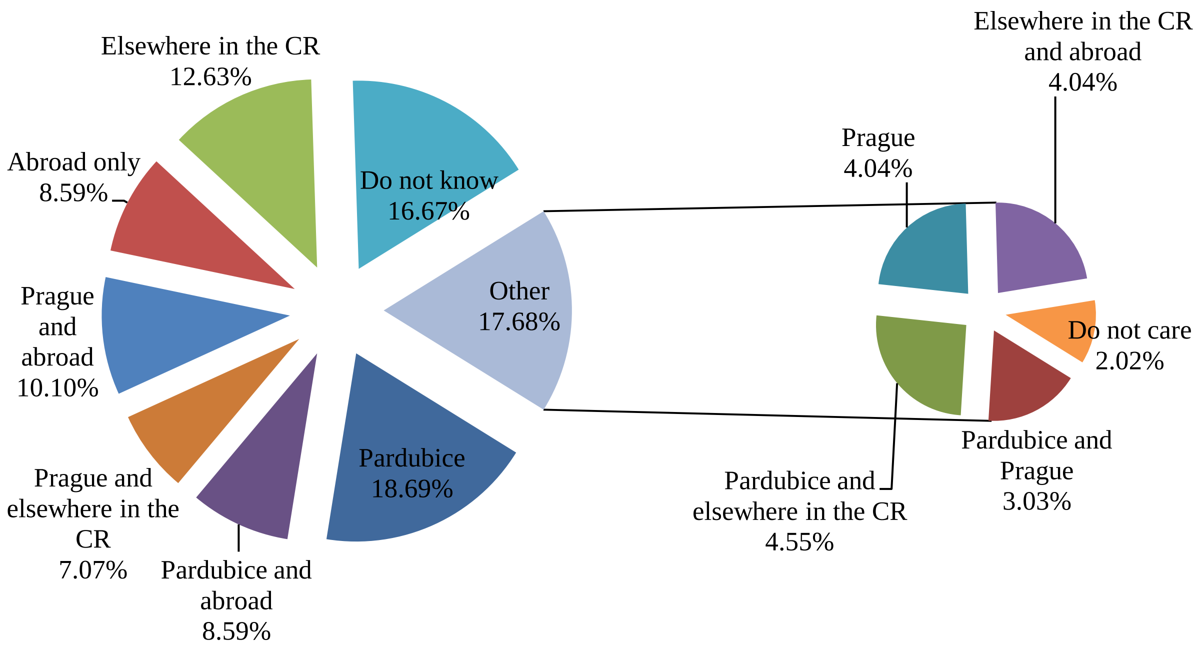
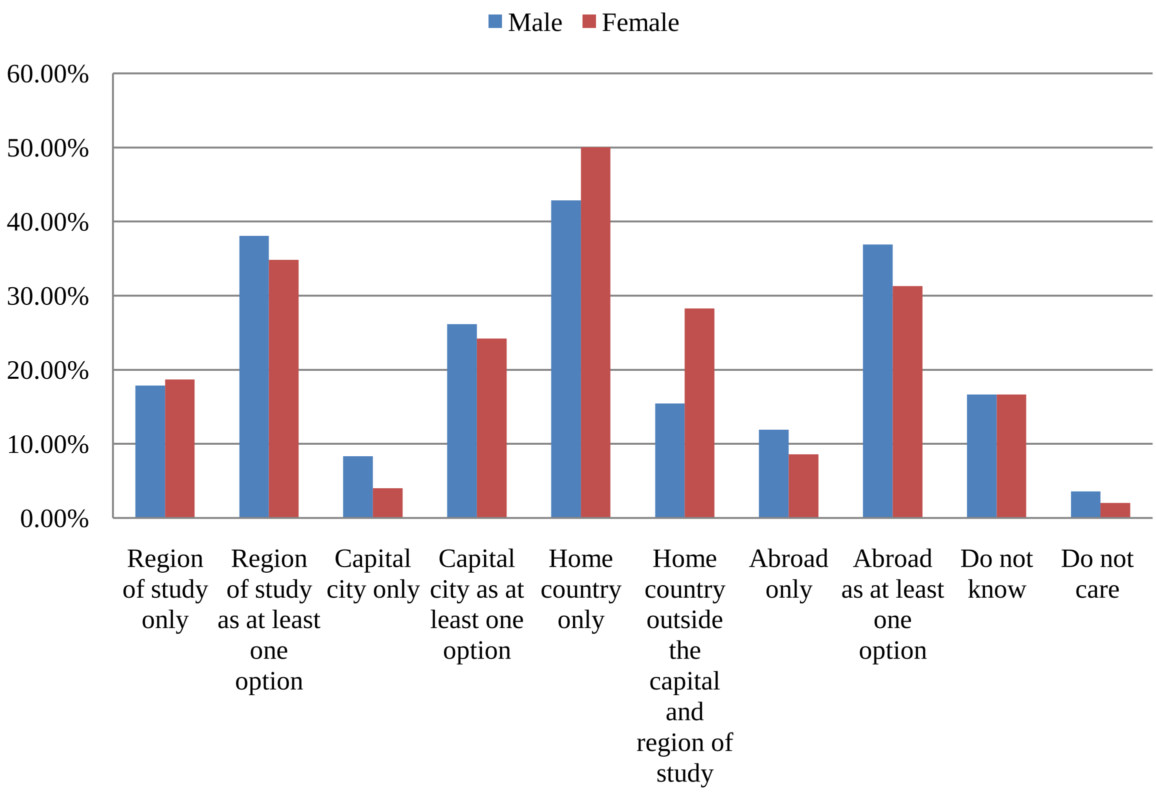


Figure 5.41 Expected graduate job destinations – Pardubice females



Figures 5.40 and 5.41 show that 38% of males and 35% of females in the Pardubice sample intend to work in the Pardubice region as at least one option. Pardubice was a sole option for 18% of men and 19% of women. 26% of men and just over 24% of women intend to work in Prague as at least one option; Prague was a lone option for 8% of men and 4% of women. Working in the Czech Republic but outside the region of study and the capital was chosen as at least one option by 15.5% of men and just over 28% of women. Nearly 43% of men and 50% of women intend to work in the Czech Republic only; nearly 37% of men and just over 31% of women selected choices outside the Czech Republic as at least one option. Working abroad was a sole option for just below 12% of men and nearly 9% of women. Nearly 17% of respondents, both male and female, do not know where they want to find their graduate job and just over 3.5% of men and 2% of women do not care about it. The gender differences are presented graphically in Figure 5.42.

Figure 5.42 Graduate destinations: gender comparison – Pardubice sample

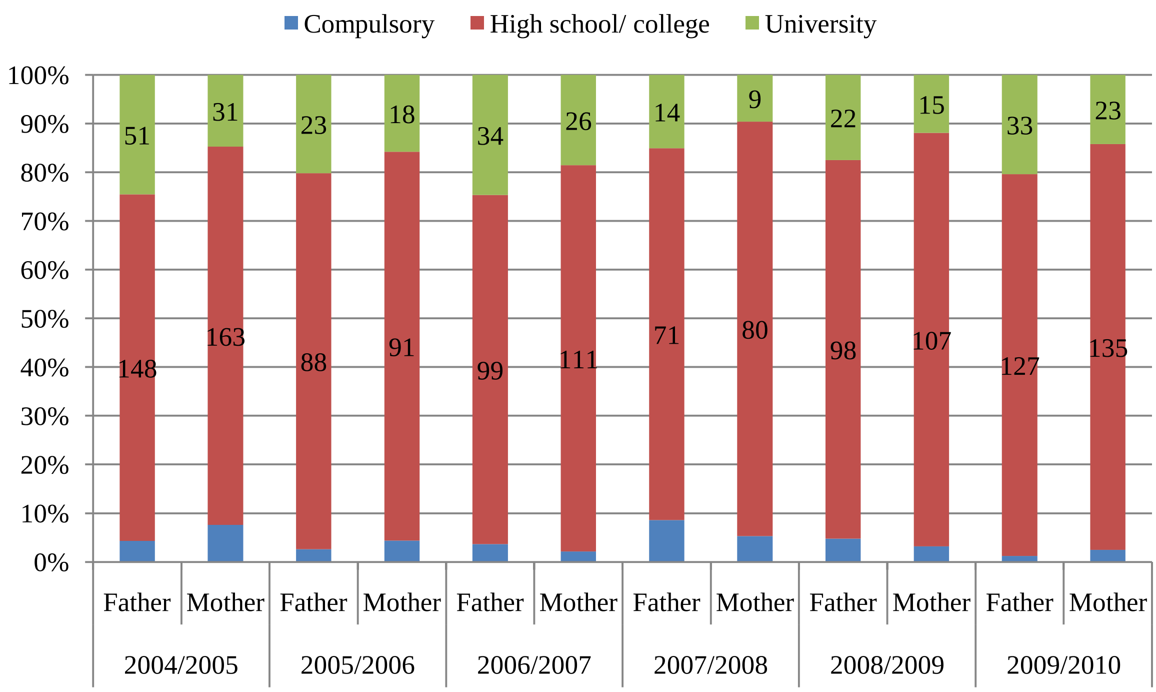


Students in Pardubice seem to be most likely to look for their graduate job in the Czech Republic, when compared to their peers in Liberec and Prague. On the other hand students from Prague are most likely to consider looking for their graduate job abroad. The highest proportion of students who do not know where they want to find their graduate job is in Pardubice; the most certain about their intentions are students in Prague. Overall comparison suggests that students generally care about their destinations once they graduate; the maximum proportion of those who do not care was 5% of men in Prague. On the other hand, in Prague there is to be found the lowest proportion of women who do not care (0.5%).

5.3.3.2 Parental education

Figure 5.43 presents the highest achieved level of education of the respondents' parents. Mothers and fathers are treated separately to see if there is any difference between their schooling attainments. Figure 5.43 shows graphically the proportions of parents with compulsory, high school and university education; every year there were more university educated fathers than university educated mothers. The number of parents educated to a compulsory level only has been tiny over the years. Parents with secondary education formed a large majority each year the survey was conducted. Amongst all Czech surveyed institutions, the smallest proportion of university educated parents are in the Pardubice sample.

Figure 5.43 Parental education – Pardubice sample



5.3.3.3 Parental income

The question in the questionnaire that asked students about their parents' income was modified in 2007/2008[38] for Pardubice data collection. Like in Prague and Liberec the low response rate of the question was successfully improved. This is apparent from Tables 5.11 and 5.12 where valid and missing cases are presented. Before 2007/2008 the non-response rate ranged from 15% to 22% whereas from 2007/2008 it ranged from 1% to 6%.

In addition, tables 5.11 and 5.12 present estimates of the central tendency for both fathers and mothers, respectively. A comparison of these shows that respondents' fathers earn more than their mothers since the arithmetic mean, median and mode are either the same or lower for

[38] Data collection was undertaken later in the first term than in Liberec and Prague. Therefore the changes in the questionnaire suggested by the researcher were implemented in 2007/2008.

mothers than for fathers. The Pardubice sample seems to be positively skewed since the mean is larger than the median, which suggests that there are more people earning below average than above average. When compared to the Prague and Liberec samples, parents of students in Pardubice earn the lowest income.

The 75th percentile shows that the threshold below which three quarters of fathers earn is higher than that below which three quarters of mothers do, which, along with the median and the first quartile, implies that men earn more than women. This is also demonstrated by the histograms with a normal distribution curve in Figures 5.44, 5.46 and 5.45, 5.47 for fathers and mothers, respectively. Given the change in methodology the histograms are presented separately for the period before (Figure 5.44 and 5.45) and after the change which occurred in 2007/2008 (Figure 5.46 and 5.47).

Table 5.11 Father's income – Pardubice sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	182	29	21431	16000	15000	12000	16000	25000
2005/2006	100	15	23360	20000	20000	15000	20000	25000
2006/2007	115	25	27562	20000	15000	15000	20000	25000
2007/2008	93	2	23172	17500	17500	17500	17500	25000
2008/2009	119	7	23361	17500	17500	17500	17500	25000
2009/2010	153	9	25931	25000	17500	17500	25000	30000

Table 5.12 Mother's income – Pardubice sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	*Missing*	*Mean*	*Median*	*Mode*	*25*	*50*	*75*
2004/2005	189	22	14272	12000	15000	9000	12000	15000
2005/2006	104	11	16269	15000	15000	12000	15000	18000
2006/2007	117	23	17309	14000	20000	10000	14000	20000
2007/2008	94	1	16090	17500	17500	12500	17500	17500
2008/2009	123	3	16159	17500	17500	12500	17500	17500
2009/2010	155	7	18564	17500	17500	12500	17500	25000

Figure 5.44 Fathers' income distribution prior to 2007/2008 – Pardubice sample

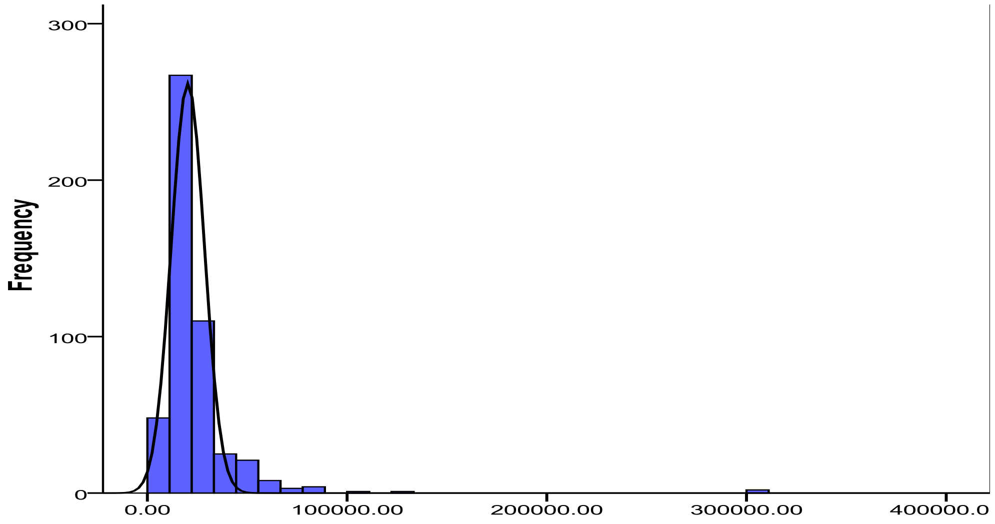
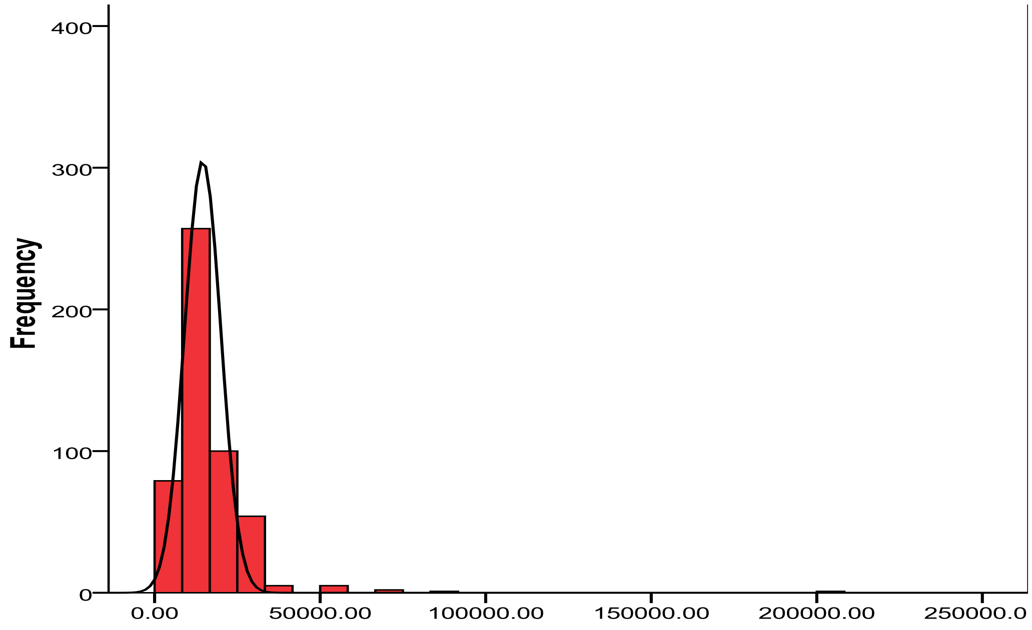


Figure 5.45 Mothers' income distribution prior to 2007/2008 – Pardubice sample



After the change occurred, though still positively skewed, the distribution of parental income became more normal like. As in the case of Prague and Liberec, the last interval (earnings above 50,000 CZK/month) could be split into more to allow for more precise estimates of the earnings in the right tail of the income distribution. This is particularly the case for fathers' earnings.

Figure 5.46 Fathers' income distribution after 2007/2008 – Pardubice sample

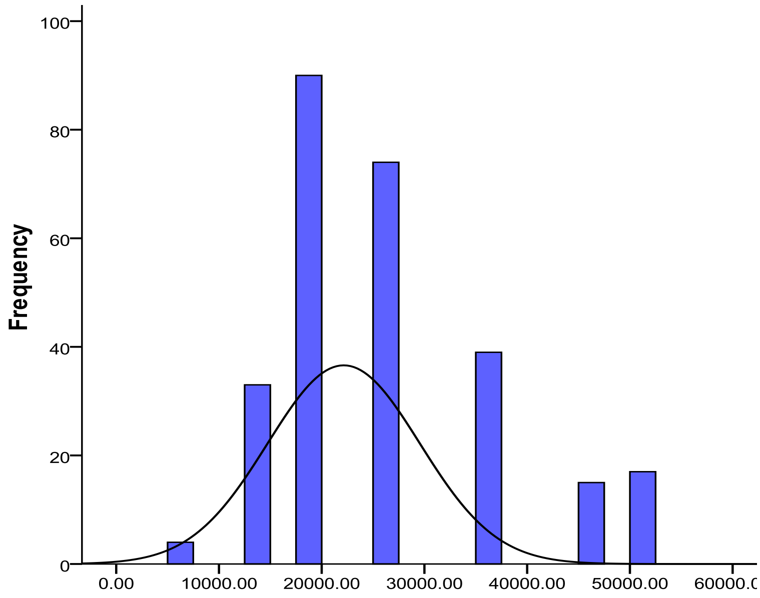
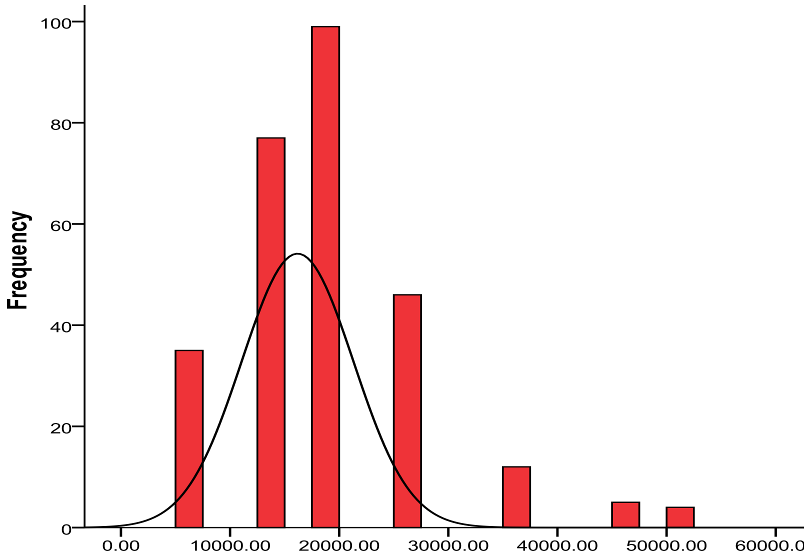


Figure 5.47 Mothers' income distribution after 2007/2008 – Pardubice sample



5.3.3.4 Perceptions of parental income

As in Prague and Liberec, respondents were asked to what extent they perceived their parental income to be high. The findings are summarised in a cross tabulation (Table 5.13 and 5.14 for fathers' and mothers' income respectively) with the Spearman correlation coefficient showing the strength of the relationship between the parental income and students' perceptions of its level. The correlation coefficient (0.6 in case of both fathers and mothers) shows a strong positive relationship, i.e. the higher is the parent's income the more likely are the students to perceive their parent's income to be high.

Although, like in Liberec, most mothers of respondents in Pardubice earn between 15,000 and 20,000 CZK/month, a smaller proportion of mothers earn between 15,000 and 30,000 CZK/month in Pardubice (52.16%) than in Liberec (60%) and a higher proportion of mothers in Pardubice earn between 10,000 and 20,000 CZK/month (63.31%) when compared to Liberec (56.82%) (both is also the case when compared to Prague). A higher proportion of students disagree with the statement in the 20,000 – 30,000 CZK/month interval in Prague (33.33%) and Liberec (12.68%) than in Pardubice (4.14%).

When it comes to fathers, a higher proportion of fathers earn 15,000 – 30,000 CZK/month in Pardubice (60.29%) than in Prague (42.72%) and Liberec (56.50%), and a higher proportion of fathers earn 20,000 – 40,000 CZK/month in Prague (49.23%) and Liberec (43.73%) than in Pardubice (41.54%). The proportion of students who disagree with the statement when fathers earn 20,000 – 30,000 CZK/month is higher in Prague (46.48%) and Liberec (13.95%) than in Pardubice (12.82%).

Table 5.13 Crosstabulation of father's income and perceptions of its level

		I perceive my father's wage to be high					
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	Total
Father's wage	5000	1	1	2	0	0	4
	12500	3	24	6	0	0	33
	17500	2	32	56	0	0	90
	25000	0	10	62	2	0	74
	35000	1	2	23	12	1	39
	45000	0	1	5	9	0	15
	50000	1	0	5	8	3	17
	Total	8	70	159	31	4	272

Spearman's correlation coefficient = 0.606**

Table 5.14 Crosstabulation of mother's income and perceptions of its level

		I perceive my mother's wage to be high					
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	Total
Mother's wage	5000	26	7	2	0	0	35
	12500	10	49	17	0	1	77
	17500	7	35	56	1	0	99
	25000	0	6	33	7	0	46
	35000	1	1	7	3	0	12
	45000	1	1	2	1	0	5
	50000	0	1	1	1	1	4
	Total	45	100	118	13	2	278

Spearman's correlation coefficient = 0.597**

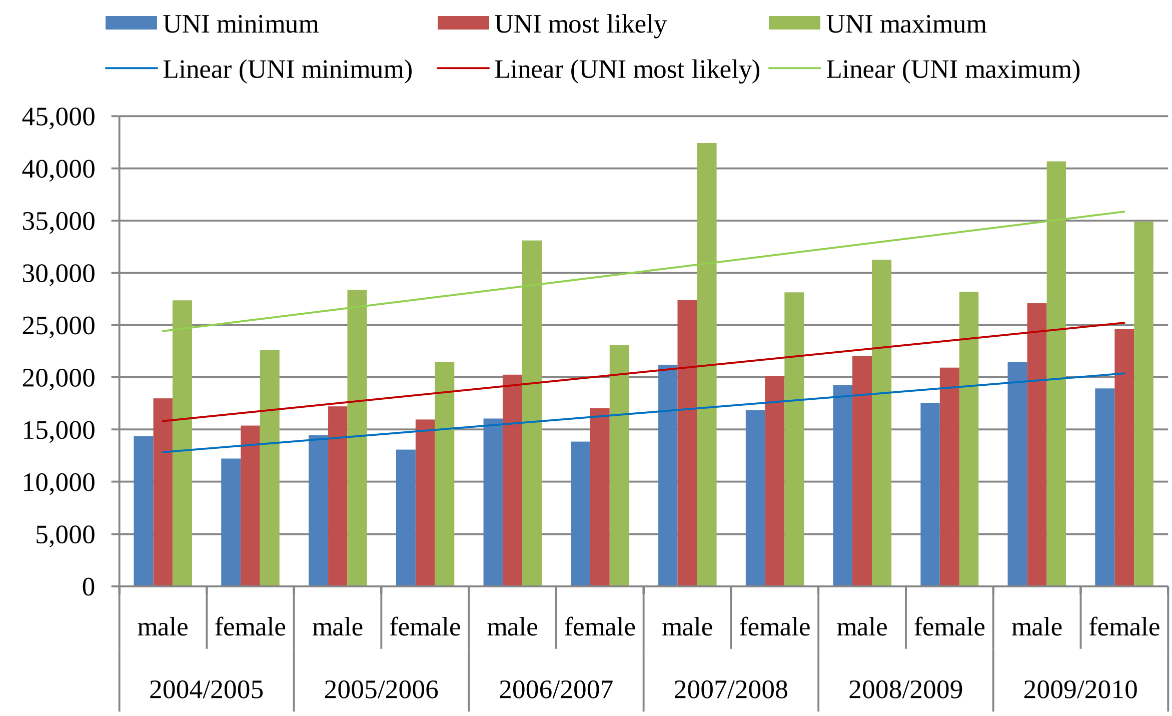
The descriptive analysis suggests that parental earnings are higher in Prague than in Liberec and these are higher than in Pardubice. Students, both male and female, in Prague are most demanding in terms of their parents' salaries when compared to their peers from Liberec and Pardubice, i.e. students in Prague will agree with the statement at a higher level of parental earnings when compared to students in Liberec and Pardubice. When Pardubice and Liberec are compared together, females in Liberec are more demanding in terms of their parental earnings than their peers in Pardubice but the opposite seems to be the case when it comes to male students in Liberec and Pardubice.

This may imply that students in Prague will have higher demands in terms of their own salary when compared to students in Liberec and Pardubice. Indeed, section 5.3.2.5.showed that students from Prague expect to earn more than their peers in Liberec and the following section 5.3.3.5 tends to suggest that students from Prague and Liberec expect higher earnings than students from Pardubice.

5.3.3.5 Earnings expectations

Figure 5.48 suggests that men in the Pardubice sample expect higher earnings at the point of graduation than their female counterparts every surveyed year at all three levels of probability. It also seems that the largest difference between men and women is to be found at the maximum level of the expected earnings. This seems to be the case in the other three hypothetical situations, i.e. point of graduation from secondary education and ten years after that, and ten years after graduating from university (see Appendix 5.8 for graphical presentation of the three scenarios for the Pardubice sample). In addition, the trend lines plotted through the earnings estimates presented in Figure 5.48 show an increasing trend, i.e. expectations increase from year to year.

Figure 5.48 Expected earnings immediately after university graduation – Pardubice sample

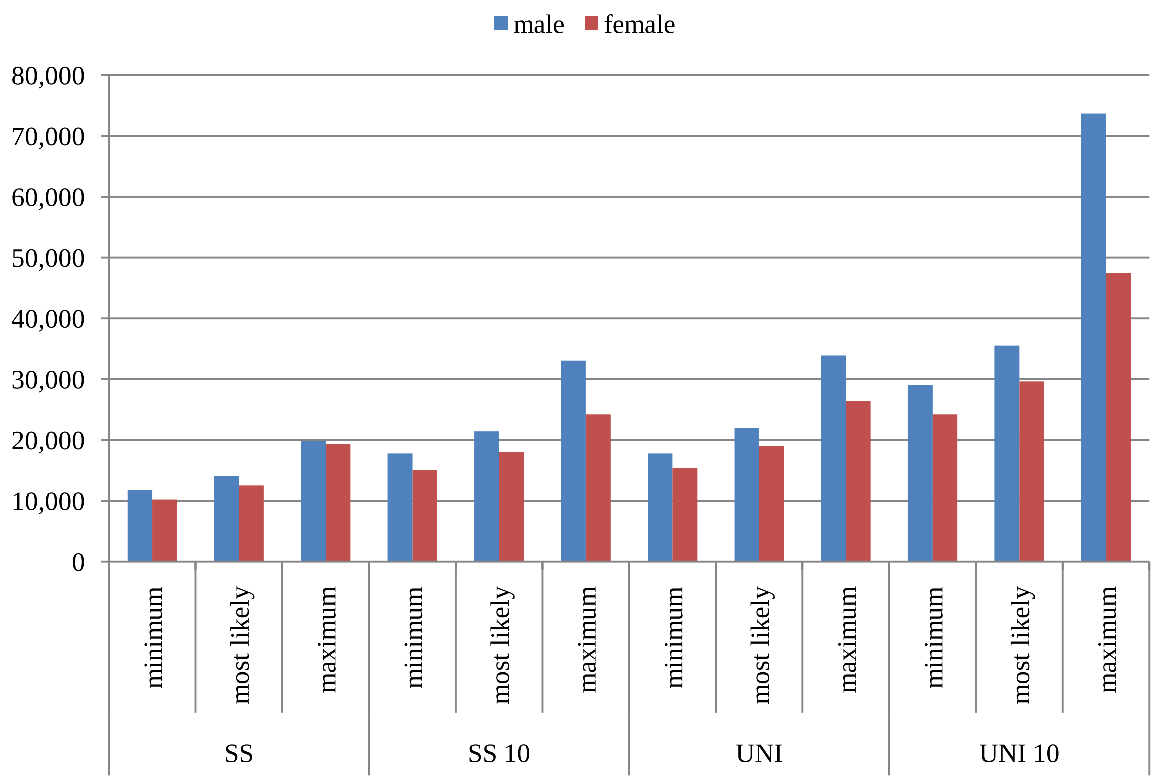


The data presented in Figure 5.49 show that the difference between men and women is least apparent in estimates at the point of finishing high school and is the largest when it comes to ten years after graduating from university, i.e. the further in the future is the estimate of the earnings made and the higher is the level of education, the larger is the gender difference in expected earnings. In other words, the data suggest that the gender differences in earnings expectations tend to increase with level of education and with experience.

This pattern, which is observed at all three Czech surveyed institutions, reflects the findings in the literature regarding age-earning profiles of men and women as well as the gender differences in actual earnings in the Czech Republic. The data from the Czech Statistical Office suggest that the gender-pay gap increases with age, experience and income. Indeed, the largest gender-pay gap is to be found at the 95th percentile of the income distribution (Erhartova, 2009).

Moreover, it seems that the lower is the level of probability of obtaining the expected income[39], the higher is the difference in expectations between men and women. In addition, Figure 5.49 implies that the higher is the level of schooling, the higher are the expected earnings, and that expected earnings increase with experience, i.e. students seem to expect the lowest wages after finishing secondary education (SS) and the highest wages ten years after graduating from university (UNI 10). It is noteworthy that, like in all other Czech cases, earnings expected at the point of graduation from university (UNI) appear to be similar to those expected ten years after graduating from high school (SS 10). This similarity will be tested in section 5.6 in order to find out whether students perceive a university degree to be worth approximately ten years of labour market experience.

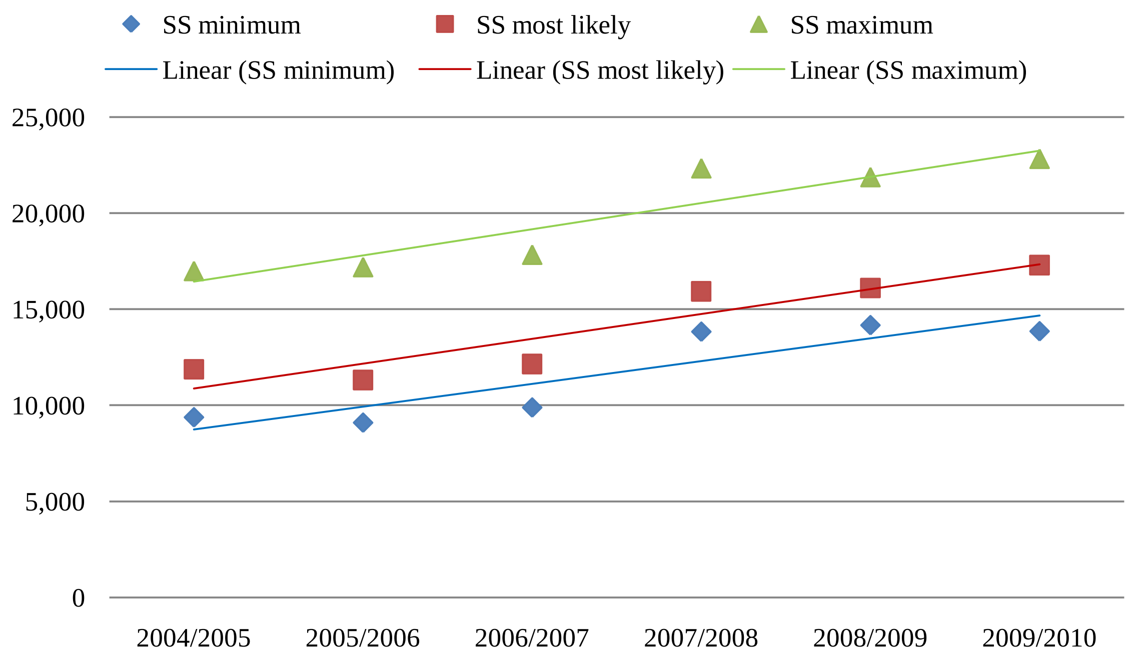
Figure 5.49 Averaged expected earnings across years – all levels and points in time – Pardubice sample



[39] Minimum is the most probable and maximum is least probable;

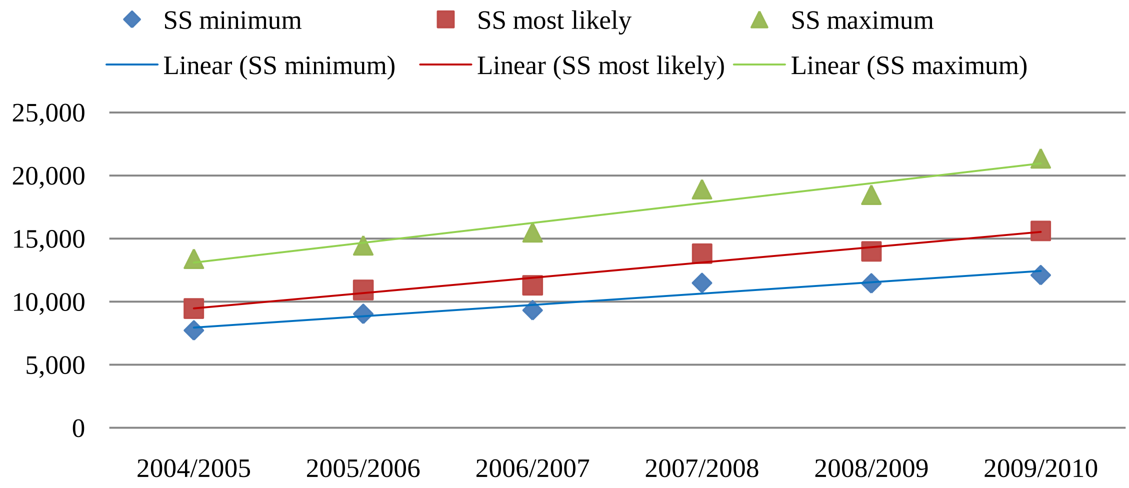
Figures 5.50 and 5.51 present the development of earnings expectations in time for men and women, respectively. Earnings expected immediately after finishing secondary education are, as in the other Czech samples, used for illustrative purposes (see Appendix 5.9 for the development of earnings expectations in other three scenarios for both genders). It is apparent from Figures 5.50 and 5.51 and Appendix 5.9 that earnings expectations for both men and women in the Pardubice sample increase in time in a steady and continuous manner. Although there is an anomaly in terms of a sudden increase in 2007/2008[40], students in Pardubice, like in Prague and Liberec, seem to be well informed and thus their expectations may be considered as realistic. In addition, earnings expected at the point of graduation from high school, as well as their rate of growth during the surveyed years (indicated by the slope of the trend line), in the Pardubice sample seems to be, as in other Czech institutions, very similar for both genders.

Figure 5.50 Development in time of earnings expected at the point of graduation from high school – males, Pardubice sample



[40] Reason for this is the data being collected later than usually

Figure 5.51 Development in time of earnings expected at the point of graduation from high school – females, Pardubice sample



Figures 5.52 and 5.53 show the distribution of the expected earnings with and without a university degree at both points in time, i.e. at graduation and ten years later. The distributions are similar in terms of their shape, i.e. kurtosis and skewness, but the distribution of earnings expectations with a university degree is shifted more towards the right hand side for both points in time suggesting that students expect to earn more with a university education than with high school education regardless of their labour market experience. Moreover, the left-hand side of the distribution in Figure 5.52 suggests that fewer students expect lower earnings at the point of graduation form a university than after graduating from high school.

Figure 5.52 Expected earnings' distribution at the point of graduation from high school and university – Pardubice sample

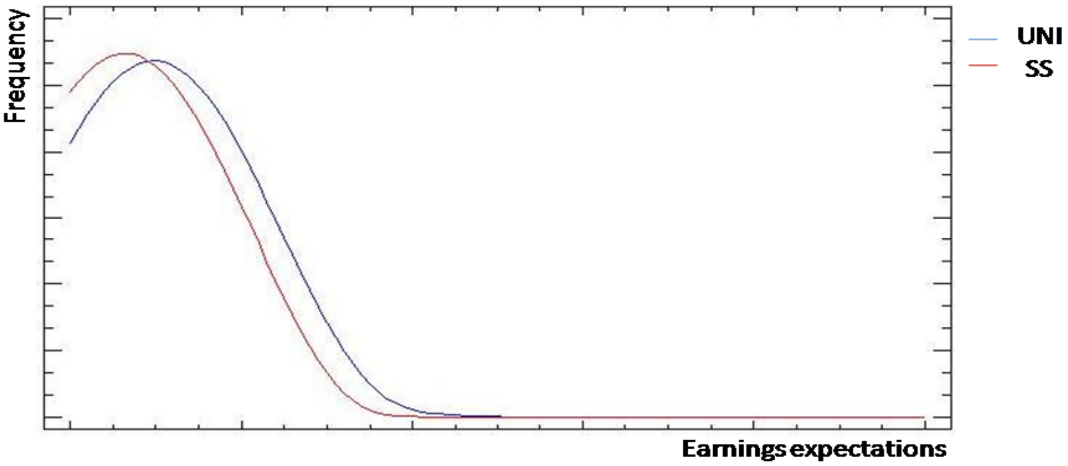
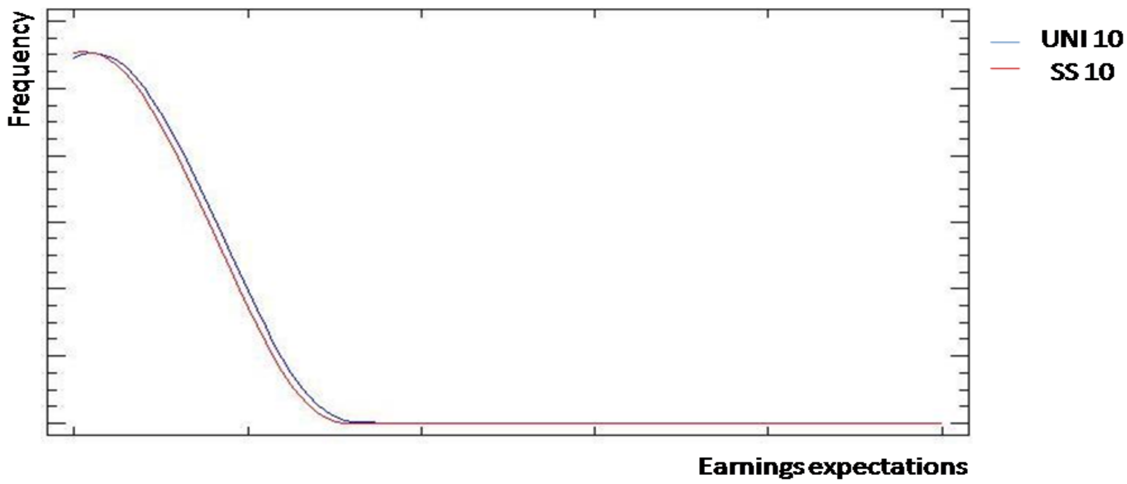


Figure 5.53 Expected earnings' distribution ten years after graduation from high school and university – Pardubice sample



5.3.3.6 Expected rates of return

Figure 5.54 shows the rates of return as an average of all surveyed years for men and women. When comparing the minimum and the most likely expected rates of return at both points in time, the difference between men and women is not as large (or none at all), as at the maximum level. Figure 5.54 tends to suggest that students in Pardubice, as in the two previous Czech samples, expect, on average, to benefit from their university studies more in the medium term than immediately after graduation. This pattern will be statistically tested in section 5.6.

Figure 5.54 Gender differences in expected rates of return – by situation, Pardubice sample

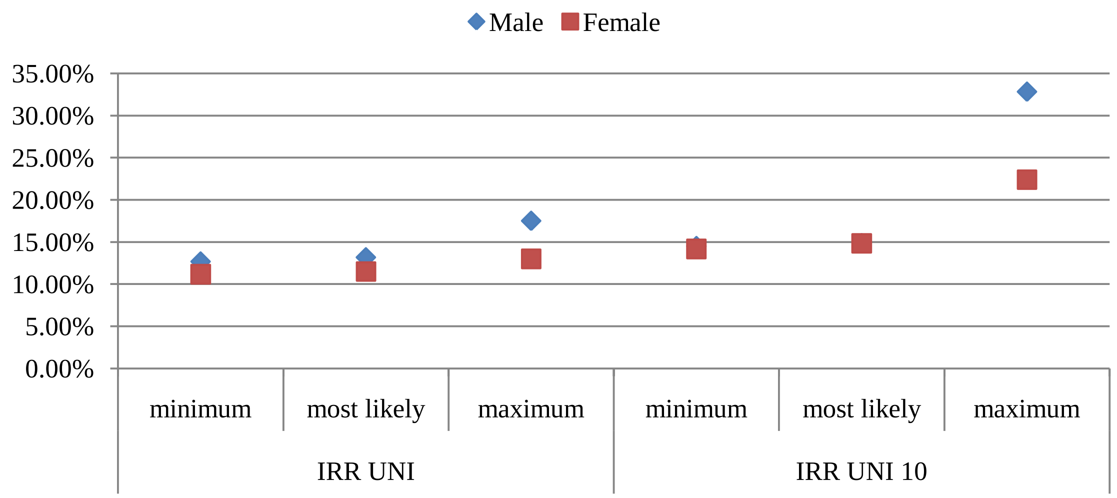
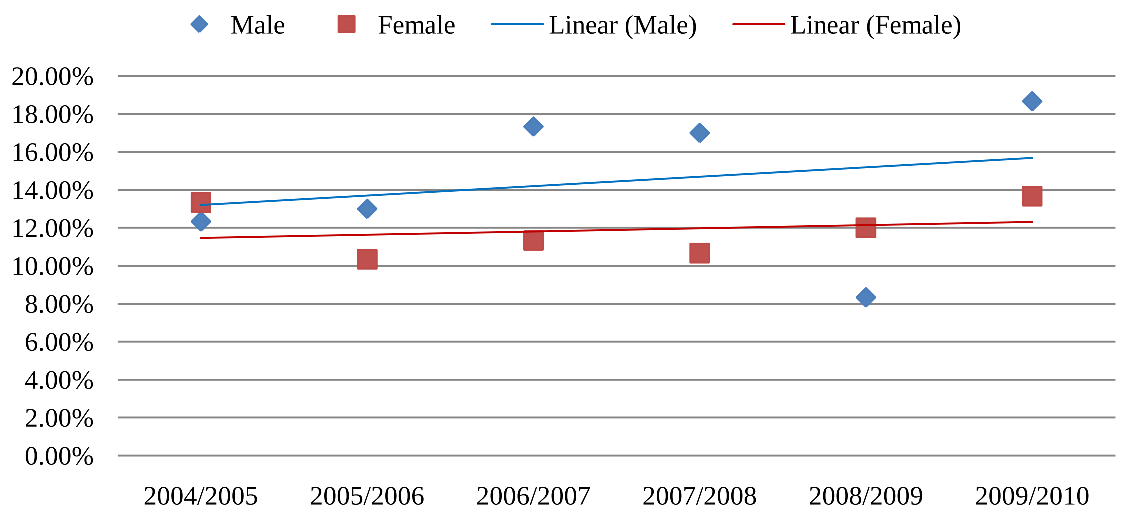


Figure 5.55 presents gender differences in expected rates of return by year. As in the previous cases, an average of the minimum, most likely, and maximum rates of return expected at the point of graduation was used to show the development over time. The average rate of return has been fluctuating for both genders. The trend line however smoothes the pattern and as a result demonstrates the development of expected rates of return for women to be slightly increasing/stable over time and shows an increasing trend for men. This implies that on average the difference between men and women in terms of their expected rates of return has been widening. Indeed in 2004/2005 women expected higher rates of return than men while from 2005/2006 men expected higher rates of return (except for 2008/2009). The surprising change in the difference between men and women in 2008/2009 is likely to be attributed to a sample size – only 16 men were in the sample and thus the sample is likely to be sensitive to extreme data.

Figure 5.55 Gender differences in expected rates of return at graduation – by year, Pardubice sample



5.4 Descriptive analysis of the English data

5.4.1 Huddersfield

The University of Huddersfield Business School is the only institution where English data were collected for this study. In 2009/2010 another English business school started to participate in this research project. However it was decided that it would not be appropriate to use the data for this study as no comparison over time would be available and thus limited conclusions could be made.

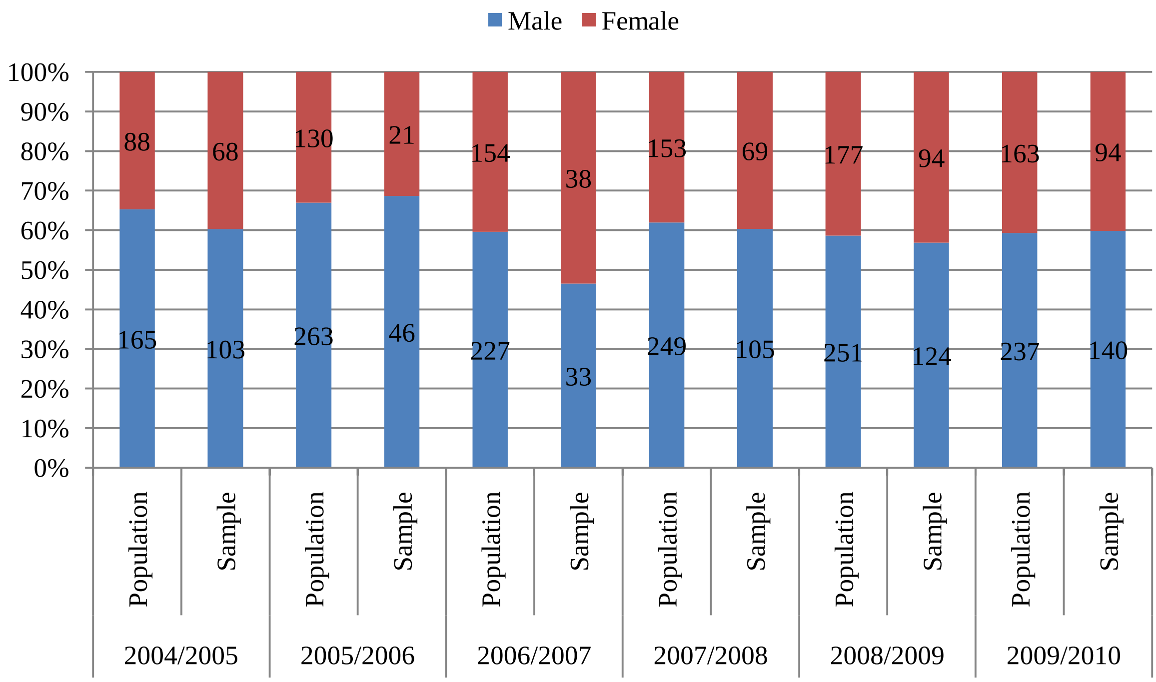
5.4.1.1 Gender and expected graduate destinations

Figure 5.56 presents a gender distribution of the sample of students in Huddersfield as well as of the population of first year students at the University of Huddersfield Business School from which the sample was drawn. It presents graphically the relative proportions of men and women in both the sample and the population with absolute numbers stated in each column. Figure 5.56 shows men forming a majority of around 60%, except for the academic year 2006/2007[41]. Although recent developments in the gender make up of the student body as a whole shows that men have become a minority, this is not the case in the Huddersfield sample. However, the sample does reflect the actual gender distribution of first year students

[41] A relatively small sample size is the likely reason for this

at the University of Huddersfield Business School, and thus is considered to be representative of the population.

Figure 5.56 <u>Gender distribution – Huddersfield population and sample</u>



Figures 5.57 and 5.58 present destinations where students intend to work after graduation from university, for males and females respectively. Like Czech students, respondents in Huddersfield were given a list of options from which a maximum of two could be chosen. The question was first asked in Huddersfield in 2007/2008, i.e. the results are from the data collected in the last three years of the research. The data are analysed together rather than by year to allow for comparison with the Czech respondents. As in the case of the Czech Republic 'pie in pie' charts were chosen for graphical presentation of the graduates' destinations. Those categories that represent less than 5% of responses are classified as 'other' and a separate pie is constructed to show their proportions in the sample.

Figure 5.57 Expected graduate job destinations – Huddersfield males

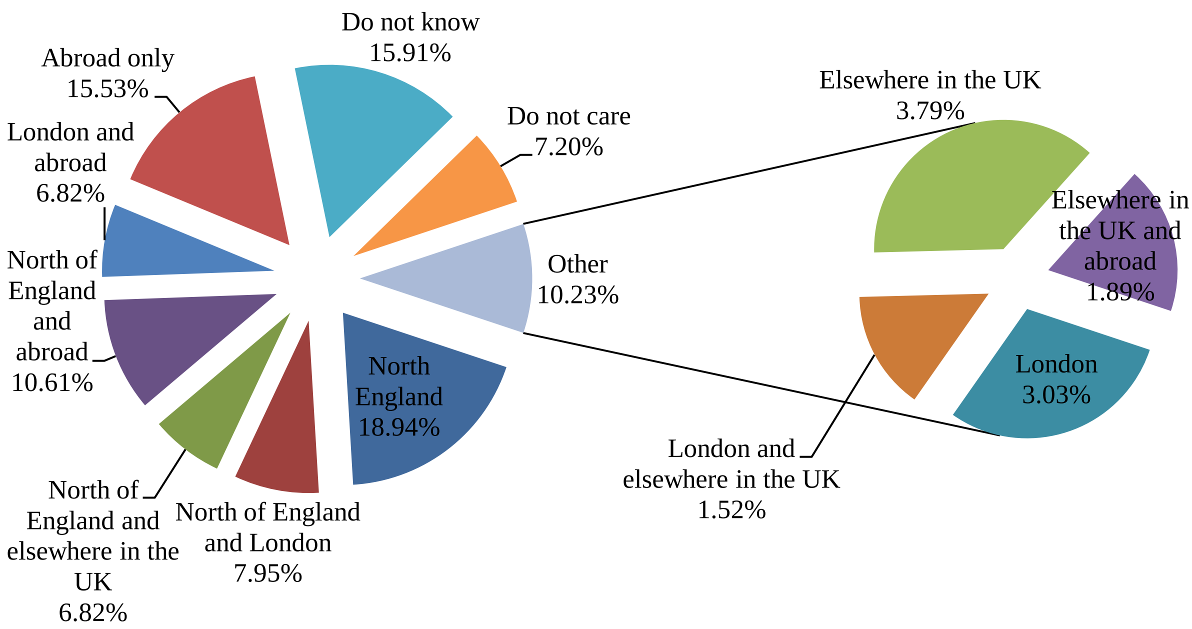
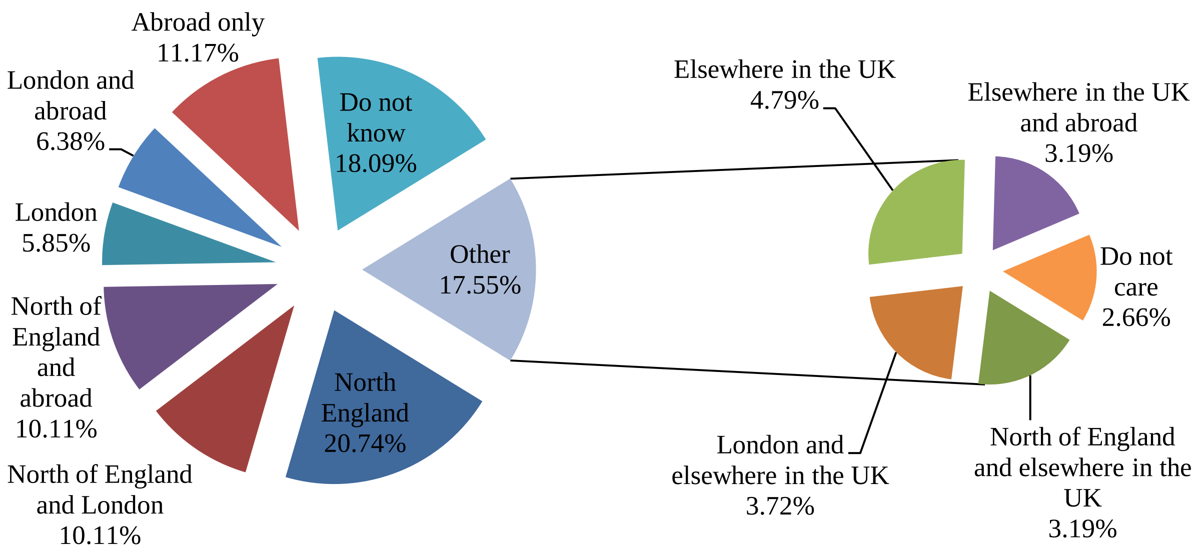


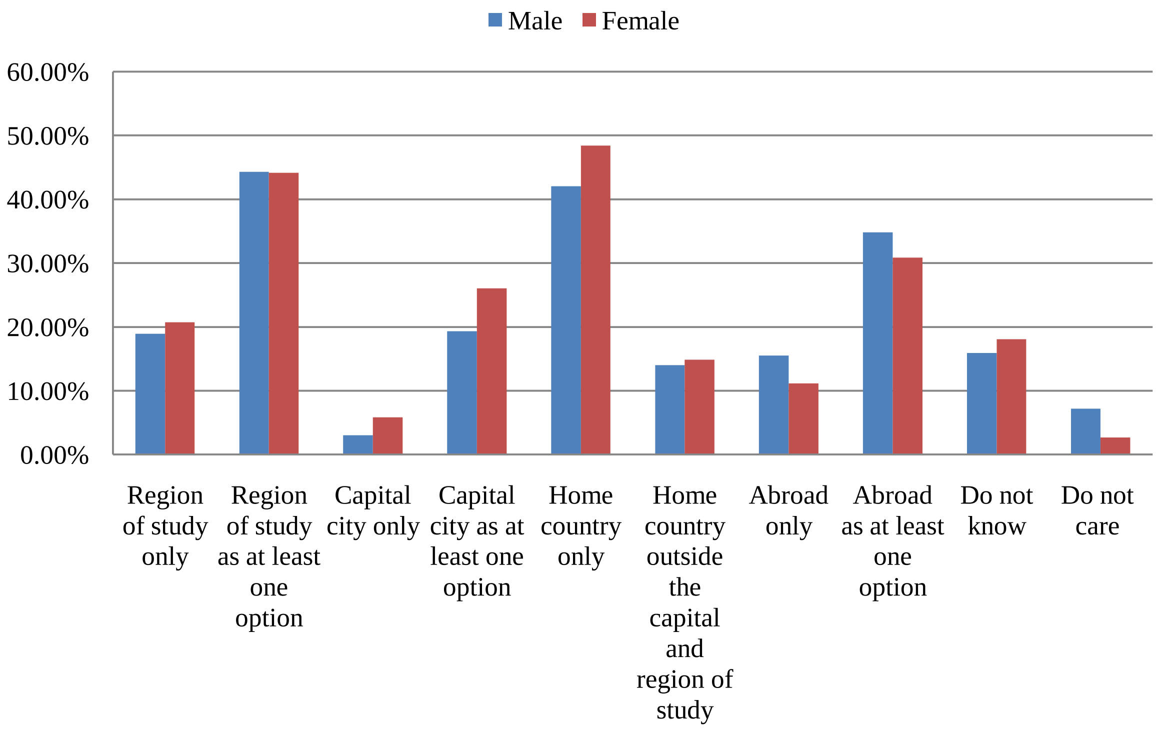
Figure 5.58 Expected graduate job destinations – Huddersfield females



Figures 5.57 and 5.58 show that over 44% of men and women in the Huddersfield sample intend to work in the North of England as at least one option. The North of England was a sole option for 19% of men and nearly 21% of women. Just over 19% of men and 26% of women intend to work in London as at least one option; London was a lone option for 3% of

men and nearly 6% of women. Working in the UK but outside the region of study and the capital was chosen as at least one option by 14% of men and nearly 15% of women. 42% of men and just over 48% of women intend to work in the UK only; nearly 35% of men and nearly 31% of women selected choices outside the UK as at least one option. Working abroad was a sole option for 15.5% of men and just over 11% of women. Nearly 16% of men and 18% of women do not know where they want to find their graduate job and just over 7% of men and nearly 3% of women do not care about it. The gender differences are presented graphically in Figure 5.59.

Figure 5.59 Graduate destinations: gender comparison – Huddersfield sample

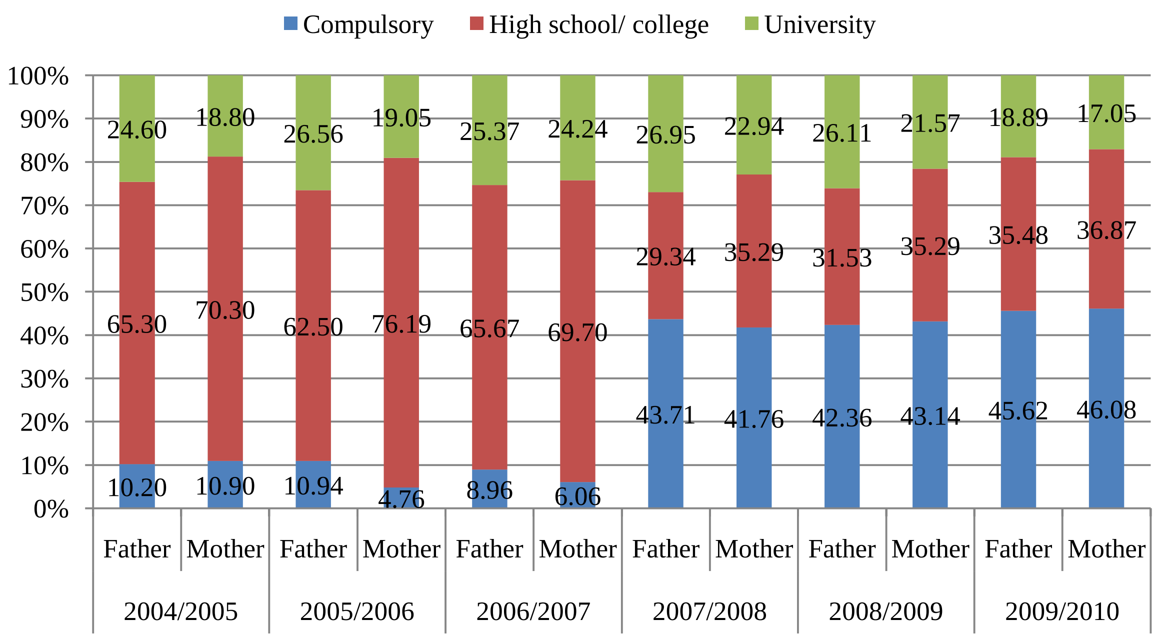


The qualitative analysis suggests that the option 'elsewhere in the UK' is likely to represent the home regions of the respondents. However, like in the case of the Czech Republic, the information as to where the respondents came from is not available. Thus it is proposed that in England, too, the question is incorporated in the questionnaire in future research.

5.4.1.2 Parental education

Figure 5.60 presents the proportions of parents in terms of their achieved level of education. One thing is apparent when looking at the graphical presentation; namely the sudden change in the proportion of parents with compulsory and college education. This, however, is caused by the change in the formulation of one question in the questionnaire. Until 2006/2007 inclusive, students were asked to tick one of the following options: primary, secondary or university, when answering the question regarding the education level of their parents. Such a formulation was however not appropriate since the minimum education level that can be achieved in the UK is not at a primary level but GCSE qualification at a school level. Some students may have been confused as the terminology did not reflect the actual system. This is why the options were changed into school, college and university. As a result, there is a higher proportion of parents with compulsory education from 2007/2008 and the distribution across the educational spectrum seems more likely to reflect the actual situation. This explanation is further supported by the fairly stable proportion of university educated parents over the surveyed years (around 25% of fathers, and 20% of mothers).

Figure 5.60 Parental education – Huddersfield sample



5.4.1.3 Parental income

Another change the original questionnaire underwent was in the question regarding parental income. Like in the case of the Czech Republic, a low response rate was the reason for changing the format of the question. Originally the question asked respondents to state mother's and father's income as a precise figure. However, when students were not sure about the exact amount of money their parents earned, they chose not to provide an answer. However, for this research project it is not particularly important to have a precise figure; rather an approximate idea about the level of income is required so that the socio-economic background of students can be established. This is why six intervals were offered in an attempt to improve the response rate. The success of this change is apparent from Table 5.15 and 5.16 where valid and missing cases are presented. From 2007/2008 the maximum non-response rate was 23% while before the minimum non-response rate was over 31%.

Table 5.15 Father's income – Huddersfield sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	***Missing***	***Mean***	***Median***	***Mode***	***25***	***50***	***75***
2004/2005	118	54	37183	30000	30000	18000	30000	40000
2005/2006	42	24	31893	29000	30000[a]	19625	29000	40000
2006/2007	30	41	35183	30000	30000	19750	30000	46250
2007/2008	149	25	29362	25000	50000	15000	25000	45000
2008/2009	192	26	28359	25000	15000	15000	25000	45000
2009/2010	179	55	27877	25000	15000	15000	25000	45000

Table 5.16 Mother's income – Huddersfield sample

Academic year	Cases		Estimates of Central Tendency			Percentiles		
	Valid	***Missing***	***Mean***	***Median***	***Mode***	***25***	***50***	***75***
2004/2005	94	78	18873	18000	18000	11750	18000	25000
2005/2006	36	30	20736	21000	10000[a]	10000	21000	28000
2006/2007	21	50	23229	20000	18000	16500	20000	35000
2007/2008	148	26	18716	15000	5000	5000	15000	25000
2008/2009	194	24	17835	15000	5000	5000	15000	25000
2009/2010	190	44	16737	15000	5000	5000	15000	25000

Estimates of central tendency and percentiles are useful indicators of the distribution of observations. By comparing mean, median and mode the distribution can be determined. If all three estimates of central tendency are equal then the distribution of observations is likely to be normal. In the case of parental income in Huddersfield the sample is positively skewed, which suggests that there are more people earning below average than above average. This is demonstrated by the histograms with a normal distribution curve in Figures 5.61, 5.63 and 5.62, 5.64 for fathers and mothers, respectively. Given the change in methodology the histograms are presented separately for the period before (Figures 5.61 and 5.62) and after the change which occurred in 2007/2008 (Figures 5.63 and 5.64).

As in the case of the Czech Republic, there are more high-earners amongst fathers than amongst mothers. This is particularly obvious from a comparison of Figure 5.63 and 5.64. The last interval, which suggests annual earnings above £50,000, could be split into more given the number of fathers that fit there to allow for more precise income distribution estimate particularly at the right tail of extreme data. As in the case of the Czech Republic, this does not seem to be an issue when it comes to earnings of mothers, which suggests that there are more high earners amongst fathers than amongst mothers in all surveyed samples.

Figure 5.61 <u>Fathers' income distribution before 2007/2008 – Huddersfield sample</u>

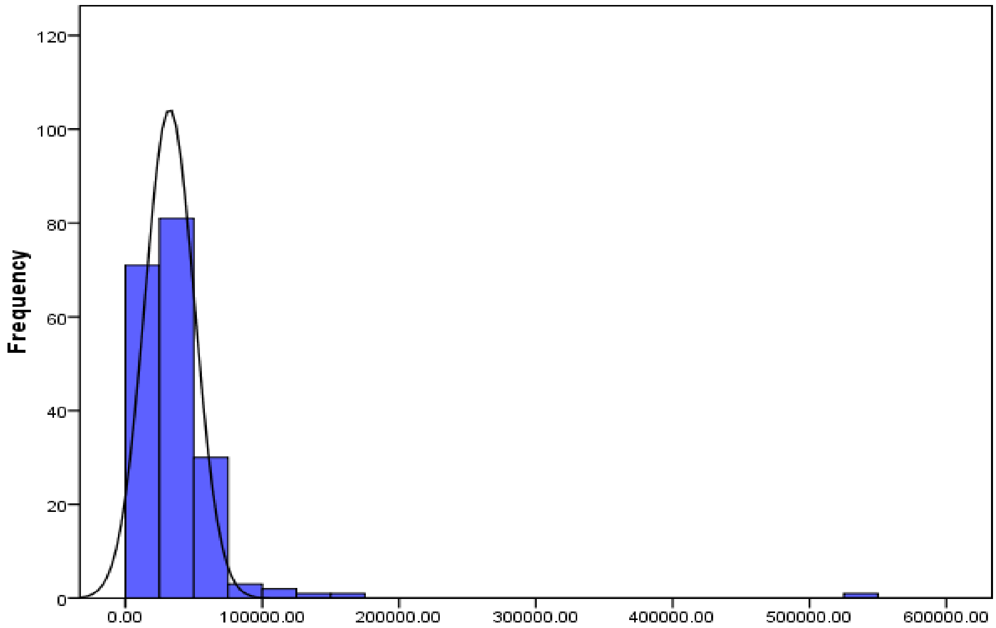


Figure 5.62 Mothers' income distribution before 2007/2008 – Huddersfield sample

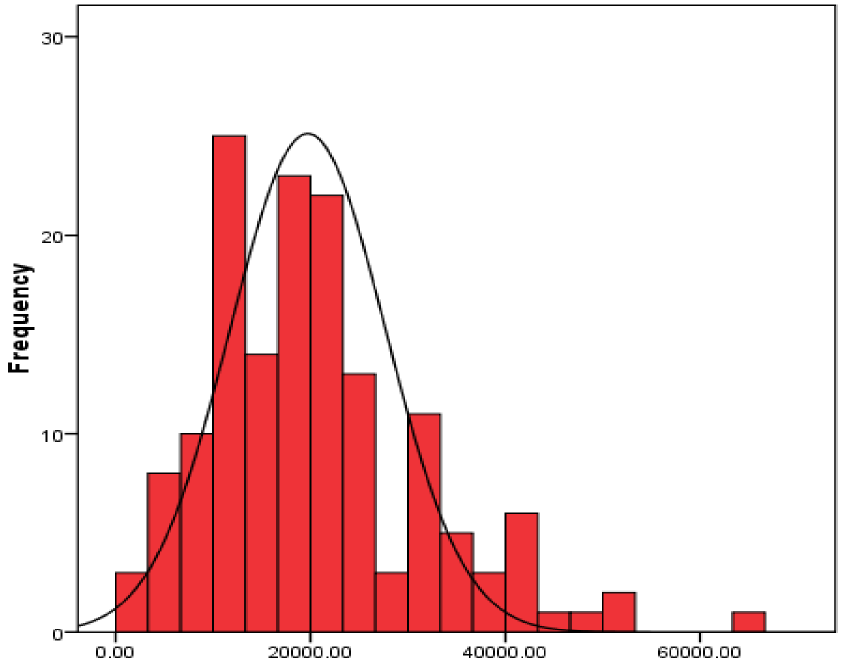


Figure 5.63 Fathers' income distribution after 2007/2008 – Huddersfield sample

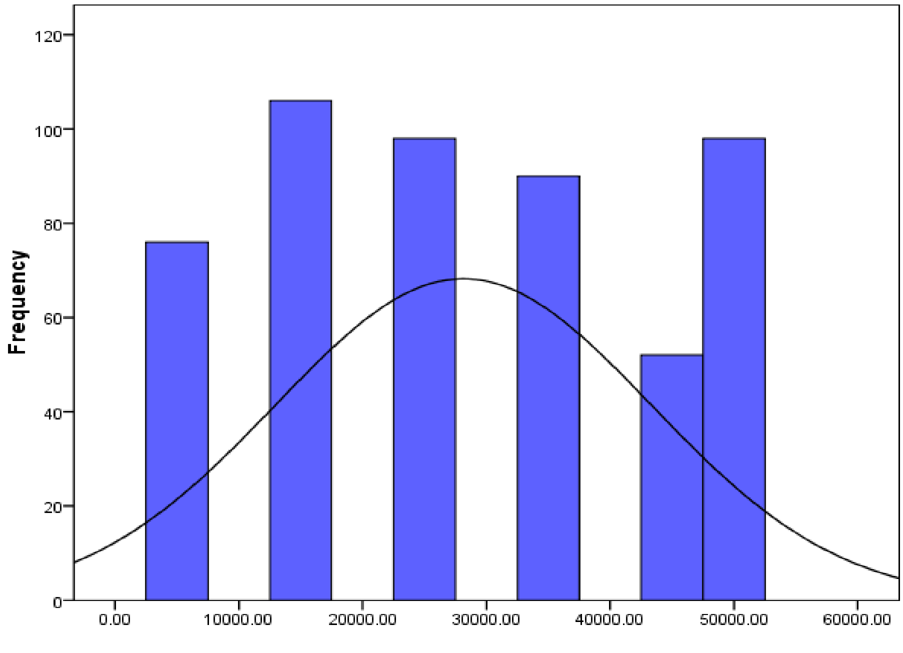
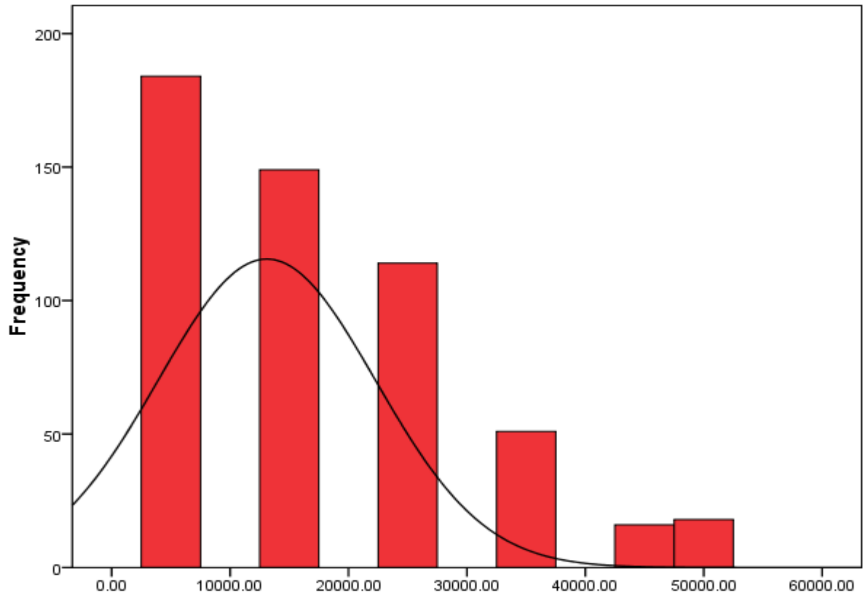


Figure 5.64 Mothers' income distribution after 2007/2008 – Huddersfield sample



5.4.1.4 Perceptions of parental income

Students in Huddersfield were, like their peers in the Czech Republic, asked to what extent they perceived their parental income to be high. The findings are summarised in a cross tabulation (Table 5.17 and 5.18 for fathers' and mothers' income respectively), which presents centres of intervals of parental income and the Likert scale regarding students' perceptions, which were both suggested to the respondents in the questionnaire. Spearman's correlation coefficient is also noted to show the strength of the relationship between the parental income and students' perceptions of its level.

Tables 5.17 and 5.18 show to what extent students agree with the statement that they perceive their parents' income to be high, and present the number of respondents in each given parental income interval. For example 97 respondents stated that their father's annual income was above £50,000 and 71 of those, i.e. nearly three quarters strongly agreed or agreed that they perceived such income to be high. On the other hand fathers of 74 respondents earned less than 10,000 GBP/year and 57, i.e. more than three quarters of their children strongly disagreed or disagreed with the statement that they perceived their father's income to be high. The correlation coefficient (0.69 and 0.63 for fathers' and mothers' respectively) shows a strong positive relationship, i.e. the higher is the parent's income the more likely are the students to perceive their parents' incomes to be high.

Students in Huddersfield, like their peers in the Czech Republic, were asked on what basis they answered the question about the perception of their parents' income. Similarly to Czech interviewees, the most frequent answer was based on their parents' job and the time they spend at work. Thus, even though a parent has a relatively high income (compared to the national average) but has to invest much time and energy to earn the income, students are more likely to disagree with the statement that their parents' income is high, and vice versa. For example ten Huddersfield students disagreed with the statement although their fathers earn more than 40,000 GBP/year. As a contrast, six respondents strongly agreed or agreed that their mother's income was high although she earned less than 10,000 GBP/year. This was also discussed during the qualitative interviews and it was uncovered that the reason for this might be mother being either unemployed or a housewife and in the case of father either unemployed or a carer; thus given the circumstances the respondents may feel that the income is appropriate or sufficiently high.

Table 5.17 Crosstabulation of father's income and perceptions of its level

		I perceive my father's wage to be high					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Father's wage	5000	40	17	13	3	1	74
	15000	21	51	30	3	0	105
	25000	1	27	56	13	1	98
	35000	0	8	43	35	4	90
	45000	0	4	14	22	12	52
	50000	1	5	20	46	25	97
	Total	63	112	176	122	43	516

Spearman's correlation coefficient = 0.693**

Table 5.18 Crosstabulation of mother's income and perceptions of its level

		I perceive my mother's wage to be high					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Mother's wage	5000	106	33	27	2	4	172
	15000	33	77	33	5	1	149
	25000	2	30	68	12	1	113
	35000	1	8	23	16	3	51
	45000	0	0	6	7	3	16
	50000	0	1	3	7	6	17
	Total	142	149	160	49	18	518

Spearman's correlation coefficient = 0.633**

5.4.1.5 Earnings expectations

Figure 5.65 shows gender differences in the Huddersfield sample in terms of earnings expectations. As in the Czech samples, it seems that there the difference between male and female expectations is the biggest at a maximum level. This seems to be the case in the other three hypothetical situations, i.e. point of graduation from secondary education and ten years after that, and ten years after graduating from university (see Appendix 5.10 for a graphical presentation of the three scenarios). The trend lines plotted through the earnings estimates of students in Huddersfield show a slightly increasing tendency (in the case of the maximum expected earnings the trend is slightly decreasing). The growth of the expected earnings seems to be slower than in the case of the Czech Republic, represented by the three surveyed institutions, which all show similar results to each other in terms of the rate of growth indicated by the slope of the trend lines.

Figure 5.65 Expected earnings immediately after university graduation – Huddersfield sample

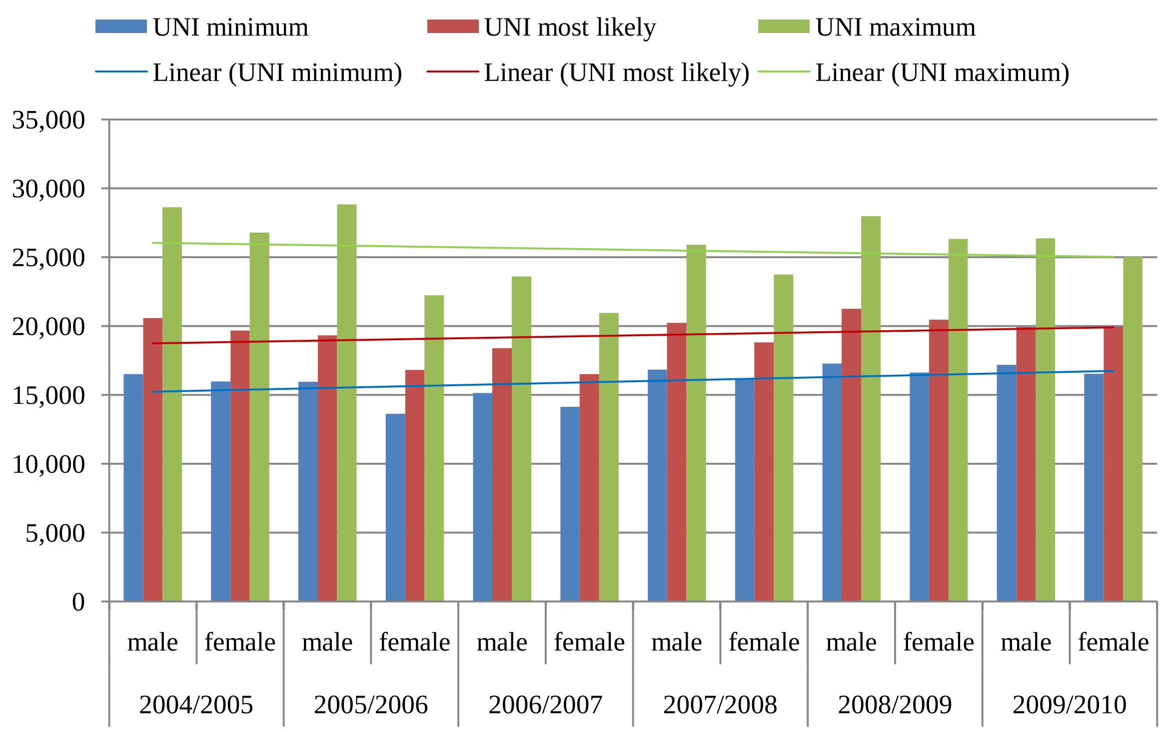
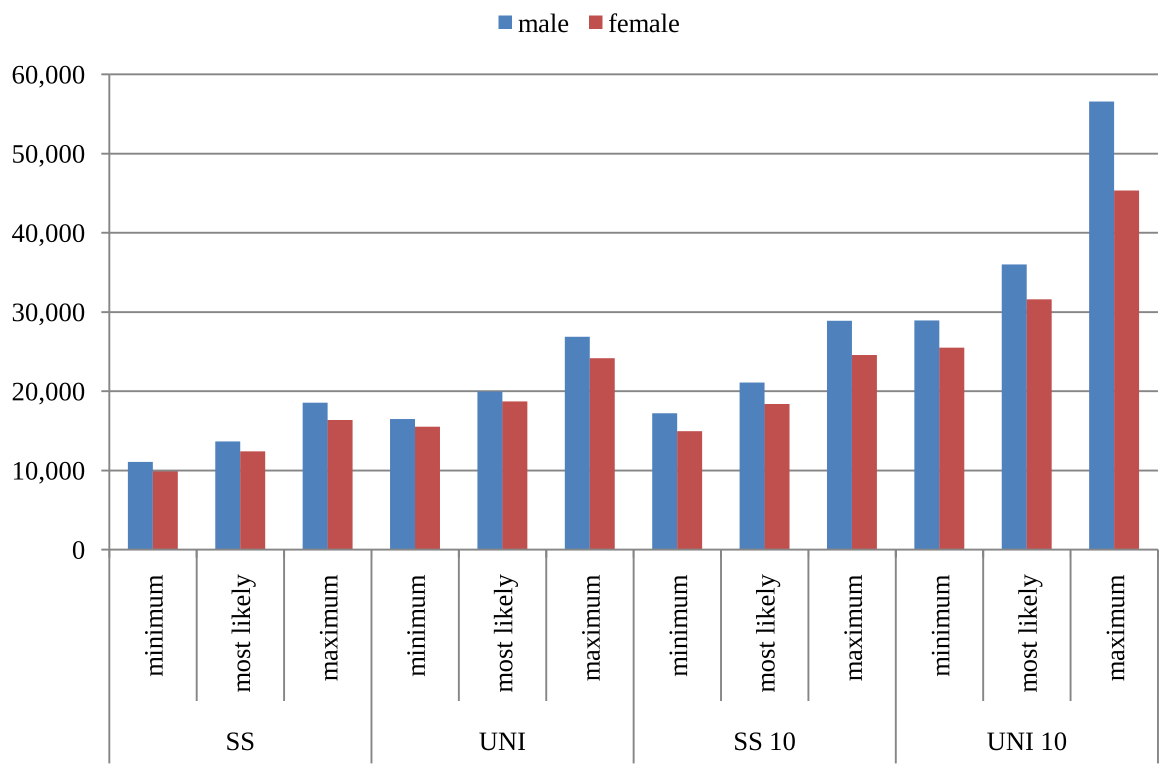


Figure 5.66 seems to suggest that the further in the future is the estimate of the earnings made, and the higher is the level of education, the larger is the difference in expected earnings between men and women. In other words, as in the Czech samples, more gender

differences are apparent in earnings estimated for ten years after graduation whether from a high school or a university. As is the case for the data from the Czech Republic, the data collected in Huddersfield tend to show that the age-earnings profiles are expected to become flatter later in women's working lives as opposed to those of men.

In addition, Figure 5.66 implies that the higher is the level of schooling, the higher are the expected earnings and that expected earnings increase with experience. Thus, as in the case of the Czech Republic, students seem to expect the lowest wages after finishing secondary education (SS) and the highest wages ten years after graduating from university (UNI 10). In addition, it is particularly noteworthy that, as in the Czech samples, earnings expected by students in Huddersfield at the point of graduation from the university (UNI) appear to be similar to those expected ten years after graduating from high school (SS 10).

Figure 5.66 Averaged expected earnings across years – all levels and points in time – Huddersfield sample



Figures 5.67 and 5.68 present the development of earnings expectations in time for men and women, respectively. Earnings expected immediately after finishing secondary education are used as an example (see Appendix 5.11 for the development of earnings expectations in other

three scenarios for both genders). It is apparent from Figures 5.67 and 5.68 that earnings expectations are stable over time, although the trend line plotted though the expected earnings estimates of women shows a slight increase. Appendix 5.11 however shows a different trend when it comes to earnings expected with a university education. Until 2006/2007 the earnings expectations tended to decline, while from 2007/2008 the expectations tended to increase. The likely explanation is that students started to compensate for the increase in tuition fees by expecting to earn more (see more in section 5.4.1.6).

Figure 5.67 Development in time of earnings expected at the point of graduation from high school – males, Huddersfield sample

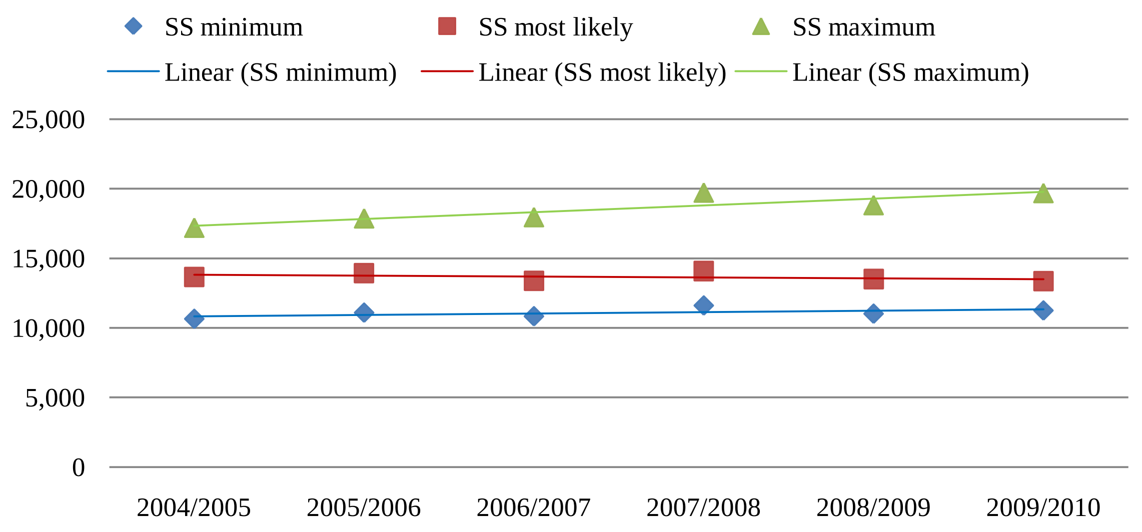
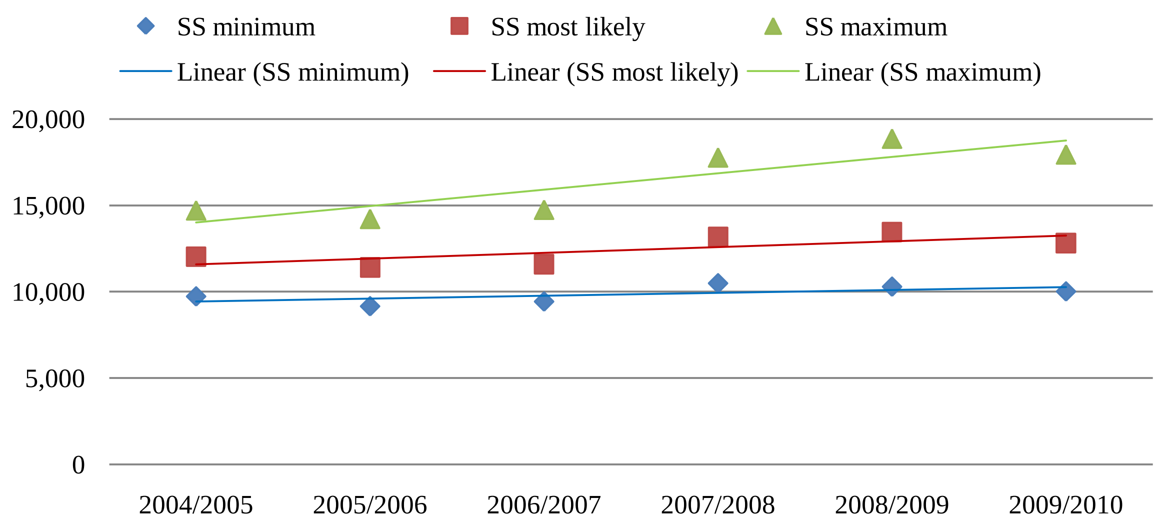


Figure 5.68 Development in time of earnings expected at the point of graduation from high school – females, Huddersfield sample



The following Figures 5.69 and 5.70 show the distribution of the expected earnings with and without the university degree at both points in time, i.e. at graduation and ten years later. The distributions are similar in terms of their shape, i.e. kurtosis and skewness, but the distribution of earnings expectations with a university degree is shifted more towards the right hand side for both points in time suggesting that students expect to earn more with a university education than with high school education regardless of their labour market experience.

Figure 5.69 Expected earnings' distribution at the point of graduation from high school and university – Huddersfield sample

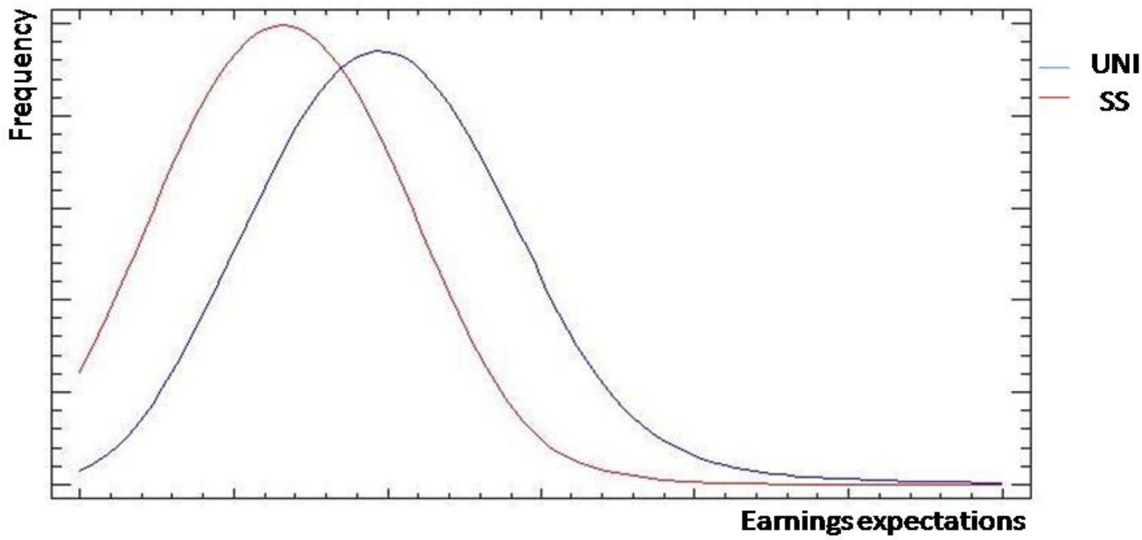
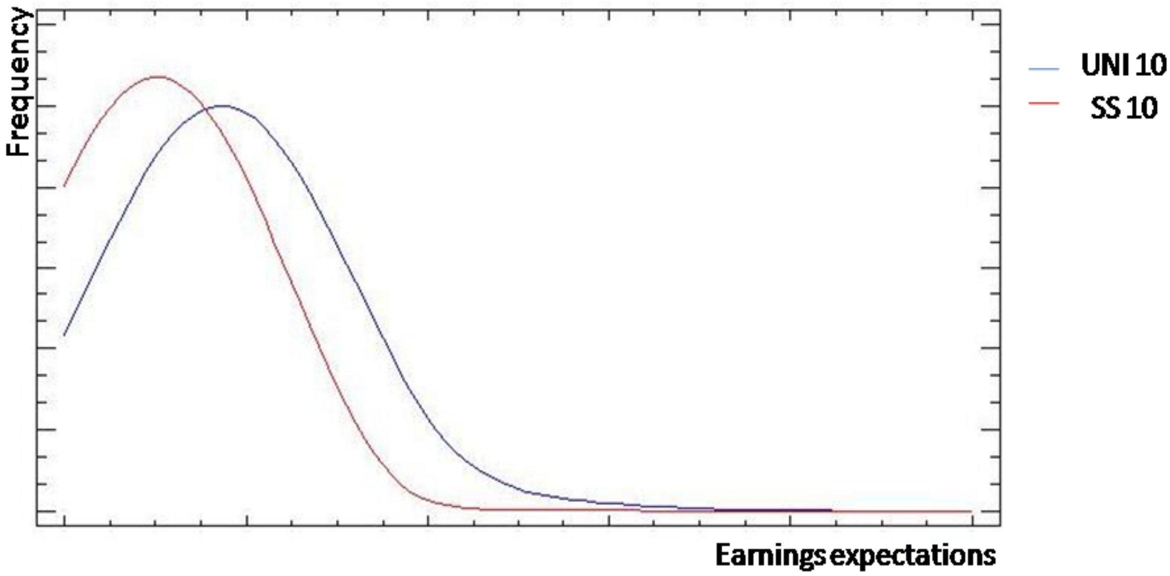


Figure 5.70 Expected earnings' distribution ten years after graduation from high school and university – Huddersfield sample



5.4.1.6 Expected rates of return

Figure 5.71 shows the rates of return as the average of all surveyed years for men and women. It is interesting to see that the rates of return calculated from the most likely expected earnings are lower than those computed from the minimum and the maximum of the earnings expected by women. When it comes to men, this is true for the rates of return expected at the point or graduation; 10 years later the most likely expected rates of return are the same as the minimum and lower than the maximum. What is also noticeable is that women in the Huddersfield sample expect the most likely obtained rates of return ten years after graduation to be similar to the maximum expected rates of return at the point of graduation.

Figure 5.71 tends to suggest that students in Huddersfield, both male and female, expect higher returns ten years after graduation. In other words, it seems that students in Huddersfield, like their peers in the Czech Republic, expect, on average, to benefit from their university studies more in the medium term than immediately after graduation.

Rates of return expected by men are lower than those expected by women (except for the maximum expected rates of return ten years after graduation). However, Figure 5.71 tends to suggest that men expect a faster growth than women, i.e. even though women expect higher rates of return than men, men expect a higher increase in their rates of return in the future. The trend suggests that expectations of men and women are becoming closer to each other over time and thus the gender gap in the expected rates of return narrows with labour market experience.

Figure 5.71 Gender differences in expected rates of return – by situation, Huddersfield sample

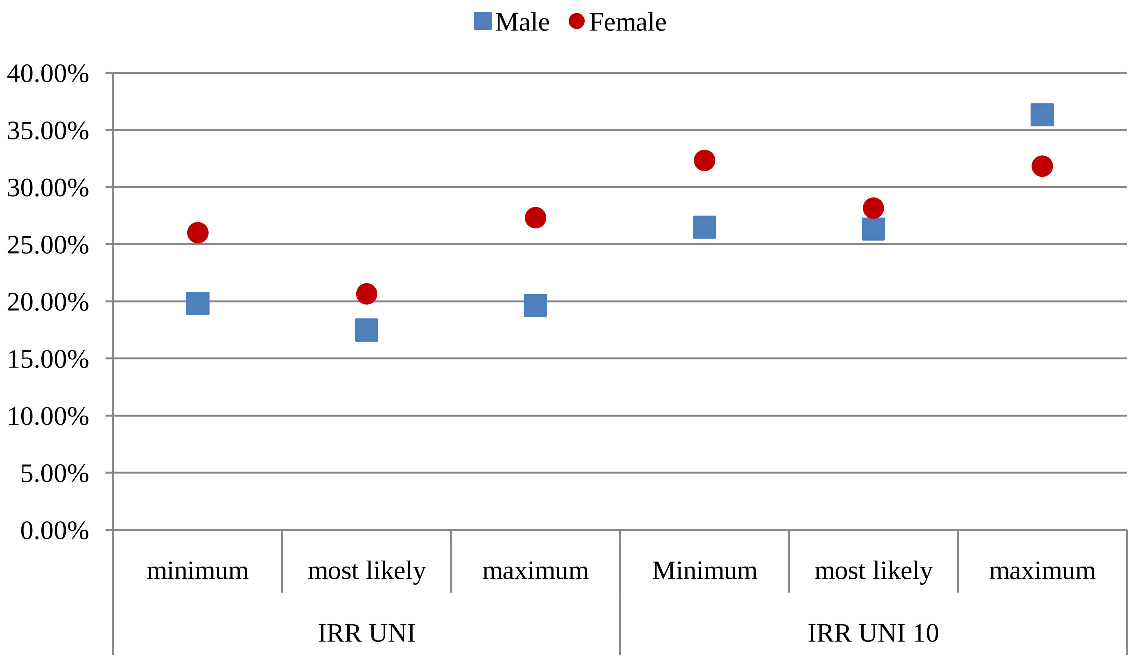
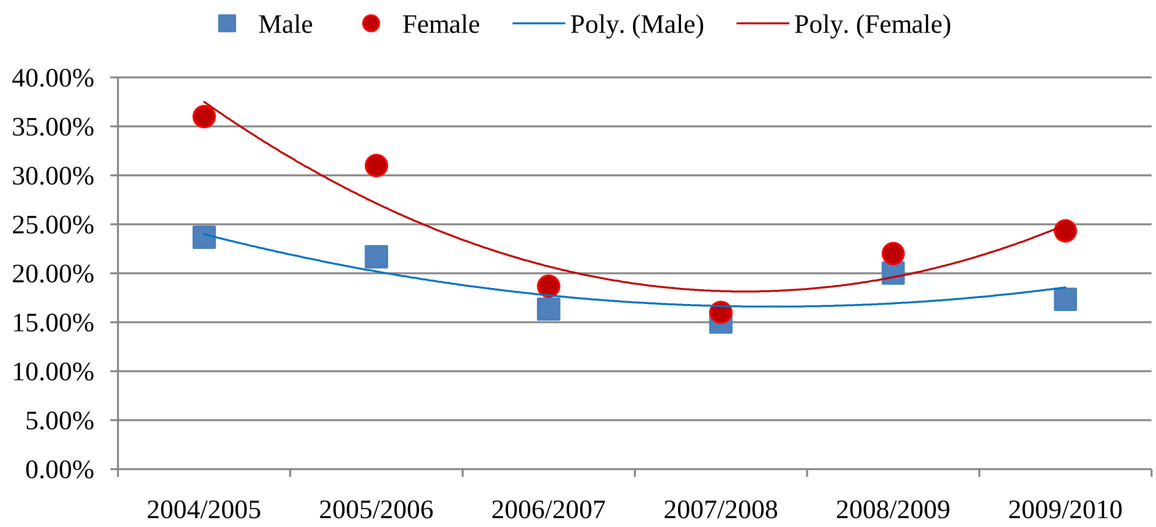


Figure 5.72 presents gender differences in expected rates of return by year. The average of the minimum, most likely and maximum rates of return expected at the point of graduation was used to show the development over time. Unlike in the Czech samples, polynomial rather than linear trend lines describe best the development of the rates of return expected by students in Huddersfield. The trend line shows a decreasing and increasing tendency before and after 2007/2008, respectively. An obvious explanation is that in 2006/2007 a change in the financing of higher education occurred and the tuition fee system changed as a consequence. The fees tripled but stopped being charged up front; rather a system of deferred fees was implemented.

It seems that although the fees were not to be paid up front students started to compensate for the perceived debt by increasing their expectations regarding their income after graduating from university. The earnings expected after high school graduation have been stable/stagnating over the years. The earnings expected after graduation from university had been decreasing until 2007/2008 perhaps as a result of an increasing participation in higher education. If students' expectations are being formed at least partially rationally (as assumed in this study), students are likely to take the changing supply of and demand for skills into account. It seems that respondents perceived the supply of graduates to be greater than the demand for them and therefore their expected earnings as graduates were declining until 2007/208. However, although the participation in higher education continued to grow after 2007/2008, expected earnings started to increase too. Thus the likely explanation of this phenomenon seems to be the expected compensation of students for the perceived debt as a result of the increased tuition fees.

Figure 5.72 Gender differences in expected rates of return at graduation – by year, Huddersfield sample



5.5 Summary

Sections 5.2 – 5.4 have dealt with descriptive statistics of the data collected in two countries – the Czech Republic and England - and at faculties of economics (business schools) of four higher education institutions – University of Economics in Prague, Technical University of Liberec, University of Pardubice and the University of Huddersfield. The proportion of men and women was not even within the surveyed universities and the gender distribution was different from institution to institution. Nevertheless the samples reflected the populations from which they were drawn in terms of the gender distribution and thus are considered to be representative in all cases. Given the differences in the gender distribution, the samples were described separately for men and women to separate out any effect of gender on the findings.

The descriptive analysis suggests that earnings expectations vary by gender and by institution. It has been found that students in Huddersfield expect much larger income than the sample of students from the Czech Republic. There is a case for comparison between the samples collected in the Czech Republic. Three universities in three different regions were studied and differences were identified. Students in Prague seem to expect substantially higher earnings than their peers in Liberec, and the latter seem to expect to earn slightly more than students surveyed in Pardubice. This seems to be the case for both genders. These relationships will be further tested in section 5.7.

The descriptive analysis suggests that the higher is the level of education and the greater is the experience the higher are the expected earnings. Students at all surveyed institutions seem to expect the lowest earnings as high school graduates and the highest ten years after graduating from university. Students seem also to expect to earn as university graduates similar income as they would ten years after completing high school without entering higher education. This relates to the point of faster and further growth that seems to be expected by students thanks to a university education. All this will be tested in section 5.6.

5.6 Expected earnings and rates of return vs. level of education, experience and probability – Multifactor within-subjects ANOVA

A one-way within-subjects ANOVA allows the determination of whether or not there is a relationship between a categorical independent variable and a continuous dependent variable, where each subject is measured at every level of the independent variable. Within-subject ANOVA is used as an equivalent of a paired samples t-test when one wants to compare three or more groups where the same subjects are in all of the groups. To perform a within-subject ANOVA, the data set must be organised so that the subject is the unit of analysis and there are different variables containing the value of the dependent variable at each level of the within-subjects factor.

A multifactor within-subjects ANOVA (MW-S ANOVA) can be used to examine multiple within-subjects factors. MW-S ANOVA can determine the independent influence of each of the independent variables on the dependent variables (main effects) as well as the extent to which the effect of an independent variable on the dependent variable depends on the level of the other independent variable in the model (interactions).

In this within-subject design, the dependent measures function as levels of the independent variables, namely *education, experience and probability* and each respondent serves as his or her own control; this leads to the advantage of eliminating variance specifically due to individual differences. By using the within-subject design the differences between individuals are removed and thus the difference in expected earnings between levels of education or experience can be truly accounted for by the effect of the factor rather than differences between individuals.

The hypotheses H1A, H2A, H3A and H5A are tested in the following sections, namely:

H1A: Students expect their earnings to increase with education
(*Null hypothesis:* Mean earnings are not different between levels of education)
(*Alternative hypothesis:* Mean earnings are different between levels of education)

H2A: Students expect their earnings to increase with experience
(*Null hypothesis:* Mean earnings are not different between levels of experience)
(*Alternative hypothesis:* Mean earnings are different between levels of experience)

H3A: Students expect their university degree to be related to a faster and further growth of earnings
(*Null hypothesis:* Growth is not different from zero)
(*Alternative hypothesis:* Growth is different from zero)

H5A: Students expect to benefit from a university degree more in the medium term than immediately after graduation
(*Null hypothesis:* Mean rates of return are not different between levels of experience)
(*Alternative hypothesis:* Mean rates of return are different between levels of experience)

5.6.1 Expected earnings

Table 5.19 shows the variables that represent each combination of the within-subject factors. *Education* is a two-level factor representing secondary (1) and higher education (2); *experience* is a two-level factor representing the point of graduation, i.e. zero work experience (1) and ten years of post-education work experience (2); the *probability* factor has three levels, namely minimum (1), most likely (2) and maximum (3). Thus, e.g. minimum earnings expected after completing secondary education is coded as 1 – 1 – 1 (secondary education, zero work experience, highest level of probability[42]), maximum earnings expected ten years after graduation from university are coded as 2 – 2 – 3 (university education, ten years of work experience and the lowest level of probability), and so on.

Table 5.19 Within-subjects factors – expected earnings

Education	Experience	Probability	Dependent Variable
1	1	1	SSmin
		2	SSave
		3	SSmax
	2	1	SS10min
		2	SS10ave
		3	SS10max
2	1	1	UNImin
		2	UNIave
		3	UNImax
	2	1	UNI10min
		2	UNI10ave
		3	UNI10max

Table 5.20 contains the first test of the main effects and interactions, making use of multivariate analysis. Like in MANOVA, Wilk's lambda converted to an F statistic is used and the F-value, degrees of freedom and the p-value are presented. A significant main effect indicates that at least two of the groups composing that factor have significantly different means. A significant interaction between a set of factors indicates that the influence of any one factor involved in the interaction changes significantly under different levels of the other factor(s) in the interaction.

[42] Reminder: minimum earnings represent the highest probability of obtaining the income and maximum earnings represent the lowest level of probability of obtaining the income.

Table 5.20 <u>Multivariate tests – MW-S ANOVA</u>

Multivariate Tests[b]				
Effect	**F**	**Hypothesis df**	**Error df**	**Sig.**
Education	1198.704[a]	1.000	3799.000	.000
Experience	920.636[a]	1.000	3799.000	.000
Probability	937.021[a]	2.000	3798.000	.000
Education * Experience	344.653[a]	1.000	3799.000	.000
Education * Probability	311.809[a]	2.000	3798.000	.000
Experience * Probability	204.278[a]	2.000	3798.000	.000
Education * Experience * Probability	146.827[a]	2.000	3798.000	.000

The second way of testing the within-subjects factor is called *repeated measures* (DeCoster, 2004). This method makes an additional assumption that the correlations between the within-subjects levels are all the same – the assumption of *sphericity*. A significant test means that sphericity has been violated which indicates that the corrected results of a repeated-measures analysis should be used (Table 5.21).

Table 5.21 <u>Test of sphericity – MW-S ANOVA</u>

Mauchly's Test of Sphericity[b]							
					Epsilon[a]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Geisser	Feldt	bound
Education	1.000	.000	0		1.000	1.000	1.000
Experience	1.000	.000	0		1.000	1.000	1.000
Probability	.058	10783.498	2	.000	.515	.515	.500
Education * Experience	1.000	.000	0		1.000	1.000	1.000
Education * Probability	.028	13548.745	2	.000	.507	.507	.500
Experience * Probability	.044	11829.857	2	.000	.511	.511	.500
Education * Experience * Probability	.018	15310.864	2	.000	.504	.504	.500

In the case of the violation the assumption of sphericity, *Greenhouse-Geisser* or *Huynh- Feldt* tests should be examined as they are corrected for the assumption violations. Since the F- and p-values and degrees of freedom are the same for the two tests, the results of one test only are presented in Table 5.22.

Table 5.22 Test of within-subjects effects

Tests of Within-Subjects Effects			
Source	df	F	Sig.
Education	1.000	1198.704	.000
Experience	1.000	920.636	.000
Probability	1.030	755.182	.000
Education * Experience	1.000	344.653	.000
Education * Probability	1.014	212.695	.000
Experience * Probability	1.023	231.581	.000
Education * Experience * Probability	1.009	108.905	.000

It is apparent that all three within-subjects effect are significant since the p-value associated with the F-statistic is lower than 0.05. Where exactly the differences lie and whether the differences between each level of the factors are significant was tested by the LSD post-hoc test for each factor separately.

In addition, Table 5.23 presents the estimated marginal means of expected earnings for each of the factor levels. Differences between levels of education, experience and probability are apparent. However, whether or not they are statistically significant is determined by the LSD post-hoc test, the results of which are presented in Tables 5.24, 5.25 and 5.26 for education, experience and probability, respectively.

Table 5.23 Estimated marginal means – education, experience, probability

					95% Confidence Interval	
Education	Experience	Probability	Mean	Std. Error	Lower Bound	Upper Bound
1	1	1	14252.63	130.845	13996.09	14509.16
		2	17905.99	163.586	17585.26	18226.71
		3	25521.65	302.153	24929.25	26114.04
	2	1	22356.75	316.772	21735.69	22977.81
		2	27635.83	490.402	26674.35	28597.31
		3	44012.16	1140.953	41775.22	46249.1
2	1	1	22437.61	194.404	22056.46	22818.75
		2	27968.45	258.665	27461.31	28475.58
		3	41667.96	747.459	40202.5	43133.42
	2	1	39227.33	507.817	38231.71	40222.95
		2	50153.91	745.569	48692.15	51615.66
		3	101728.2	3321.347	95216.39	108240

The pair-wise comparisons in the post-hoc tests show that earnings expectations differ by level of education, experience and probability. It is apparent from the positive mean difference (I-J) (level 2 - level 1, i.e. UNI-SS) presented in Table 5.24 that students expect their earnings to be significantly higher with a university degree than without it regardless of experience or probability.

Table 5.24 <u>Difference in earnings expectations by level of education</u>

Pairwise Comparisons						
					95% Confidence Interval for Difference[a]	
(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	-21916.407*	633.014	.000	-23157.487	-20675.327
2	1	21916.407*	633.014	.000	20675.327	23157.487

Table 5.25 shows that experience is expected to significantly increase earnings regardless of the level of education or probability.

Table 5.25 <u>Difference in earnings expectations by experience</u>

Pairwise Comparisons						
					95% Confidence Interval for Difference[a]	
(I) Experience	(J) Experience	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	-22559.981*	743.524	.000	-24017.725	-21102.238
2	1	22559.981*	743.524	.000	21102.238	24017.725

Table 5.26 shows, as expected a priori, that minimum expected earnings are lower than the most likely expected earnings and these are lower than the maximum expected earnings. In other words those expected earnings that have the highest probability of being obtained are the lowest and those that are least likely to be obtained or have the lowest probability of being obtained are expected to be the highest.

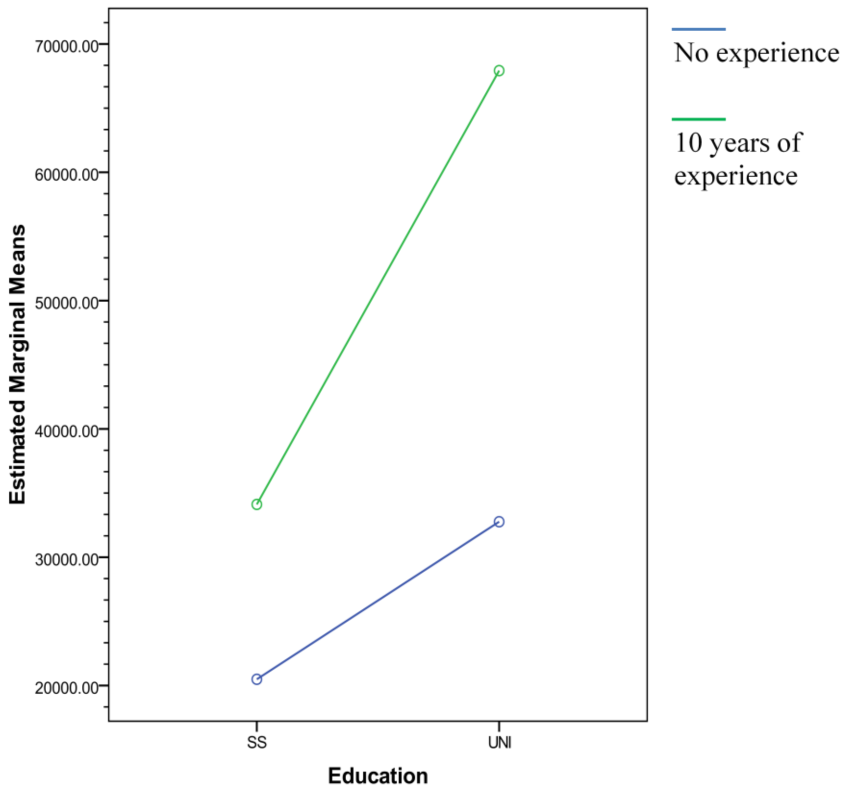
Table 5.26 Differences in earnings expectations by probability

Pairwise Comparisons

(I) Probability	(J) Probability	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
1	2	-6347.465*	149.856	.000	-6641.271	-6053.659
	3	-28663.909*	976.085	.000	-30577.611	-26750.207
2	1	6347.465*	149.856	.000	6053.659	6641.271
	3	-22316.444*	908.626	.000	-24097.887	-20535.001
3	1	28663.909*	976.085	.000	26750.207	30577.611
	2	22316.444*	908.626	.000	20535.001	24097.887

The graphical illustration of the marginal means of the expected earnings (Figure 5.73) along with the descriptive analysis (Section 5.2) tend to suggest that students expect faster and further growth of their earnings with a university education than with secondary qualifications only. This is apparent from the difference in earnings expected with secondary education between the two levels of experience which seems smaller when compared to the difference in earnings expected with a university education between the two levels of education, i.e. SS10-SS < UNI10-UNI. Within ten years students expect their earnings to increase substantially more with a university education than with secondary education; thus they expect a faster growth of their earnings thanks to the university degree. Further growth, i.e. the difference between UNI10-SS10 and UNI-SS (UNI10-SS10 > UNI-SS) is also apparent.

Figure 5.73 Estimated marginal means of expected earnings by education and experience



When compared the two inequations show technically the same, namely that:

$$\mathrm{UNI10 - SS10 - UNI + SS} > 0$$

Within-subjects ANOVA post-hoc tests do not allow for multiple comparisons of the means between different levels of the factor as was the case in the between-subjects ANOVA post-hoc tests. A method of *within-subject contrast* can be applied in this case. In order to do so a new variable needs to be created that represents the difference between the variables corresponding to the different levels that are to be compared. To see if there is significant difference, a one-sample t-test is used to test whether the mean of the difference variable is significantly different from zero. The new difference variable *growth* (UNI10-SS10-UNI+SS) was computed at all three levels *min*, *ML*, *max*, i.e. minimum, most likely and maximum expected earnings and tested whether it is significantly different from zero (Table 5.27).

Another rather curious finding was identified by the descriptive analysis; namely that students seem to expect similar earnings at the point of graduation (UNI) to those expected ten years after completing secondary education (SS10). This is also apparent from the marginal means presented in Table 5.23. This wil also be tested using the one-sample t-test since the within-subjects ANOVA post-hoc tests do not allow the direct comparison of the means. It will be tested whether SS10 – UNI is significantly different from zero. The results of the one-sample t-tests for both hypotheses are presented in Table 5.27. A Bonferroni correction is applied to prevent inflation of the Type I error by dividing the alpha of each contrast by the total number of post-hoc contrasts that are performed from the same analysis. Thus the level of significance for each contrast is 0.05/6 = 0.0083.

Table 5.27 One-sample t-test

Variable	Test Value = 0					
					of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Growth Min	29.446	3999	.000	9073.44313	8469.3108	9677.5754
Growth ML	26.837	3959	.000	13073.75000	12118.6459	14028.8541
Growth Max	13.607	3835	.000	41515.41971	35533.4080	47497.4314
SS10min - UNImin	-.373	4022	.709	-98.30910	-615.3790	418.7608
SS10ML - UNIML	-.815	3994	.415	-328.13517	-1117.8230	461.5526
SS10max - UNImax	2.910	3929	.004	2997.63359	978.3372	5016.9300

It is apparent from Table 5.27 that *growth* is significantly different from zero and the mean difference shows that the variable is significantly larger than zero. Both these statements are valid for all three levels of probability. The conclusion thus is that students on average expect statistically significantly further and faster growth of their earnings with a university degree than with secondary education. The percentiles (Table 5.28) show that this is the case for 80% of respondents.

There is not enough evidence to reject the hypothesis that SS10-UNI is significantly different from zero at least when it comes to the minimum and most likely expected earnings. In the case of maximum expected earnings the p-value is lower than the corrected alpha - thus the hypothesis can be rejected.

However, as can be seen from the descriptive statistics (Table 5.28) the median is zero at all levels of probability. The one-sample t-test compares the mean value which is much higher in the case of maximum expected earnings than in the case of minimum and most likely expected earnings, probably due to extreme data in the 90th percentile. The percentiles show that at all three levels of probability 60 % of students expect either the same or higher earnings at graduation from university than ten years after completing secondary education.

On the other hand, 50% expect either the same or lower earnings at the point of university graduation than ten years after finishing high school.

Thus in this case, despite the significance of the test for the maximum expected earnings, it is concluded that on average students do not expect significantly different earnings at the point of graduation from university to those expected ten years after completion of secondary education. As a result it seems that students value their university education as much as ten years of post-secondary education experience.

Table 5.28 Descriptive statistics

		Growth Min	Growth ML	Growth Max	SS10min - UNImin	SS10ML - UNIML	SS10max - UNImax
N	Valid	4000	3960	3836	4023	3995	3930
	Missing	163	203	327	140	168	233
Mean		9073.4431	13073.7500	41515.4197	-98.3091	-328.1352	2997.6336
Median		5000.0000	7000.0000	15000.0000	.0000	.0000	.0000
Minimum		-110000.00	-160000.00	-1400000.00	-105000.00	-244000.00	-959000.00
Maximum		460000.00	935000.00	9880000.00	780000.00	1300000.00	1000000.00
Percentiles	10	-2000.0000	-2000.0000	-1000.0000	-10000.0000	-10000.0000	-20000.0000
	20	.0000	.0000	3000.0000	-5000.0000	-6000.0000	-10000.0000
	30	2000.0000	3000.0000	6000.0000	-4000.0000	-5000.0000	-6000.0000
	40	3000.0000	5000.0000	10000.0000	-2000.0000	-2500.0000	-5000.0000
	50	5000.0000	7000.0000	15000.0000	.0000	.0000	.0000
	60	7000.0000	10000.0000	22000.0000	.0000	.0000	.0000
	70	10000.0000	12500.0000	34900.0000	2000.0000	2000.0000	5000.0000
	80	15000.0000	19000.0000	50000.0000	5000.0000	5000.0000	10000.0000
	90	25000.0000	32500.0000	90650.0000	8000.0000	10000.0000	22000.0000

5.6.2 Rates of return

In this subsection a multifactor within-subjects ANOVA is used to determine whether rates of return, like earnings expectations, increase with experience. Table 5.29 shows the within-subjects factors which are defined as previously (see section 5.6.1). In this case, however, the level of education is not included as a factor since it is irrelevant given the way the rates of return are calculated. The relevant factors here are *experience* and *probability*.

Table 5.29 Within-subjects factors – rates of return

Within-Subjects Factors		
Experience	Probability	Dependent Variable
1	1	RR min
	2	RR ML
	3	RR max
2	1	RR10 min
	2	RR10 ML
	3	RR10 max

The multivariate tests of the effects of the selected factors and their interaction are significant as predictors of the variations in the dependent variables (Table 5.30).

Table 5.30 Multivariate tests – MW-S ANOVA

Multivariate Tests[b]				
Effect	F	Hypothesis df	Error df	Sig.
Experience	257.391[a]	1.000	3792.000	.000
Probability	102.935[a]	2.000	3791.000	.000
Experience * Probability	55.998[a]	2.000	3791.000	.000

Mauchly's test of sphericity is significant (Table 5.31), i.e. the assumption of sphericity has been violated. Thus the Greenhouse-Geisser/ Huynh-Feldt test is used to test the within-subjects effects. The results are significant since the p-value associated with the F-statistic is lower than 0.05 (Table 5.32). It shows that there is a difference in rates of return caused by experience and probability. Where exactly the differences lie is determined by the post-hoc tests which not only show the differences between each level of the factors but also whether or not they are significant.

Table 5.31 Test of sphericity – MW-S ANOVA

Mauchly's Test of Sphericity[b]							
					Epsilon[a]		
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Experience	1.000	.000	0	.	1.000	1.000	1.000
Probability	.143	7365.795	2	.000	.539	.539	.500
Experience * Probability	.164	6859.969	2	.000	.545	.545	.500

Table 5.32 Test of within-subjects effects

Tests of Within-Subjects Effects			
Source	df	F	Sig.
Experience	1.000	257.391	.000
Probability	1.077	83.862	.000
Experience * Probability	1.089	107.159	.000

The pair-wise comparison of the rates of return when experience only is taken into account shows that the rates of return expected ten years after graduation are statistically significantly higher than those expected at the point of graduation. On average students expect their rates of return to increase by 9.7 percentage points between the two points in time (Table 5.33).

Table 5.33 Difference in rates of return by experience

Pairwise Comparisons						
					95% Confidence Interval for Difference[a]	
(I) Experience	(J) Experience	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	-.097*	.006	.000	-.109	-.086
2	1	.097*	.006	.000	.086	.109

Table 5.34 shows that the maximum rates of return (i.e. the least probable) are statistically significantly higher than those expected at highest and most likely level of probability. However, the difference between the minimum and most likely expected rates of return is not significant at any reasonable level. The difference between these is on average 0.1 percentage point.

Table 5.34 Differences in earnings expectations by probability

Pairwise Comparisons						
					95% Confidence Interval for Difference[a]	
(I) Probability	(J) Probability	Mean Difference (I-J)	Std. Error	Sig.[a]	Lower Bound	Upper Bound
1	2	.001	.003	.777	-.005	.007
	3	-.087*	.010	.000	-.107	-.067
2	1	-.001	.003	.777	-.007	.005
	3	-.088*	.008	.000	-.104	-.072
3	1	.087*	.010	.000	.067	.107
	2	.088*	.008	.000	.072	.104

5.6.3 Conclusions

A multifactor within-subjects ANOVA was used in this section to find out whether earnings expectations and expected rates of return increase with experience. In the case of expected earnings it was examined whether they increase with education too. Additionally a level of probability was examined for both the expected earnings and the rates of return.

A multifactor within-subjects ANOVA was an appropriate statistical procedure since the same subject was measured at every level of the two/three independent variables. The research was designed so each respondent served as his or her own control. This is a great advantage when compared to research designs usually adopted when studying actual rates of return where either different groups of people are compared so the individual differences are likely to cause variance in the results, or if a longitudinal approach is adopted the influence of external factors over the years can interfere with the findings. By using the within-subject design the differences between individuals are removed. Moreover since the students were asked about their expectations regarding their future income at the same time, time and personal development in terms of additional training do not influence the findings. Thus the differences in expected earnings between the levels of education/experience can be truly accounted for by the effect of the factors.

The results of this section show that the students' earnings expectations statistically significantly increase with level of education and experience. Earnings have also been found to be expected to grow faster and further with a university education than with a secondary education. A curious finding has been discovered; students do not expect statistically different earnings at the point of graduation from university to those expected ten years after completing secondary education. Thus it is concluded that students on average value a university education as much as ten years of post-secondary education labour market experience. Finally it has been statistically proved that students on average expect to benefit from their university education more in the medium term since the rates of return expected at the point of graduation were 9.7 percentage points lower than those expected ten years later.

5.7 Gender and regional differences in the rates of return and earnings expectations – Multivariate analysis of variance

Multivariate analysis of variance (MANOVA) is a statistical procedure that determines if a set of categorical variables (factors) can explain the variability in a set of continuous dependent variables. The primary purpose of MANOVA is to show that an independent variable (manipulated either within- or between-subjects) has an overall effect on a set of continuous dependent variables. MANOVA separately considers the effect of independent variables on dependent variables and it produces a matrix of results, which separately contains the influence of the factors on each of the dependent variables (DeCoster, 2004; Everitt & Dunn, 1991).

The hypotheses H1B and H2B, and H1C and H2C are tested in the following subsections, namely:

H1B: Students' earnings expectations differ by a place of study
(*Null hypothesis:* Mean expected earnings are not different among surveyed institutions)
(*Alternative hypothesis:* Mean expected earnings are different among surveyed institutions)

H2B: Rates of return differ by a place of study
(*Null hypothesis:* Mean expected rates of return are not different among surveyed institutions)
(*Alternative hypothesis:* Mean expected rates of return are different among surveyed institutions)

H1C: There are gender differences in earnings expectations
(*Null hypothesis:* Mean expected earnings of men are not different from mean expected earnings of women)
(*Alternative hypothesis:* Mean expected earnings of men are different from mean expected earnings of women)

H2C: There are gender differences in expected rates of return
(*Null hypothesis:* Mean rates of return expected by men are not different from mean rates of return expected by women)
(*Alternative hypothesis:* Mean expected earnings of men are different from mean earnings of women)

5.7.1 Expected rates of return

The variables identified as dependents in this section are the rates of return expected at graduation and ten years later at all three levels of probability of obtaining the return[43]. The categorical independent variables are gender of respondents (GENDER) and the institutions where the data were collected (UNI). Since the rates of return are measured in percentages, all surveyed institutions can be included in the UNI factor regardless of which country they are located in. The coding of the between-subject factors and the number of cases in each level of the factor is presented in Table 5.35.

Table 5.35 Between-subject factors

UNI	1	Prague	1337
	2	Liberec	908
	3	Pardubice	804
	4	Huddersfield	744
GENDER	0	Male	1385
	1	Female	2408

Table 5.36 summarises multivariate tests of each effect in the model. The MANOVA test statistic results are very difficult to interpret on their own; thus they are converted to an F statistic to make the estimation of the p-value easier. There are four common statistics that can be transformed to a statistic that has approximately an F distribution. SPSS (PASW) reports all four values as well as the corresponding F statistics, its degrees of freedom and the p-value. The most commonly used and accepted statistic is Wilk's Lambda, which will be used in this research to determine the significance of the multivariate tests. It is a custom to report the F-value, its degrees of freedom and the p-value rather than the value of Wilk's lambda (Crichton, 2000; DeCoster, 2004; Everitt & Dunn, 1991).

[43] RR min, RR ML, RR max (rates of return at the point of graduation at minimum, most likely and maximum level of probability of obtaining the return, respectively);
RR10min, RR10ML, RR10max (rates of return ten years after graduation at minimum, most likely and maximum level of probability of obtaining the return, respectively).

Table 5.36 Multivariate tests

Multivariate Tests[c]				
Effect	F	Hypothesis df	Error df	Sig.
Intercept	435.376[a]	6	3780.000	.000
UNI	17.553	18	10691.940	.000
GENDER	4.212[a]	6	3780.000	.000
UNI * GENDER	2.556	18	10691.940	.000

A significant main effect indicates that at least two of the groups composing that factor have significantly different means. A significant interaction between a set of factors indicates that the influence of any one factor involved in the interaction significantly changes under different levels of the other factors in the interaction. It is apparent from Table 5.36 that both factors have a significant effect on the dependents variables and thus that the overall multivariate test is significant. The UNI*GENDER interaction is also significant, which suggests that the influence of the gender changes across universities, and the influence of the university is different for men and women.

To identify which dependent variables contributed to the significant overall effect a test of between-subject effects is performed. Table 5.37 contains tests of the main effects of the between-subjects factors as well as tests of any interactions that only involve between-subjects factors. It reports the ability of each of the between-subjects effect factor to account for variability in each of the dependent measures individually. The row next to the name of each factor or interaction reports a test of whether there is a significant relationship between that factor and the dependent variable, independent of the other effects in the model.

Table 5.37 shows that the factor UNI has significant effects on every dependent variable, i.e. the rates of return at both points in time and at all three levels of probability[44]. GENDER was found to have an effect on the maximum rates of return expected ten years after graduation (RR10 max). To determine where exactly the differences are, like in one-way ANOVA, post-hoc tests can be performed.

[44] except for RR max

Table 5.37 Tests of between-subject effects

Tests of Between-Subjects Effects									
Source	Dependent Variable	df	F	Sig.	Source	Dependent Variable	df	F	Sig.
Corrected Model	RR min	7	27.377	.000	UNI * GENDER	RR min	3	8.925	.000
	RR ML	7	10.112	.000		RR ML	3	3.651	.012
	RR max	7	1.664	.113		RR max	3	.890	.446
	RR10 min	7	25.154	.000		RR10 min	3	3.891	.009
	RR10 ML	7	10.657	.000		RR10 ML	3	1.187	.313
	RR10 max	7	5.758	.000		RR10 max	3	.584	.626
Intercept	RR min	1	1971.589	.000	Error	RR min	3785		
	RR ML	1	1389.749	.000		RR ML	3785		
	RR max	1	517.067	.000		RR max	3785		
	RR10 min	1	1736.600	.000		RR10 min	3785		
	RR10 ML	1	978.627	.000		RR10 ML	3785		
	RR10 max	1	334.113	.000		RR10 max	3785		
UNI	RR min	3	53.759	.000	Total	RR min	3793		
	RR ML	3	19.031	.000		RR ML	3793		
	RR max	3	1.485	.217		RR max	3793		
	RR10 min	3	50.634	.000		RR10 min	3793		
	RR10 ML	3	19.358	.000		RR10 ML	3793		
	RR10 max	3	6.959	.000		RR10 max	3793		
GENDER	RR min	1	2.663	.103	Corrected Total	RR min	3792		
	RR ML	1	.848	.357		RR ML	3792		
	RR max	1	.838	.360		RR max	3792		
	RR10 min	1	1.681	.195		RR10 min	3792		
	RR10 ML	1	.078	.780		RR10 ML	3792		
	RR10 max	1	7.809	.005		RR10 max	3792		

5.7.1.1 Post-hoc test – UNI factor

Post-hoc tests can only be performed for categorical variables with more than two levels. UNI factor is a four level independent variable and thus the LSD post-hoc test can be performed. Table 5.38 presents the number of respondents within each level of the independent variable, i.e. at each surveyed institution for which all the dependent variables could be calculated[45].

[45] Not all students answered all the questions needed for calculation of the rates of return

Table 5.38 Between-subjects factors – LSD post-hoc test for UNI factor (rates of return)

UNI	1	Prague	1337
	2	Liberec	908
	3	Pardubice	804
	4	Huddersfield	744

The LSD post-hoc test compares every possible combination of the means of the dependent variable between each level of the independent variable, i.e. the means of the expected rates of return at both points in time and all three levels of probability are compared between each surveyed institution. All significant differences are highlighted in red. Given the large size of the output table, the differences between institutions are summarised in Table 5.39 and flagged to show which differences are significant at 5%.

Table 5.39 shows that the rates of return at both points in time and all three levels of probability are expected to be significantly[46] higher for students in Huddersfield than for their counterparts in the Czech Republic. One exception can be found, namely the difference between maximum rates of return expected ten years after graduation by students in Huddersfield and Prague is negative, which suggests that rates of return expected by students in Prague are higher than those expected by the students in Huddersfield. When it comes to the differences within the Czech Republic, students in Prague expect significantly higher returns ten years after graduation than students in Liberec and significantly[47] higher returns at all levels than students in Pardubice. Students from Liberec seem to expect higher rates of return than students in Pardubice at all levels; however the differences are not significant.

Table 5.39 LSD Post-hoc test – UNI

	RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
Huddersfield - Prague	.0880*	.0603*	.0078	.1060*	.0705*	-.1015*
Huddersfield - Liberec	.1010*	.0681*	.0386	.1416*	.1266*	.1083*
Huddersfield - Pardubice	.1167*	.0759*	.0484*	.1568*	.1375*	.1164*
Prague - Liberec	.0130	.0078	.0308	.0357*	.0560*	.2098*
Prague - Pardubice	.0287*	.0156	.0406*	.0508*	.0669*	.2180*
Liberec - Pardubice	.0157	.0078	.0098	.0152	.0109	.0082

[46] Differences in RR max between Huddersfield and Prague, and Huddersfield and Liberec are not significant
[47] Difference in RR ML between Prague and Pardubice is not statistically significant

5.7.1.2 Multifactor post-hoc tests – UNI*GENDER

It is of interest to find out how the rates of return differ within each institution by gender and how large the differences are. Independent samples t-test should be performed for the GENDER factor since it is a two-level categorical variable and thus is not suitable for one-way ANOVA and consequently the LSD post-hoc tests cannot be performed. However the independent sample t-test would only show whether the rates of return are different for men and women. Moreover, if the independent samples t-test was performed for each institution separately a risk of committing type I and II errors, i.e. accepting or rejecting a null hypothesis when it should not be, would be likely to increase. Thus, a multifactor LSD post-hoc tests can be carried out for all dependent variables and the interaction between UNI and GENDER to identify differences between universities broken down by gender. Moreover, the multiple comparisons of means would allow the identification of any gender differences within the institutions themselves, all at a 5% level of significance.

In one-way ANOVA, where one factor is included, comparing individual cells in a post-hoc test was relatively easy. Comparing the individual cells formed by the combination of two or more factors is more complicated however. The UNI factor has four levels, representing the individual institutions where the data were collected, and the GENDER factor has two levels (male and female). It is desirable to compare all of the means within a 4x2 between-subjects factorial design. In order to do so a new variable needs to be created so it has a different value for each cell in the 4x2 design. The total number of cells in an interaction can be determined by multiplying together the number of levels in each factor composing the interaction, i.e. the variable will need to have 4*2=8 different levels, each corresponding to a unique combination of the two independent variables.

There are two ways of doing so; recoding each of the combinations as 1 through 8 to represent the different cells in the new variable is one way. However, given the number of cells, a reference table would need to be used to know the relationships between the values of the new composite variable and the values of the original variables. There is another way, which is simpler and thus will be used in this case. Since the levels of both independent variables are coded numerically, a number can be computed for each combination using the formula (UNI*10) + GENDER. The new variable will always be a two-digit number, where the first digit is equal to the level on UNI factor and the second digit is equal to the level on the GENDER factor e.g. 31 means UNI=3 and GENDER=1, i.e. the code represents females at the University of Pardubice; 40 means UNI=4 and GENDER=0, i.e. males at the University of Huddersfield, and so on (DeCoster, 2004).

Since the output table is large, the differences were summarised in two different tables and flagged to show whether or not the difference is significant at a 5% level of significance. Table 5.40 presents differences between universities for men and women at all levels of expected rates of return, i.e. it shows whether there is a difference in the rates of return expected by e.g. men in Huddersfield and men in Prague; the same is carried out for women.

Differences identified between institutions change slightly when broken down by gender. Women in Prague expect statistically significantly higher returns at all levels than women in Pardubice, while the differences between men in Prague and Pardubice, like between men in Prague and Liberec, are not statistically significant[48]. Women in Prague expect significantly lower rates of return ten years after graduation than women in Liberec; at the point of graduation the differences are, though positive, not statistically significant. The differences between Liberec and Pardubice are not significant even when broken down by gender. At the minimum and most likely levels, men and women in Huddersfield expect significantly higher rates of return than men and women in the Czech institutions. At the maximum level the differences are not statistically significant. This can possibly be explained by the large variance/standard deviation of the rates of return at maximum level, particularly ten years after graduation.

Table 5.40 Differences in rates of return between institutions by gender

		RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
Huddersfield - Prague	**MALE**	.0557*	.0523*	-.0066	.0879*	.0617*	-.1790*
	FEMALE	.1348*	.0817*	.0252	.1407*	.0861*	-.0609
Huddersfield - Liberec	**MALE**	.0574*	.0324	.0107	.0962*	.0843*	.0078
	FEMALE	.1518*	.1024*	.0600*	.1886*	.1552*	.1369
Huddersfield - Pardubice	**MALE**	.0778*	.0481*	.0015	.1260*	.1214*	.0203
	FEMALE	.1651*	.1066*	.0740*	.1980*	.1560*	.1354
Prague - Liberec	**MALE**	.0017	-.0198	.0173	.0084	.0227	.1868*
	FEMALE	.0170	.0208	.0347	.0480*	.0691*	.1978*
Prague - Pardubice	**MALE**	.0221	-.0042	.0081	.0381	.0597	.1993*
	FEMALE	.0303*	.0249*	.0488*	.0574*	.0699*	.1963*
Liberec - Pardubice	**MALE**	.0204	.0156	-.0092	.0298	.0370	.0125
	FEMALE	.0133	.0042	.0140	.0094	.0008	-.0015

[48] With the exception of RR10max, which is significant at 5% level

Table 5.41 presents gender differences in the expected rates of return within institutions. It is apparent that the gender differences are statistically significant in Huddersfield and Prague. In Huddersfield the rates of return are different for men and women at the minimum level of the rates of return at both points in time. At the point of graduation the rates of return also differ by gender at the most likely level. In Prague the only statistically significant gender difference was identified at the maximum level of the rates of return expected ten years after graduation. Regardless of whether the differences are statistically significant, it seems that women in Huddersfield expect higher rates of return than men, while women in Liberec and Pardubice seem to expect lower rates of return than men at all levels. In Prague the differences are very small, both positive and negative, and statistically insignificant (except for RR10 max); thus it can be concluded that there are no gender differences in the rates of return expected by students in Prague.

Table 5.41 Gender differences in rates of return within institutions

	Male-Female	Male-Female	Male-Female	Male-Female
	Prague	Liberec	Pardubice	Huddersfield
RR min	.0021	.0174	.0103	-.0770*
RR ML	-.0175	.0232	.0117	-.0469*
RR max	.0073	.0247	.0480	-.0246
RR10 min	-.0142	.0254	.0051	-.0670*
RR10 ML	-.0043	.0421	.0059	-.0288
RR10 max	.1380*	.1490	.1350	.0199

5.7.2 Expected earnings

MANOVA is used in this section to find out whether earnings expectations vary by gender and place of study. In order to do so it is necessary to convert[49] the British annual earnings into monthly earnings expressed in Czech Koruna so that the earnings expected by students at all four institutions can be meaningfully analysed together at the same time. The same exchange rate is used for all years so that the variations in the exchange rate do not influence the level of earnings each year.

Earnings expected at both levels of education, both points in time and all three level of probability[50] are the dependent variables. Table 5.42 presents the number of students at each

[49] Exchange rate used: 30CZK/GBP – 11th August 2010, Czech National Bank.

[50] SS min – minimum expected earnings after completing secondary education; UNI10 max – maximum expected earnings ten years after graduation from university

level of the between-subjects factors. Only students who answered the questions relevant to all dependent variables are included; this is why the total number is lower than the total number of respondents (Table 4.1).

Table 5.42 Number of respondents – between-subjects factors

UNI	1	Prague	1337
	2	Liberec	910
	3	Pardubice	805
	4	Huddersfield	748
GENDER	0	Male	1391
	1	Female	2409

The F statistic and its associated p-value of the multivariate tests (Table 5.43) show that all factors and interactions are significant predictors of the variations in the dependent variables.

Table 5.43 Multivariate tests – expected earnings

Multivariate Tests[c]				
Effect	F	Hypothesis df	Error df	Sig.
Intercept	3537.076[a]	12.000	3781.000	.000
UNI	144.438	36.000	11172.114	.000
GENDER	15.152[a]	12.000	3781.000	.000
UNI * GENDER	1.997	36.000	11172.114	.000

a. Exact statistic
b. The statistic is an upper bound on F that yields a lower bound on the significance level.
c. Design: Intercept + UNI + GENDER + UNI * GENDER

The dependent variables which contributed to the overall significant multivariate test can be identified from the results of the tests of between-subjects effects, which are presented in Table 5.44. Both factors have been found to be significant predictors for *all* dependent variables. The interaction between UNI and GENDER is significant for some dependent variables. The interaction GENDER*UNI of particular interest because when a post-hoc test is performed, valuable information can be extracted in terms of gender differences and institutions. Thus the LSD post-hoc tests shall be carried out for UNI factor and the GENDER*UNI interaction. For the reasons explained earlier in this section, post-hoc tests for GENDER in the form of an independent samples t-test will not be performed; all information shall be obtained from the multifactor (GENDER*UNI) post-hoc tests.

Table 5.44 Tests of between-subjects effects

Tests of Between-Subjects Effects									
Source	Dependent Variable	df	F	Sig.	Source	Dependent Variable	df	F	Sig.
Corrected Model	SSmin	7	826.575	.000	UNI * GENDER	SSmin	3	3.220	.022
	SSave	7	849.273	.000		SSave	3	1.536	.203
	SSmax	7	313.475	.000		SSmax	3	.878	.451
	SS10min	7	193.243	.000		SS10min	3	3.034	.028
	SS10ave	7	110.943	.000		SS10ave	3	2.651	.047
	SS10max	7	36.371	.000		SS10max	3	2.013	.110
	UNImin	7	912.282	.000		UNImin	3	1.414	.237
	UNIave	7	573.458	.000		UNIave	3	1.883	.130
	UNImax	7	63.913	.000		UNImax	3	3.580	.013
	UNI10min	7	241.170	.000		UNI10min	3	.709	.547
	UNI10ave	7	163.126	.000		UNI10ave	3	.328	.805
	UNI10max	7	26.352	.000		UNI10max	3	3.296	.020
Intercept	SSmin	1	26731.169	.000	Error	SSmin	3792		
	SSave	1	27438.824	.000		SSave	3792		
	SSmax	1	10149.199	.000		SSmax	3792		
	SS10min	1	6201.110	.000		SS10min	3792		
	SS10ave	1	3563.978	.000		SS10ave	3792		
	SS10max	1	1503.689	.000		SS10max	3792		
	UNImin	1	31888.965	.000		UNImin	3792		
	UNIave	1	21477.031	.000		UNIave	3792		
	UNImax	1	3155.549	.000		UNImax	3792		
	UNI10min	1	7759.617	.000		UNI10min	3792		
	UNI10ave	1	5331.061	.000		UNI10ave	3792		
	UNI10max	1	877.489	.000		UNI10max	3792		
UNI	SSmin	3	1641.238	.000	Total	SSmin	3800		
	SSave	3	1674.299	.000		SSave	3800		
	SSmax	3	606.955	.000		SSmax	3800		
	SS10min	3	347.394	.000		SS10min	3800		
	SS10ave	3	195.078	.000		SS10ave	3800		
	SS10max	3	39.265	.000		SS10max	3800		
	UNImin	3	1824.361	.000		UNImin	3800		
	UNIave	3	1125.011	.000		UNIave	3800		
	UNImax	3	106.110	.000		UNImax	3800		
	UNI10min	3	431.389	.000		UNI10min	3800		
	UNI10ave	3	273.940	.000		UNI10ave	3800		
	UNI10max	3	21.157	.000		UNI10max	3800		
GENDER	SSmin	1	80.204	.000	Corrected Total	SSmin	3799		
	SSave	1	90.753	.000		SSave	3799		
	SSmax	1	45.920	.000		SSmax	3799		
	SS10min	1	66.682	.000		SS10min	3799		
	SS10ave	1	46.144	.000		SS10ave	3799		
	SS10max	1	59.036	.000		SS10max	3799		
	UNImin	1	73.016	.000		UNImin	3799		
	UNIave	1	64.800	.000		UNIave	3799		
	UNImax	1	29.994	.000		UNImax	3799		
	UNI10min	1	74.547	.000		UNI10min	3799		
	UNI10ave	1	75.691	.000		UNI10ave	3799		
	UNI10max	1	55.692	.000		UNI10max	3799		

5.7.2.1 Post-hoc tests – UNI factor

The LSD post-hoc test proves at a 5% level of significance that students' earnings expectations vary between countries. Table 5.45, which summarises the differences between individual institutions, shows clearly that students from Huddersfield expect significantly higher earnings than the students at any surveyed Czech institution. It is also apparent that differences exist within the Czech Republic. Students in Prague expect statistically significantly higher earnings than their peers in Liberec and Pardubice at all levels of education, experience and probability. Differences between earnings expected by students in Liberec and Pardubice are significant at the point of graduation from both secondary and higher education at the minimum and most likely level of probability; differences between earnings expected ten years after graduation are not statistically significant.

Table 5.45 <u>Differences in earnings expectations by institution and level of education</u>

	Huddersfield - Prague	**Huddersfield - Liberec**	**Huddersfield - Pardubice**
SS min	15086.9355*	15703.3218*	16311.4966*
SS ML	18566.4163*	19854.6408*	20758.2767*
SS max	26106.6511*	28666.6650*	29568.8150*
SS10 min	23256.8954*	25254.3380*	25171.8965*
SS10 ML	28439.4507*	31569.9293*	31036.6995*
SS10 max	30221.0456*	39614.2681*	40638.1572*
UNI min	22315.8855*	23672.8592*	25436.9872*
UNI ML	26475.5696*	28712.0864*	30615.2398*
UNI max	30885.1340*	37525.2093*	38632.2089*
UNI10 min	37935.8338*	44029.1627*	46012.5598*
UNI10 ML	45798.3963*	55739.0470*	58205.8172*
UNI10 max	23067.0931*	74900.2615*	82135.1397*
	Prague - Liberec	**Prague - Pardubice**	**Liberec - Pardubice**
SS min	616.3863*	1224.5612*	608.1749*
SS ML	1288.2245*	2191.8604*	903.6359*
SS max	2560.0138*	3462.1638*	902.150**
SS10 min	1997.4426*	1915.0011*	-82.4415
SS10 ML	3130.4787*	2597.2489*	-533.2298
SS10 max	9393.2225*	10417.1116*	1023.8892
UNI min	1356.9737*	3121.1018*	1764.1280*
UNI ML	2236.5169*	4139.6703*	1903.1534*
UNI max	6640.0754*	7747.0749*	1106.9995
UNI10 min	6093.3289*	8076.7260*	1983.3970
UNI10 ML	9940.6507*	12407.4209*	2466.7702
UNI10 max	51833.1684*	59068.0466*	7234.8782

5.7.2.2 Multifactor post-hoc tests - UNI*GENDER

As in the case of the expected rates of return, it is desirable to compare all of the means within a 3x2 between-subjects factorial design. In order to do so a new composite variable was created; each level of the composite variable corresponds to a unique combination of the two independent variables, namely UNI and GENDER. The new variable is a two-digit number, where the first digit is equal to the level in the UNI factor and the second digit is equal to the level in the GENDER factor. The numbers of respondents that belong to each level of the new variable (UNI*GENDER) are summarised in Table 5.46.

Table 5.46 Number of respondents in a composite variable UNI*GENDER

Between-Subjects Factors		
		N
UNI*GENDER	10	509
	11	828
	20	248
	21	662
	30	185
	31	620
	40	449
	41	299

The complexity of the output table with the multiple comparisons might cause difficulties interpreting the results. This is why the multiple comparisons were split into two separate tables; each presents different relationships between the means of each level of the composite variable. Table 5.47 presents the differences between universities for males and females and each dependent variable separately. For example, the first row and the first column represents the difference between means of earnings expected by males in Huddersfield and Prague after completing secondary education at a minimum level of probability (i.e. Huddersfield Male SS min – Prague Male SS min = 15,090.4*); the eighth row and sixth column represents the difference between the most likely expected earnings of females in Huddersfield and Pardubice, and so on. The asterisk stands for a level of significance (*5%, **10%). The difference is not statistically significant at any reasonable level when no asterisk is presented next to the figure.

Table 5.47 shows clearly that both men and women in Huddersfield expect significantly higher earnings than any of the respondents in the Czech Republic. In addition, men in Prague expect significantly higher earnings than their peers in Liberec at all levels of education, experience and probability. The difference varies between 1,000 CZK/month (SSmin) to 72,000 CZK/month (UNImax), which suggests that the regional differences are not only significant but also increase with level of education, experience and probability. In the case of females, those in Prague expect higher earnings than those in Liberec and in most cases the differences are statistically significant. Moreover, as in the case of men, the difference tends to increase with the level of education, experience and probability. When it comes to differences between Prague and Pardubice, in most cases they are statistically significant for both men and women and also tend to increase with education, experience and the probability of obtaining the income. Differences between earnings expected by men and women in Liberec and Pardubice are not as straightforward as in the comparison with Prague. In most cases the differences are not statistically significant; nevertheless it seems that men in Pardubice expect higher earnings than men in Liberec and that women in Pardubice expect lower earnings than women in Liberec.

Table 5.47 Differences in earnings expectations by gender, institution and level of education

	Huddersfield - Prague		Huddersfield - Liberec		Huddersfield - Pardubice	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
SS min	15090.3763*	14211.3155*	16097.5797*	14445.6438*	15925.4764*	15241.6194*
SS ML	18130.8181*	17896.2282*	18130.8181*	18634.6836*	20004.8637*	19710.5729*
SS max	24387.6651*	26153.8462*	27732.1736*	27733.9230*	27344.3794*	28862.9626*
SS10 min	22754.5168*	21479.7473*	26102.2543*	22285.9961*	29233.7059*	23350.0566*
SS10 ML	26860.4294*	27270.6243*	31723.5838*	28793.6551*	24400.1204*	30114.3597*
SS10 max	19930.4138*	32676.4214*	32659.1125*	37301.3393*	24756.0284*	40126.0006*
UNI min	21455.0310*	22304.8588*	22782.6263*	23319.8875*	23601.9593*	25251.6291*
UNI ML	25362.1663*	26450.6224*	27303.7485*	28338.2398*	27607.0397*	30550.4315*
UNI max	25396.1018*	33670.7544*	33671.0162*	38221.0339*	26155.0834*	41556.5811*
UNI10 min	36869.3904*	35348.0119*	43224.4414*	40209.1741*	42014.7204*	42805.2271*
UNI10 ML	42393.0404*	43580.7321*	52786.6316*	51366.9457*	51539.2253*	54346.3507*
UNI10 max	-17374.1480	36499.8142*	54678.0480*	67954.2963*	53324.6042*	75227.9075*
	Prague - Liberec		Prague - Pardubice		Liberec - Pardubice	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
SS min	1007.2034*	234.3283	835.1001*	1030.3039*	-172.1033	795.9755*
SS ML	1798.7404*	738.4554*	1874.0456*	1814.3447*	75.3051	1075.8893*
SS max	3344.5085*	1580.0768*	2956.7143*	2709.1164*	-387.7942	1129.0396*
SS10 min	3347.7375*	806.2488	-961.2860	1870.3093*	-4309.0235*	1064.0605
SS10 ML	4863.1544*	1523.0308	-2460.3090	2843.7354	-7323.4634*	1320.7046
SS10 max	12728.6987*	4624.9179	4825.6146	7449.5792	-7903.0841	2824.6613
UNI min	1327.5952*	1015.0288*	2146.9283*	2946.7703*	819.3330	1931.7415*
UNI ML	1941.5822*	1887.6173*	2244.8734*	4099.8091*	303.2912	2212.1918*
UNI max	8274.9144*	4550.2795*	758.9816	7885.8267*	-7515.9329	3335.5472
UNI10 min	6355.0510*	4861.1622*	5145.3300*	7457.2152*	-1209.7210	2596.0530
UNI10 ML	10393.5912*	7786.2136*	9146.1849*	10765.6187*	-1247.4063	2979.4050
UNI10 max	72052.1960*	31454.4821*	70698.7522*	38728.0933*	-1353.4438	7273.6112

The second issue that arises from the multifactor comparison is the relationship between the earnings expectations of men and women within the surveyed institutions. It is apparent from Table 5.48 that the gender differences within the universities are statistically significant[51]. The gender differences occur at every level of education, experience and probability; in fact they tend to increase with the level of education, experience and probability at all surveyed institutions.

[51] With one exception – Liberec, SS10ML, which is not statistically significant at any reasonable level

Table 5.48 Gender difference within institutions by the level of education, experience and probability

	Male-Female Prague	Male-Female Liberec	Male-Female Pardubice	Male-Female Huddersfield
SS min	1584.7221*	811.8470*	1779.9259*	2463.7830*
SS ML	2411.0086*	1350.7236*	2351.3078*	2645.5985*
SS max	4613.6179*	2849.1862*	4366.0201*	2847.4369*
SS10 min	4608.8798*	2067.391**	7440.4752*	5883.6493*
SS10 ML	6444.8222*	3104.699	11748.8666*	6034.6273*
SS10 max	23663.3937*	15559.6129*	26287.3583*	10917.3861*
UNI min	2373.5669*	2061.0004*	3173.4089*	1523.7391*
UNI ML	3089.3537*	3035.3889*	4944.2895*	2000.8976*
UNI max	9935.0555*	6210.421**	17061.9006*	1660.4029
UNI10 min	7626.8681*	6132.9792*	9938.7533*	9148.2466*
UNI10 ML	13347.3273*	10739.9498*	14966.7611*	12159.6357*
UNI10 max	86107.1671*	45509.4533*	54136.5083*	32233.2050*

5.7.3 Conclusions

MANOVA has been used in this section to determine if categorical variables UNI and GENDER, i.e. the institution/place of study and gender of respondents can explain the variability in a set of continuous dependent variables, i.e. rates of return and earnings expected at both levels of education (secondary and higher), experience (at the point of graduation and ten years later) and all three levels of probability (minimum, most likely and maximum). Multifactor least significant difference (LSD) post-hoc tests were used for a new composite variable UNI*GENDER to determine where exactly the differences were to be found.

The expected rates of return at both points in time and all three levels of probability are expected to be significantly higher for students in Huddersfield than for their counterparts in the Czech Republic. Thus the hypothesis that the rates of return vary between countries is confirmed. The rates of return within the Czech Republic vary as well. Students in Prague expect significantly higher returns than students in Liberec and Pardubice; however, the differences between Liberec and Pardubice are, though positive, not statistically significant. The rates of return thus vary statistically significantly within the country when Prague is included in the comparison.

Differences identified between institutions change slightly when broken down by gender. Women in Prague expect statistically significantly higher returns at all levels than women in

Pardubice and Liberec (ten years after graduation). However, the differences between men in Prague and Pardubice, like between men in Prague and Liberec, are, though mostly positive, not statistically significant. The differences between Liberec and Pardubice are not significant even when broken down by gender. In most cases, men and women in Huddersfield expect significantly higher rates of return than men and women in the Czech institutions. Gender differences within institutions are mostly not statistically significant. Regardless of whether or not the differences are statistically significant, it seems that women in Huddersfield expect higher rates of return than men, while women in Liberec and Pardubice seem to expect lower rates of return than men at all levels. In Prague no clear gender differences in the expected rates of return were identified.

Students from Huddersfield expect significantly higher earnings than the students at any surveyed Czech institution. Thus the hypothesis that students' earnings expectations vary between countries is confirmed at the 5% level of significance. Students' earnings expectations have also been found to differ by place of study within a country. Students in Prague expect statistically significantly higher earnings than their peers in Liberec and Pardubice at all levels of education, experience and probability. Differences between earnings expected by the students in Liberec and Pardubice are significant at the point of graduation but not ten years later. Thus the hypothesis that earnings expectations vary by a place of study within the country is confirmed at the 5% level of significance, particularly when Prague is included in the comparison and when the earnings at the point of graduation are being compared.

The earnings expectations have been found to vary within and between countries even when broken down by gender. Moreover, it has been found out that the regional differences tend to increase with level of education, experience and probability. Men and women in Huddersfield expect significantly higher earnings than their Czech counterparts. Within the Czech Republic, men and women in Prague expect significantly higher earnings than their peers in Liberec and Pardubice. Differences between earnings expected by men and women in Liberec and Pardubice are not as straightforward as in the comparison with Prague. In most cases the differences are not statistically significant; nevertheless it seems that men in Pardubice expect higher earnings than men in Liberec and that women in Pardubice expect lower earnings than women in Liberec.

Gender differences in earnings expectations have been found to be statistically significant within each surveyed institution. The gender differences occur at every level of education, experience and probability; in fact they tend to increase with the level of education, experience and probability at all surveyed institutions. Thus the hypothesis that there are gender differences is confirmed.

In conclusion, expected rates of return as well as expected earnings have been found to vary between countries with students in Huddersfield, both male and female, expecting both significantly higher rates of return and significantly higher earnings than their counterparts in the Czech Republic. Differences in rates of return and earnings expectations between institutions within the Czech Republic have also been identified particularly when Prague was included in the comparison. Finally, without considering the statistical significance of the results, women in Huddersfield seem to expect higher rates of return than men, while women in Liberec and Pardubice seem to expect lower rates of return than men. In Prague no clear gender differences in the expected rates of return were identified. Nevertheless it was found that, when it comes to earnings, the gender-pay gap is expected to increase with the level of education and experience.

5.8 Gender and graduate destinations – Chi-squared test

The Chi-square test is used to determine whether there is an association (or a relationship) between two categorical variables. In the case of two variables being compared, the test can also be interpreted as determining if there is a difference between the two variables. The sample data is used to calculate a test statistic, the size of which reflects the probability (p-value) that the observed association between the two variables has occurred by chance, i.e. due to sampling error (DeCoster, 2004). In this case the Chi-squared test will be used to determine whether there is an association between gender and graduate destination, or in other words whether women expect to find their graduate job in different locations to men.

The null hypothesis (H0) is tested and either accepted or rejected, in which case an alternative hypothesis (H1) is accepted. If the probability of the test statistic is greater than alpha = 0.05, the null hypothesis is not rejected at the 5% level of significance and it is concluded that there is no relationship between the variables, i.e. they are independent.

H0: There is no association between the gender of respondents and the intended location of the graduate job.

H1: There is an association between the gender of respondents and the intended location of the graduate job.

The chi square test assumes that each cell has an expected frequency of five or more in a two-by-two table, and five or more in 80% of cells in larger tables, but no cells with a zero expected count. If this assumption is not met the Fisher's exact test can be used (DeCoster, 2004). However, in SPSS 15 (and PASW 17.02) without the SPSS Exact Test Module, the Fisher's exact test can only be performed on a two-by-two table. For tables with *i* rows and *j* columns and an expected frequency of more than 80% of the cells being less than five, a G-test likelihood ratio is recommended to be used instead of the Pearson Chi-square (Agresti, 2002; Özdemir and Eyduran, 2005). The appropriate statistics are flagged with an asterisk.

5.8.1 Huddersfield

The cross tabulation (Table 5.50) presents how many women and men intend to work in the respective locations. The coding of the graduate job locations is presented in Table 5.49

Table 5.49 Coding of the graduate destinations

Place of study only	1
Place of study + capital	2
Place of study + elsewhere in the home country	3
Place of study + abroad	4
Capital only	5
Capital + elsewhere in the home country (outside place of study)	6
Capital + abroad	7
Abroad only	8
Elsewhere in the home country only (outside capital and the place of study)	9
Elsewhere in the home country + abroad	10
Don't know	11
Don't know + don't care (or don't care only)	12

Table 5.50 shows that the three highest proportions of students (both male and female) intend to work either in the place of study, abroad or do not know where they intend to work. The cross tabulation here is used by the Chi-squared test to determine whether women and men expect to work at different locations, i.e. whether there is a relationship between gender and graduate destination.

Table 5.50 Crosstabulation – Huddersfield sample

		Job Location												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Gender	M	50	21	18	28	8	4	18	41	10	5	42	19	264
	F	39	19	6	19	11	7	12	21	9	6	34	5	188
Total		89	40	24	47	19	11	30	62	19	11	76	24	452

Since not more than 80% of the cells have an expected frequency of less than 5 (Table 5.51), Pearson Chi-square is the appropriate test statistic to be used.

Table 5.51 Chi-squared test results – Huddersfield sample

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square*	14.922[a]	11	.186
Likelihood Ratio	15.412	11	.164
Linear-by-Linear Association	.497	1	.481
N of Valid Cases	452		

[a] two cells (8.3%) have expected count less than 5. The minimum expected count is 4.58.

The p-value associated with the test statistic is higher than 0.05. Thus the null hypothesis cannot be rejected and it can be concluded that there is no statistically significant relationship between gender and the intended job location. In other words, in the Huddersfield sample women do not expect to work at different locations to men.

5.8.2 Prague

The cross tabulation (Table 5.52) shows that, as in the case of Huddersfield, the three highest proportions of students in Prague intend to work at the place of study, abroad or do not know where they want to find their graduate job.

Table 5.52 Crosstabulation – Prague sample

		Job Location												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Gender	M	50	21	18	28	8	4	18	41	10	5	42	19	264
	F	39	19	6	19	11	7	12	21	9	6	34	5	188
Total		89	40	24	47	19	11	30	62	19	11	76	24	452

Since 31.3% of the cells have an expected frequency of less than 5 the likelihood ratio is the appropriate statistic to choose when determining whether or not there is a statistically significant relationship between gender and graduate destinations.

Table 5.53 Chi-squared test results – Prague sample

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square*	7.264[a]	7	.402
Likelihood Ratio	7.372	7	.391
Linear-by-Linear Association	.522	1	.470
N of Valid Cases	345		

[a] five cells (31.3%) have expected count less than 5. The minimum expected count is 2.42.

The p-value associated with the test statistic is higher than 0.05 (Table 5.53). This is why the null hypothesis cannot be rejected at the 5% level of significance, i.e. it can be concluded that there is no statistically significant relationship between gender and the intended graduate destination.

5.8.3 Liberec

The cross tabulation presented in Table 5.54 shows that the highest proportion of students in Liberec intends to work in the place of study. However, when gender is taken into account, it is apparent that more women than men intend to work in Liberec.

Table 5.54 Crosstabulation – Liberec sample

		Job Location												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Gender	M	8	12	4	19	6	5	18	16	3	6	13	1	111
	F	73	42	15	38	10	17	34	39	25	11	37	3	344
Total		81	54	19	57	16	22	52	55	28	17	50	4	455

More than 20% of cells have an expected frequency of less than 5. Thus the likelihood ratio is used to determine whether the variables under test are independent.

Table 5.55 Chi-squared test results – Liberec sample

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.267[a]	11	.022
Likelihood Ratio*	24.794	11	.010
Linear-by-Linear Association	3.983	1	.046
N of Valid Cases	455		

[a] five cells (20.8%) have expected count less than 5. The minimum expected count is .98.

Since the p-value associated with the test statistic is lower than 0.05 the null hypothesis can be rejected with 95% confidence, i.e. it can be concluded that there is a statistically significant relationship between gender and the intended job location. In other words women expect to work at different locations to men. The test however does not show where the differences lie exactly, i.e. which cell or cells produced the statistically significant difference. This is why a post-hoc analysis should be performed.

The residual, or the difference, between the observed frequency and the expected frequency is a reliable indicator of the difference between variables, especially if the residual is converted to a z-score and compared to a critical value equivalent to the level of alpha. SPSS (PASW) provides a standardized residual converted to a z-score for each cell.

A standardized residual indicates what each cell in the table contributes to the chi-square statistic. Since they are calculated to follow a standard normal distribution, absolute values greater than 1.96 for a 0.05 probability level indicate that the cell in question provides significant information about the combinations of groups of the variables whose occurrence is different from what would be expected under the hypothesis of independence.

A positive value for the standardized residual indicates that the cell is over-represented in the sample when compared to the expected frequency, i.e. there were more cases in the category than was expected. Standardized residuals that have a negative value imply that the cell is under-represented in the sample compared to the expected frequency, i.e. there were fewer cases in the category than was expected.

Table 5.56 presents the observed and expected frequencies and the standardised residual for each cell. The absolute value of the standardised residual is greater than 1.96 in the case of males who intend to work in the place of study. Its negative value indicates that there were fewer men in the sample who intend to work in the place of study than would be expected under the hypothesis of independence. Thus in the case of the Liberec sample it can be concluded that more women than men intend to work in the place of study.

Table 5.56 Post-hoc analysis results – chi-square, Liberec sample

			Job Location												Total
			1	2	3	4	5	6	7	8	9	10	11	12	
GENDER	MALE	Count	8	12	4	19	6	5	18	16	3	6	14	0	111
		Expected Count	19.8	13.2	4.6	13.9	3.9	5.4	12.7	13.4	6.8	4.1	12.4	.7	111.0
		Residual	-11.8	-1.2	-.6	5.1	2.1	-.4	5.3	2.6	-3.8	1.9	1.6	-.7	
		Std. Residual	-2.6	-.3	-.3	1.4	1.1	-.2	1.5	.7	-1.5	.9	.4	-.9	
	FEMALE	Count	73	42	15	38	10	17	34	39	25	11	37	3	344
		Expected Count	61.2	40.8	14.4	43.1	12.1	16.6	39.3	41.6	21.2	12.9	38.6	2.3	344.0
		Residual	11.8	1.2	.6	-5.1	-2.1	.4	-5.3	-2.6	3.8	-1.9	-1.6	.7	
		Std. Residual	1.5	.2	.2	-.8	-.6	.1	-.8	-.4	.8	-.5	-.3	.5	
Total		Count	81	54	19	57	16	22	52	55	28	17	51	3	455
		Expected Count	81.0	54.0	19.0	57.0	16.0	22.0	52.0	55.0	28.0	17.0	51.0	3.0	455.0

5.8.4 Pardubice

The cross tabulation in Table 5.57 shows that the greatest proportions of students either intend to work in the place of study or do not know where they will find their graduate job.

Table 5.57 Crosstabulation – Pardubice sample

		Job Location												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Gender	M	15	6	3	8	7	1	8	10	4	5	14	3	84
	F	37	6	9	17	8	14	20	17	25	8	33	4	198
Total		52	12	12	25	15	15	28	27	29	13	47	7	282

The likelihood ratio is used since nearly 30% of cells have an expected frequency of less than 5. Since the p-value associated with the test statistic is higher than 0.05 the null hypothesis cannot be rejected, i.e. it can be concluded that there is no statistically significant relationship between gender and the intended job location in the Pardubice sample (Table 5.58). In other words women in Pardubice do not expect to work at different locations to their male peers.

Table 5.58 Chi-squared test results – Pardubice sample

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.718[a]	11	.249
Likelihood Ratio*	14.973	11	.184
Linear-by-Linear Association	.116	1	.734
N of Valid Cases	282		

[a] seven cells (29.2%) have expected count less than 5. The minimum expected count is 2.09.

5.8.5 Conclusions

In this section the Chi-squared test was used to determine whether or not there were any gender differences in graduate destinations. Except for the case of Liberec, no statistically significant difference has been identified, i.e. gender and graduate destination variables have been to found to be independent. In other words, there is not enough evidence to argue that women and men intend to work in different locations. In Liberec however, fewer men intend to work in the place of study than would be expected under the independence hypothesis, i.e. if the graduate destination was not dependent on gender. Thus it is concluded that in the Liberec sample significantly more women than men intend to find their graduate job in the Liberec region.

5.9 Expected earnings and rates of return vs. graduate destinations – One-way ANOVA

A one-way analysis of variance (ANOVA) is used when there is a categorical independent variable (with two or more categories), and a continuous dependent variable in order to test for differences in the means of the dependent variable broken down by the levels of the independent variable. In this case the one-way ANOVA will test whether the mean of earnings expectations at the point of graduation and the mean of expected rates of return differ between the twelve above defined categories of graduate destinations (Table 5.49).

To determine whether there is a relationship between the independent variable and the dependent variable, a one-way between-subjects ANOVA tests whether the means of all of the groups are the same. If there are any differences among the means, the value of the dependent variable depends on the value of the independent variable (DeCoster, 2004). Except for the ANOVA table, an output with marginal means can be obtained to show the means of the dependent variable in each group of the independent variable.

A significant F statistic states that at least two group means are different from each other, indicating the presence of a relationship. However, it does not indicate where the difference may lie. This is why a post-hoc analysis should follow a significant ANOVA test in order to understand the nature of the relationship between the dependent and the independent variable. The most commonly reported post-hoc tests are LSD (Least Significant Difference test), SNK (Student-Newman-Keuls), Tukey, and Bonferroni. The LSD method is recommended since it is the most likely to detect any differences among the groups (DeCoster, 2004).

Several dependent variables were identified that were hypothesised to be influenced by the graduate job location; namely earnings expectations and the expected rates of return at the point of graduation, both at all three levels of probability. The independent variable is the intended graduate destination. Students were offered a list of options from which a maximum of two could have been selected. Their combinations were then coded and clustered into twelve categories, so that each subject is only in one level of the independent variable (Table 5.49). The knowledge of the coding system is required for a correct interpretation of the estimated marginal means table, where the codes of the combinations rather than the names of destinations are used.

The hypotheses H3B and H4B are tested in this section, namely:

H3B: Students' earnings expectations immediately after graduation are influenced by the graduate job location
(*Null hypothesis:* Mean expected earnings are not different for different job locations)
(*Alternative hypothesis:* Mean expected earnings are not different for different job locations)

H4B: Expected rates of return at the point of graduation are influenced by the graduate job location
(*Null hypothesis:* Mean expected rates of return are not different for different job locations)
(*Alternative hypothesis:* Mean expected rates of return are not different for different job locations)

5.9.1 Differences in expectations in Huddersfield by graduate destination

5.9.1.1 Males

The p-value associated with the F statistic shows that the ANOVA test is not statistically significant at the 5% level of significance for any of the dependent variables in the case of males in Huddersfield (Table 5.59). Although the differences in expectations are not significant when broken down by graduate destination, the estimated marginal means (Table

1, Appendix 5.12) tend to suggest that those men who intend to work either in the capital or abroad, as at least one option, tend to expect higher earnings and rates of return.

Table 5.59 ANOVA test results – Huddersfield males

ANOVA		
	F	Sig.
uni MIN	0.57	0.853
uni ML	0.748	0.691
uni MAX	0.587	0.839
IRRuniMIN	0.454	0.929
IRRuniML	0.321	0.981
IRRuniMAX	0.607	0.822

5.9.1.2 Females

Table 5.60 presents the results of the ANOVA test for Huddersfield females. The results show that the maximum expected earnings have been found to be statistically significant at the 5% level of significance, i.e. the lowest probable expected earnings have been found to be dependent on the graduate job location with 95% confidence.

Table 5.60 ANOVA test results – Huddersfield females

ANOVA		
	F	Sig.
uni MIN	1.041	0.412
uni ML	1.684	0.081
uni MAX	2.497	0.006**
IRRuniMIN	0.874	0.567
IRRuniML	1.674	0.084
IRRuniMAX	1.642	0.092

** 5% level of significance

The post-hoc test LSD relies on equality of variances. This is why Levene's test of homogeneity of variances was conducted and its results are presented in Table 5.61. It shows that the dependent variable that was identified as statistically significant can be tested further by the LSD post-hoc test to determine where exactly the differences lie.

Table 5.61 Test of homogeneity of variances - Huddersfield females

	Levene Statistic	df1	df2	Sig.
UNI min	1.568	11	174	.112
UNI ML	1.768	11	169	.063
UNI max	5.078	11	169	.000
IRR uni MIN	1.622	11	160	.097
IRR uni ML	2.182	11	154	.018
IRR uni MAX	1.379	11	154	.188

The post-hoc test (Table 5.62) identified a significant difference in the maximum earnings expected between the job locations coded 1 and 5, i.e. place of study only and capital only. The results show that those women in Huddersfield who intend to work in the capital expect their earnings to be on average over £11,000 pa higher when compared to those who intend to find their graduate job in the region of study. Indeed, Table 2 in Appendix 5.12 suggests that the expected annual earnings in the 'place of study' group are expected to be on average £24,000 and those in the category 'capital only' are expected to be over £35,000 pa, i.e. women who plan to find their graduate job in Northern England expect to earn less than those who intend to work in London.

Table 5.62 Post-hoc test results – maximum expected earnings, Huddersfield females

Dependent Variable	(I) Job Location]	(J) Job Location	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
UNI max	1	2	-2759.60171	2515.35169	.994	-11096.6625	5577.4591
		3	-4864.86486	3922.29365	.985	-17865.1943	8135.4646
		4	-7759.60171	2515.35169	.095	-16096.6625	577.4591
		5	-11319.41032	3060.59439	.015	-21463.6624	-1175.1583
		6	563.70656	3673.32048	1.000	-11611.4085	12738.8216
		7	-5031.53153	2960.66261	.866	-14844.5625	4781.4995
		8	-1920.42042	2561.10034	1.000	-10409.1138	6568.2730
		9	-1420.42042	3312.37245	1.000	-12399.1836	9558.3427
		10	-6864.86486	4246.40238	.901	-20939.4434	7209.7136
		11	74.52907	2133.89749	1.000	-6998.2127	7147.2709
		12	1135.13514	4246.40238	1.000	-12939.4434	15209.7136

5.9.2 Differences in expectations in Prague by graduate destination

5.9.2.1 Males

The p-value associated with the F statistic shows that the ANOVA test is not significant for any of the dependent variables in the case of males in Prague (Table 5.63). Although the differences in expectations are not significant when broken down by job location, the estimated marginal means (Table 3[52], Appendix 5.12) tend to suggest that those men who intend to work abroad seem to expect higher earnings than those who plan to work in the Czech Republic (outside Prague).

Table 5.63 ANOVA test results – Prague males

ANOVA		
	F	Sig.
uni MIN	1.038	0.408
uni ML	1.028	0.414
uni MAX	0.599	0.756
IRRuniMIN	0.679	0.69
IRRuniML	0.869	0.533
IRRuniMA	0.545	0.799

5.9.2.2 Females

The ANOVA test results presented in Table 5.64 show that the maximum earnings expected by women in Prague and their expected rates of return at every probability level have been found to differ statistically significantly by graduate destination at the 5% level of significance.

Table 5.64 ANOVA test results – Prague females

ANOVA		
	F	Sig.
uni MIN	1.39	0.211
uni ML	1.825	0.084
uni MAX	2.687	.011**
IRRuniMIN	3.253	.003**
IRRuniML	2.394	.023**
IRRuniMAX	2.268	.031**

Since the post-hoc test LSD relies on equality of variances Levene's test of homogeneity of variances was conducted and its results are presented in the Table 5.65. It shows that those dependent variables that were identified to differ statistically significantly by the independent variable have equal variance and thus the LSD post-hoc test results can be used to determine where the differences lie.

[52] Table 3 in Appendix 5.12 shows eight rather than the twelve categories which were used in the case of Huddersfield. The reason for this is that Prague is the capital of the Czech Republic and the place of study at the same time. Thus categories 2, 5, 6 and 7 are excluded and the answers are merged into categories 1, 3, 4 and 5.

Table 5.65 Test of homogeneity of variances – Prague females

	Levene Statistic	df1	df2	Sig.
UNImin	1.924	6	199	0.079
UNIave	0.547	6	199	0.772
UNImax	4.584	6	198	0.000
IRRuniMIN	4.114	6	197	0.001
IRRuniAVE	3.063	6	197	0.007
IRRuniMAX	4.101	6	196	0.001

In the case of Prague females, categories 11 and 12 were merged since there was only one respondent in the category 12 (option 'do not care'); the post-hoc tests cannot be performed if one or more categories contain fewer than two cases.

Given the size of the output of the LSD post-hoc test results, only the statistically significant results are presented in the set of tables 5.66.

Set of tables 5.66 Post-hoc test results summary – Prague females

IRR min

job locations		p-value
1	8	.018
1	11	.035
3	8	.002
3	11	.006
4	8	.004
4	11	.020

IRR max

Job locations		p-value
1	8	.006
1	11	.002
3	11	.019
4	8	.043
4	11	.013

IRR most likely

Job locations		p-value
1	8	.003
3	8	.001
3	11	.032
4	8	.003

UNI max

job locations		p-value
1	8	.008
1	11	.010
3	8	.014
3	11	.014
4	8	.024
4	11	.029
8	9	.046
9	11	.030
10	11	.035

The post-hoc test results and the estimated marginal means (Table 4, Appendix 5.12) show that women who either intend to work abroad or do not know/do not care have significantly higher expectations in terms of their earnings and their rates of return than those who intend to work in the place of study as at least one option.

5.9.3 Differences in expectations in Liberec by graduate destination

5.9.3.1 Males

The ANOVA test results presented in Table 5.67 show that the most likely expected earnings of men in Liberec have been found to differ statistically significantly by graduate destination at the 5% level of significance.

Table 5.67 ANOVA test results – Liberec males

ANOVA		
	F	Sig.
uni MIN	1.469	.119
uni ML	2.125	.018**
uni MAX	0.989	.424
IRRuniMIN	0.617	.756
IRRuniML	0.938	.433
IRRuniMA	0.785	.567

As in the previous cases, a test of homogeneity of variances was conducted and its results are presented in Table 5.68. The statistical significance of the homogeneity test of the most likely earnings as a dependent variable allows the LSD post-hoc test results to be used to identify where the differences lie.

Table 5.68 Test of homogeneity of variances – Liberec males

	Levene Statistic	df1	df2	Sig.
UNI min	2.27	10	100	0.019
UNI ML	2.427	10	100	0.012
UNI max	1.374	10	99	0.204
IRR uni MIN	2.908	10	99	0.003
IRR uni ML	2.456	10	99	0.011
IRR uni MAX	2.369	10	98	0.015

Given the size of the post-hoc test result table, only the combinations where a significant difference was identified are presented in Table 5.69.

Table 5.69 Post-hoc results summary – UNI ML

job locations		p-value
5	1	0.046**
5	11	0.028**
7	1	0.01**
7	4	0.007**
7	9	0.011**
7	11	0.002**
8	9	0.047**
8	11	0.037**
9	5	0.028**
9	10	0.038**
10	11	0.044**

A significant difference was identified between those who expect to work in the capital and those who intend to work in the place of study and those who do not know/do not care about their graduate job location. The estimated marginal means presented in Table 5 in Appendix 5.12 in a combination with the post hoc test results suggest that those who intend to work in the capital expect higher earnings than those who intend to work in the place of study or do not know or do not care about their graduate job location.

Additionally, the results suggest that those who intend to work either in the capital or abroad (category 7) expect significantly higher earnings than those who intend to find their graduate job in the place of study (category 1) only or in combination with working abroad (category 4), elsewhere in the country (outside the capital and the place of study – category 9) and those who do not know/do not care (category 11).

In addition, those who intend to work abroad only (category 5) have been found to expect significantly higher earnings than those who plan to work elsewhere in the Czech Republic (outside the capital and the place of study) and those who do not know/do not care. Those who intend to work elsewhere in the Czech Republic (outside the capital and the place of study) have been found to expect significantly lower earnings than those who added abroad as an option (category 10) and those who intend to work in the capital only (category 5). Finally, the respondents who selected the options of working elsewhere in the Czech Republic and abroad (category 10) have been found to expect significantly higher earnings than those who do not know or do not care.

In conclusion, it is apparent that those who intend to work abroad and in the capital (as at least one option) tend to expect higher earnings than those who either do not know or do not care about their graduate destination and those who intend to work in the Czech Republic (outside the capital and in or outside the place of study).

5.9.3.2 Females

The ANOVA test results presented in Table 5.70 show that the minimum expected earnings and the minimum and the most likely expected rates of return have been found to differ statistically significantly by graduate destination at the 5% level of significance for women in Liberec.

Table 5.70 ANOVA test results – Liberec females

ANOVA		
	F	Sig.
uni MIN	1.85	.045**
uni ML	1.35	0.196
uni MAX	0.948	0.495
IRRuniMIN	2.767	.002**
IRRuniML	1.973	.030**
IRRuniMA	0.78	0.66

The statistical significance of the homogeneity of variances test (Table 5.71) allows the LSD post-hoc test to identify the differences in the rates of return at both minimum and most likely level of probability, but not at the minimum expected earnings.

Table 5.71 Test of homogeneity of variances - Liberec females

	Levene Statistic	df1	df2	Sig.
UNI min	0.695	11	329	0.743
UNI ML	1.154	11	328	0.318
UNI max	1.427	11	330	0.159
IRR uni MIN	3.53	11	328	.000**
IRR uni ML	2.595	11	327	.004**
IRR uni MAX	0.941	11	327	0.501

The results of the LSD post-hoc test are presented in the set of tables 5.72 for both the minimum and most likely expected rates of return. The results show differences in the same combinations of graduate destinations for both the minimum and the most likely expected rates of return. In addition, one more difference was identified in the case of the minimum and one in the case of the most likely expected rates of return.

Set of tables 5.72 Post-hoc test results – Liberec females

Minimum expected rates of return

job locations		p-value
1	4	.000**
1	6	.010*
1	7	.022**
1	8	.000**
2	4	.002**
2	6	.023**
2	8	.001**
4	9	.017**
8	9	.015**

Most likely expected rates of return

job locations		p-value
1	4	.006**
1	7	.018**
1	8	.001**
2	4	.023**
2	6	.023**
2	8	.006**
4	9	.020**
7	9	.041**
8	9	.006**

Overall the post-hoc test results (Table 5.72) in combination with the estimated marginal means (Table 6, Appendix 5.12) show that female students expect significantly lower rates of return in the place of study and elsewhere in the Czech Republic (outside the capital and the place of study) than in any combination with the capital or abroad. In other words, those students who intend to work either in the capital or abroad (as at least one option) tend to expect higher rates of return to their investment in higher education.

5.9.4 Differences in expectations in Pardubice by graduate destination

5.9.4.1 Males

The results of the ANOVA test do not show any statistical significance for any tested dependent variable when it comes to men in Pardubice (Table 5.73).

Table 5.73 ANOVA test results – Pardubice males

ANOVA		
	F	Sig.
uni MIN	0.518	0.885
uni ML	0.5	0.897
uni MAX	1.142	0.343
IRRuniMIN	0.59	0.831
IRRuniML	0.389	0.956
IRRuniMAX	0.719	0.717

Nevertheless, the findings, though statistically insignificant, tend to suggest that, like in the previous cases, those students who intend to work in the capital and/or abroad seem to expect higher earnings than those who intend to work in the place of study as at least one option (Table 7, Appendix 5.12).

5.9.4.2 Females

As in the case of men, the findings tend to suggest that those women who intend to work in the place of study seem to expect lower earnings than those who want to work in Prague and abroad (Table 8, Appendix 5.12); although no statistical difference between destinations has been identified by the ANOVA test (Table 5.74).

Table 5.74 ANOVA test results – Pardubice females

ANOVA		
	F	Sig.
uni MIN	0.738	0.701
uni ML	0.898	0.543
uni MAX	1.42	0.167
IRRuniMIN	0.573	0.849
IRRuniML	1.143	0.33
IRRuniMAX	0.933	0.51

5.9.5 Conclusions

One-way ANOVA was used to test whether the mean of earnings expectations differs between twelve categories of graduate destinations. A significant F statistic indicated the presence of a relationship and the Least Significant Difference (LSD) test is recommended to detect where exactly the differences between the groups lie.

Although not every case and not every dependent variable differed statistically by the graduate destination, the results tend to suggest that those students who intend to work either in the capital or abroad seem to expect higher earnings than those who plan to work in the place of study or in the country of study but outside the capital.

The reason for the detected differences is not clear; two possibilities however seem plausible. Since students have been found to be well informed about labour market conditions the earnings in the graduate job location might influence their future expectations. For example in both surveyed countries the earnings in the capital are higher than in the rest of the country and are substantially higher than those in the places of data collection (i.e. place of study of the respondents). Therefore if students are aware of the fact that earnings are higher in the capital than anywhere else in the country, it is plausible that their expectations would be higher if they intended to work in the capital and lower if they wanted to work elsewhere in the country. Another possible explanation may be associated with the risk of earning an income in certain places. If students intend to work abroad or in the capital, they are likely to require a higher wage premium to compensate for the incurred risk of the greater competition, which they would have to face there, and of the greater variance of their earnings, which is likely to occur.

5.10 Risk and returns

Economic theory suggests that people tend to be risk averse (Markowitz, 1952). Thus fluctuations/variance in their earnings should be considered as undesirable and should be compensated to attract sufficient supply (Diaz-Serrano and Hartog, 2006). In this section two ways of estimating risk will be used. Firstly, risk will be measured by the variance of expected earnings attached to an educational choice. In the second part of this section, standard deviation of the rates of return will be used as a proxy of risk, as suggested by finance theory, and its effect on rates of return will be examined.

5.10.1 Variance of expected earnings as a proxy of expected risk

Mean of expected earnings and their standard deviation was calculated for each respondent at every level of education and experience from the minimum, most likely and maximum expected earnings. Each respondent provided three estimates of their earnings for each level of education and experience. From these three figures (i.e. minimum, most likely and maximum expected earnings) mean expected earnings and a standard deviation were calculated. From the obtained standard deviation and mean expected earnings a coefficient of variation was calculated for each of the scenarios, i.e. SS, SS10, UNI, UNI 10. The coefficient of variation was computed using the following formula:

$$Coefficient\ of\ variation = \frac{Standard\ deviation}{Mean}$$

Differences in coefficients of variation were examined using the within-subjects ANOVA[53] and the test results are summarised in Table 5.75, which presents the mean of the coefficients of variation for each institution, level of expected earnings and experience, and gender. The 'Total' in each gender represents the results for males and females as an average of all institutions. The 'Total' in each level of education and experience represents the average of both genders at each institution. Finally, 'total' in 'total' shows what the average coefficient of variation is for each level of education and expected earnings for both gender and all institutions.

[53] Test results see Appendix 5.13

Table 5.75 Coefficients of variation by gender, place of study, education and experience

Descriptive Statistics

	Gender	UNI	Mean	N		Gender	UNI	Mean	N
COVcoefSS	MALE	Prague	.3197	534	COVcoefUNI	MALE	Prague	.3430	534
		Liberec	.2944	258			Liberec	.3128	258
		Pardubice	.2973	189			Pardubice	.3323	189
		Huddersfield	.2793	508			Huddersfield	.2508	508
		Total	.2987	1489			Total	.3050	1489
	FEMALE	Prague	.3022	860		FEMALE	Prague	.3103	860
		Liberec	.2662	677			Liberec	.2870	677
		Pardubice	.2712	639			Pardubice	.2831	639
		Huddersfield	.2934	328			Huddersfield	.2403	328
		Total	.2834	2504			Total	.2879	2504
	Total	Prague	.3089	1394		Total	Prague	.3228	1394
		Liberec	.2740	935			Liberec	.2941	935
		Pardubice	.2771	828			Pardubice	.2943	828
		Huddersfield	.2848	836			Huddersfield	.2467	836
		Total	.2891	3993			Total	.2943	3993
COVcoefSS10	MALE	Prague	.3752	534	COVcoefUNI10	MALE	Prague	.5736	534
		Liberec	.3307	258			Liberec	.4549	258
		Pardubice	.3035	189			Pardubice	.4445	189
		Huddersfield	.2745	508			Huddersfield	.3413	508
		Total	.3240	1489			Total	.4574	1489
	FEMALE	Prague	.3207	860		FEMALE	Prague	.4452	860
		Liberec	.2727	677			Liberec	.3683	677
		Pardubice	.2602	639			Pardubice	.3486	639
		Huddersfield	.2686	328			Huddersfield	.2940	328
		Total	.2855	2504			Total	.3799	2504
	Total	Prague	.3416	1394		Total	Prague	.4944	1394
		Liberec	.2887	935			Liberec	.3922	935
		Pardubice	.2701	828			Pardubice	.3705	828
		Huddersfield	.2722	836			Huddersfield	.3227	836
		Total	.2999	3993			Total	.4088	3993

Between-subject ANOVA is used to find out whether there are gender and institution differences. Within-subject ANOVA is used to determine whether there is a difference in coefficients of variation between levels of education and levels of experience (DeCoster, 2004). Between-subject ANOVA identified that there are statistically significant gender differences (Table 5.76). The coefficient of variation is higher for men than women, which suggests that women expect lower risk than men. The coefficient of variation was found to differ by institution (Table 5.77). Students in Prague expect the highest risk of all, while students in Huddersfield expect the lowest risk of all. No significant difference was identified between students in Liberec and Pardubice; nevertheless coefficients of variation at both institutions are lower than in Prague and higher than in Huddersfield.

Table 5.76 Gender comparison – coefficient of variation

Pairwise Comparisons						
(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence	
					Lower Bound	Upper Bound
MALE	FEMALE	.043*	.005	.000	.033	.054
FEMALE	MALE	-.043*	.005	.000	-.054	-.033

Table 5.77 Institutional comparison – coefficient of variation

Pairwise Comparisons						
(I) UNI	(J) UNI	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence	
					Lower Bound	Upper Bound
Prague	Liberec	.050*	.007	.000	.037	.063
	Pardubice	.056*	.007	.000	.042	.070
	Huddersfield	.093*	.007	.000	.081	.106
Liberec	Prague	-.050*	.007	.000	-.063	-.037
	Pardubice	.006	.008	.472	-.010	.022
	Huddersfield	.043*	.007	.000	.029	.058
Pardubice	Prague	-.056*	.007	.000	-.070	-.042
	Liberec	-.006	.008	.472	-.022	.010
	Huddersfield	.037*	.008	.000	.022	.053
Huddersfield	Prague	-.093*	.007	.000	-.106	-.081
	Liberec	-.043*	.007	.000	-.058	-.029
	Pardubice	-.037*	.008	.000	-.053	-.022

Within-subject ANOVA identified that there are differences between levels of education and levels of experience. Students expect greater variance in the income which they expect to earn with a university education than in the income they would expect to earn with a high school education only (Table 5.78). Similarly, the coefficient of variation is greater for expected earnings with experience than without (Table 5.79). This is not a surprising result since expected earnings have been identified to increase with level of education and experience. It can be concluded however that expected earnings partially increase with education and experience to compensate for the risk, i.e. variance in expected earnings. Students are thus less sure of the relative position in the earnings distribution at which they will end up. Based on the analysis, it is concluded that an estimate of ex ante risk associated with university education is the coefficient of variation of 0.35 (Table 5.75). This is in line with the findings of Hartog et al. (2007) whose estimated coefficient of variation from a simulation of ex ante risk in university education is about 0.3, which they found comparable to a randomly selected financial portfolio of 30 stocks.

Table 5.78 Education comparison – coefficient of variation

Pairwise Comparisons						
(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence	
					Lower Bound	Upper Bound
SS	UNI	-.056*	.003	.000	-.062	-.050
UNI	SS	.056*	.003	.000	.050	.062

Table 5.79 Experience comparison – coefficient of variation

Pairwise Comparisons						
(I) Experience	(J) Experience	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence	
					Lower Bound	Upper Bound
0 years	10 years	-.062*	.003	.000	-.068	-.056
10 years	0 years	.062*	.003	.000	.056	.068

5.10.2 Standard deviation of expected rates of return as a proxy of ex-ante risk

Simple regression is used in this section to show the effect of risk on the rates of return. Based on finance theory, the standard deviation of the rate of return is used as an approximation of the risk associated with an investment in higher education. It has been shown in the literature that students act rationally according to the theory of human capital, i.e. that they only take on more education if the investment is perceived to be profitable (cf. Menon, 1997; 2008). The objective of this section is to find out whether students act rationally as investors according to finance theory, i.e. whether there is a positive relationship between expected risk and expected returns (Hypothesis H6A).

The approach to achieving the objective is demonstrated in the case of women and men in the sample regardless of year or place of study.

5.10.2.1 Regression model for women - all universities all years

The simple regression model contains one dependent and one independent variable - both of which are continuous and numeric. The dependent variable is the average rate of return expected by men and the independent (predictor) variable is its standard deviation, which represents the expected risk. The regression analysis was conducted using PASW software and its outputs are described below. A model fitting test was conducted and a linear model was chosen as the most appropriate to describe the relationship between the rates of return and the standard deviation, i.e. between return and risk.

A strong positive correlation was identified between risk and return in the case of women (sample size of 2,564 in total). The Pearson correlation coefficient is 0.942.

Correlations

		RATE OF RETURN	RISK
Pearson Correlation	RATE OF RETURN	1.000	.942
	RISK	.942	1.000
Sig. (1-tailed)	RATE OF RETURN	.	.000
	RISK	.000	.
N	RATE OF RETURN	2564	2564
	RISK	2564	2564

The R-square value shows the proportion of variance in the dependent variable (rate of return) which can be explained by the independent variable (standard deviation). This is an overall measure of the strength of association. R-square shows that nearly 89% of the variance in the rates of return (expected by women) can be explained by the standard deviation.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Linear	.942	.887	.887	13.40143

The F value or F ratio is the test statistic used to decide whether the model as a whole has statistically significant predictive capability. The null hypothesis that the model has no predictive capability, i.e. that all population regression coefficients are 0 simultaneously is rejected (at the 5% level of significance) if the F ratio is large and if the p-value associated with the F-statistic is lower than 0.05. Thus, the regression model of the rates of return and standard deviations expected by women has a statistically significant predictive capability.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
Linear	Regression	3622952.056	1	3622952.056	20172.513	.000
	Residual	460131.228	2562	179.598		
	Total	4083083.283	2563			

The first variable (constant) is referred to as the Y-intercept, i.e. the height of the regression line when it crosses the Y axis. In other words, this is the predicted value of the rate of return when the standard deviation is 0. The standard deviation of the rates of return represents the expected risk associated with the investment in higher education. If the standard deviation was equal to 0, i.e. if there is no risk associated with the investment in higher education then the constant (Y-intercept) would represent the expected risk free rate of return to higher education. In the case of women the average expected risk free rate of return to higher education is just over 8%.

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence	
		B	Std. Error	Beta			Lower Bound	Upper Bound
Linear	(Constant)	8.225	.275		29.857	.000	7.685	8.765
	RISK	.913	.006	.942	142.030	.000	.901	.926

The unstandardised coefficient B is the value for predicting the dependent variable from the independent variable in the regression equation. The regression equation is presented as follows:

$$Y = \beta_0 + \beta_1 X$$

where

β_0 is the Y-intercept

β_1 is the unstandardised coefficient B

X is the predictor variable

Y is the dependent variable

Based on the coefficient and the regression equation, the regression model for men is as follows:

$$Y = 8.225 + 0.913 * X$$

The β_1 coefficient for the standard deviation is 0.913. Therefore for every unit increase in risk, a 0.913 increase in rate of return is predicted. Subsequently, it can be concluded that there is a positive relationship between expected return and expected risk, i.e. there is a positive compensation to be expected for the risk of the investment in higher education; for an approximately 1.1 percentage points increase in risk there is a 1 percentage point increase in the average expected return to education.

5.10.2.2 Regression model for men - all universities all years

As in the case of women, a correlation was identified (0.796), which indicates a strong positive relationship between the return and risk expected by men in the sample (1,530 in total).

Correlations

		RATE OF RETURN	RISK
Pearson Correlation	RATE OF RETURN	1.000	.796
	RISK	.796	1.000
Sig. (1-tailed)	RATE OF RETURN	.	.000
	RISK	.000	.
N	RATE OF RETURN	1530	1530
	RISK	1530	1530

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Linear	.796	.634	.634	16.19095

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
Linear	Regression	693870.954	1	693870.954	2646.879	.000
	Residual	400560.390	1528	262.147		
	Total	1094431.344	1529			

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
Linear	(Constant)	13.034	.460		28.351	.000	12.132	13.936
	RISK	.573	.011	.796	51.448	.000	.551	.595

The regression model for men is, like for women, statistically significant, i.e. it has a predictive capability. The Y-intercept (constant) indicates that the risk free rate of return to higher education expected by men is 13%, i.e. nearly 5 percentage points higher than that of women. The regression coefficient of the standard deviation is 0.573; consequently, the regression model for men is as follows:

$$Y = 13.034 + 0.573 * \mathrm{X}$$

As in the case of women there is a positive relationship between the expected return and the expected risk; for a nearly two percentage points increase in risk there is a one percentage point increase in the average expected return to education. Women thus expect one percentage point higher compensation for the expected risk.

5.10.2.3 Risk-return compensation and the risk-free rate of return

In the case of both men and women in the surveyed samples, descriptive analysis suggests that there are differences in expected rates of return, at least when it comes to a cross-country comparison. This is why the simple regression analysis is conducted separately for each university (and gender) to see whether or not the risk free rates of return differ by place of study and in which way gender differences are present.

Table 5.80 presents mean rates of return, risk free rates of return and the regression coefficients for standard deviations, from which compensation is calculated[54] as an increase in risk required for a 1 percentage point (pp) increase in the expected rate of return (the lower is the figure the greater is the compensation required). It provides the information about the rates of return expected at the point of graduation, those expected ten years later, and the average rates of return (total). The former rates of return consist of averages calculated from individuals' minimum, most likely and maximum rates of return separately for the point at graduation and for the point ten years later. The latter is computed as an average of all

[54] 1/regression coefficient; rounded to one decimal place

individuals' rates of return regardless of the time period. The standard deviation of the returns was calculated for each individual separately. The within-subject design enables this to be undertaken since the minimum, most likely and maximum rates of return serve as variables from which both the mean and the standard deviation can be calculated.

Table 5.80 Risk free rate of return by gender and place of study

		Male			Female		
		Graduation	10 years later	Total	Graduation	10 years later	Total
Huddersfield	Mean rate of return	18.589	31.058	25.013	24.037	32.538	28.277
	Risk free rate of return	12.754	18.704	11.545	10.209	15.329	9.500
	Regression coefficient	.675	.875	0.800	1.186	1.324	1.047
	Compensation	1.5	1.1	1.3	0.8	0.8	1.0
Prague	Mean rate of return	16.294	32.757	24.796	15.570	27.740	21.597
	Risk free rate of return	10.688	16.125	12.935	7.197	13.402	8.340
	Regression coefficient	.645	.691	0.522	1.202	.949	0.908
	Compensation	1.6	1.4	1.9	0.8	1.1	1.1
Liberec	Mean rate of return	15.678	24.636	19.989	13.159	17.447	15.275
	Risk free rate of return	8.380	13.528	10.809	8.776	9.491	8.316
	Regression coefficient	1.229	.776	0.689	.830	1.028	0.820
	Compensation	0.8	1.3	1.5	1.2	1.0	1.2
Pardubice	Mean rate of return	15.558	21.674	19.134	12.067	17.152	14.564
	Risk free rate of return	7.513	10.395	9.535	8.484	10.759	8.085
	Regression coefficient	1.097	.756	0.681	.719	.857	0.768
	Compensation	0.9	1.3	1.5	1.4	1.2	1.3

It shows that the mean rates of return are higher than those that are risk-free, which is to be expected a priori. However, a noteworthy finding is that on several occasions the gender differences in the mean rate of return are the opposite to those in risk-free rates of return. In Huddersfield the mean rate of return at the point of graduation and ten years later shows that both are higher for women than men. The risk-free rate of return however indicates the opposite, i.e. women expect lower rates of return than men. This suggests that women expect higher risk which is compensated for by the higher returns. In the case of Pardubice, the mean rates of return are lower for women than men, while risk-free rates of return tend to be higher for women than men, suggesting that women in Pardubice expect lower risk. Similarly, in Liberec women expect lower returns than men at the point of graduation while when risk is eliminated, the returns expected by women are similar (slightly higher) than those expected by men. This tends to suggest that conclusions on gender differences if presented without the context of risk might be misleading. Do women in Huddersfield expect higher or lower rates of return to their investment in higher education than men? When risk is taken into account then women in Huddersfield expect higher rates of return; when risk is eliminated then women expect lower rates of return.

The regression coefficients show by how much the rate of return increases for a unit increase in risk. The required compensation for incurred risk seems to be higher for women than men. The greatest compensation is expected by women in Huddersfield and the lowest by men in Prague. The average compensation for women varies between 1 and 1.3 while that for men varies between 1.3 and 1.9.

The descriptive analysis suggests that students expect to benefit from their investment in higher education more in the medium, rather than the immediate, term. However, it is also apparent from the analysis that the further in the future are the estimates done, the larger is the standard deviation of the estimates. An interesting question therefore arises; is the increase caused by the uncertainty of the returns, i.e. by the greater risk borne by the investors when expecting returns ten years after graduation, or is there a genuine increase expected in the rates of return and thus would students expect higher rates of return even if the investment was risk free?

Table 5.80 shows that the risk free rate of return is indeed expected to be lower immediately after graduation than ten years later by both men and women at all surveyed institutions. Thus students do not expect to benefit from their investment in higher education more in the medium term to only compensate for the increased risk in terms of the uncertainty of obtaining the returns in the future, but genuinely even if the risk is eliminated.

The main conclusion of this section is that respondents behave rationally as investors since there is a positive relationship between expected risk and expected returns. The findings suggest that students expect higher returns to compensate for the expected risk. Therefore as investors, students either gain expected return by taking on risk, or reduce risk by giving up the expected return.

5.11 Factors influencing expectations - multivariate multiple regression

Multivariate regression is used in this section to examine the relationship between returns to education and family background. The expected rates of return and earnings at both points in time, and at all three levels of probability, are the dependent variables while the education and income of the respondents' mother and father are the independent variables. In addition, the relationship between the dependent variables and the age of the respondents is examined. Both age and socio-economic background have been found in the literature to have an effect on the returns to education (see section 3.5).

Thus the hypotheses H4C and H5C will be tested in the following subsections, i.e.

> H4C: Older respondents expect lower rates of return to higher education
>
> H5C: Socio-economic background influences expectations of earnings and the rates of return

Multiple regression explains variability in a continuous dependent variable using several independent continuous or dichotomous variables. Multivariate regression however examines the effect of several independent variables on two or more dependent variables. The multivariate regression is conducted using the general linear model (GLM), which can be seen as an extension of linear multiple regression for a single dependent variable. Multiple regression quantifies the relationship between several independent or predictor variables and a dependent variable and answers 'what is the best predictor of ...'. Multiple regression differs from the GLM in terms of the number of dependent variables that can be analysed. The method of solving the b coefficients is identical but *n* different sets of regression coefficients are found separately for *n* different dependent variables in the multivariate regression model.

The predictor variable of parental income was continuous until the change in methodology was implemented in 2008. To ensure consistency the continuous variable (until 2008) was transformed to an interval variable (from 2008). However, regression cannot be used for interval data. Thus, in order to analyse the effect of parental income for all surveyed years at the same time, a dummy variable[55] was created. The same was done for parental education since it is an ordinal variable. Parental income was divided into two groups, namely low income and high income. The six intervals were therefore split into two, i.e. £0-£30,000/year (low income) and £30,000/year and more (high income) in the case of Huddersfield data, and 0-30,000CZK/month (low income) and 30,000CZK/moth and more (high income) in the case

[55] A dichotomous variable that only takes value of 0 or 1

of the Czech data. The results of the descriptive analysis[56] were used as a basis for comparable differentiation between low and high income. The descriptive analysis has shown that 50% of fathers in Huddersfield earn below £30,000/year and 50% earn above that threshold. In the Czech cases, 50% of fathers have been found to earn below 30,000 CZK/month and 50% of fathers have been found to earn more than that. Therefore the 50th percentile was used to split the sample of fathers into two groups, which are of similar size. Although the 50th percentile of mothers' income was lower than that of fathers', for consistency reasons, the same figure (i.e. 30,000 CZK/month and £30,000/year) was used to differentiate between mothers with high and low income.

Parental education is a three-level variable. However, the change in methodology caused a change in the proportion of parents with compulsory and college education in Huddersfield while the proportion of parents with a university education remained consistent. For this reason it was decided to compare parents with a university education with those with any lower education. To obtain comparable results between the Czech and Huddersfield data the same approach was adopted in the case of the Czech Republic. As a result, dummy variables UNIVERSITY father and UNIVERSITY mother and HIGH father and HIGH mother have been created.

There are *k-1* dummy variables for *k*-level independent variables. The un-coded group is a reference group. Since parental education has two levels, i.e. university and lower education, one dummy variable UNIVERSITY was created for mother and father separately. The dummy variable UNIVERSITY father has the value 1 if father has completed a university education and 0 if father has completed compulsory or college education; the same is true for mothers' education. Income is also a two-level variable, i.e. high and low income. Thus dummy variable HIGH was created and the low income group is a reference group. The values of dummy variables representing different levels of the independent variables are presented in Table 5.81.

The regression coefficients are then interpreted in relation to the effect of high income on the returns to education when compared to children of low income parents. In other words, how much more/less students from high income families expect to earn than their peers from low income families. The regression will be performed with two more variables, namely YEAR,

[56] Tables 5.3, 5.4, 5.7, 5.8, 5.11, 5.12, 5.15 and 5.16

which is coded to represent the year of data collection, and FEMALE which is a dummy for respondents' gender (Table 5.81).

Table 5.81 Dummy variables

UNIVERSITY	University education	1
	Compulsory or college	0
HIGH	30,000 and more	1
	0-30,000	0
FEMALE	Female	1
	Male	0

The following tables show the multivariate regression results starting with rates of return as dependent variables in the case of Huddersfield (Table 5.84) and the Czech Republic (Table 5.85) and continuing with the expected earnings as dependent variables in the Czech Republic (Table 5.86) and in Huddersfield (Table 5.87).

The results of the regression analysis confirm that the expected rates of return in Huddersfield vary by gender with women expecting statistically significantly higher returns at the point of graduation (Table 5.84). With all other independent variables being constant, female students expect 5.8%, 7% and 10% higher rates of return than men at the lowest, most likely and highest level of probability, respectively. At the later point in time the gender difference is statistically significant at the highest level of probability of obtaining the returns (9.2%).

Age has been found to have a statistically significant negative effect on the expected rates of return. This finding is in line with the previous research (see section 3.5). The older the respondents are the more likely they are to be exposed to the labour market and consequently to have gained the work experience which has been found to have a positive effect on earnings. Thus the older respondents are more likely to have higher foregone earnings which will eventually lower their expected rates of return at the points of graduation from university. It is plausible that later in their working lives the difference in earnings expected without a university degree will reduce/diminish. Indeed, the results of the regression analysis show that the rates of returns expected ten years after graduation from university are not dependent on the age of respondents.

It is hypothesised that the returns are influenced by time. The YEAR variable however is not statistically significant when a linear regression line is estimated. When looking at the descriptive analysis, Figure 5.72 shows a convex curve rather than a line. Therefore a curve estimate was performed and a linear model has been found not to be a significant predictor; rather a quadratic model has been found to have the best fit and thus to best describe the relationship between the two variables, i.e. rates of return and YEAR.

The results of the quadratic regression are presented in Table 5.82. The linear term (YEAR) is negative and the quadratic term (YEAR**2) is positive for all dependent variables. This describes the curve as convex with an initially declining and an eventually increasing tendency. For a graphical illustration of this see Figure 5.74 which compares a negative linear relationship to a quadratic relationship with a positive quadratic term and negative linear term.

Figure 5.74 Quadratic model – convex curve

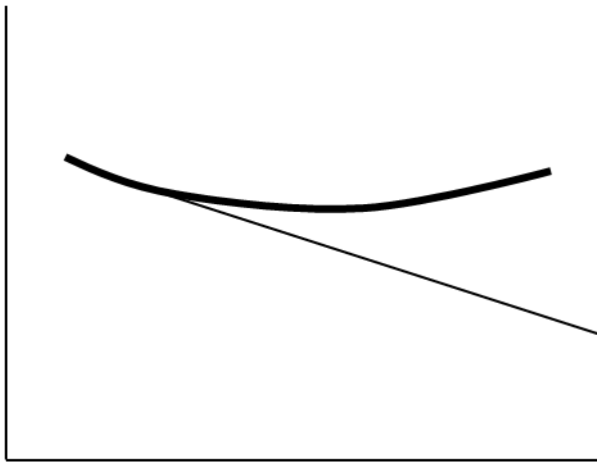
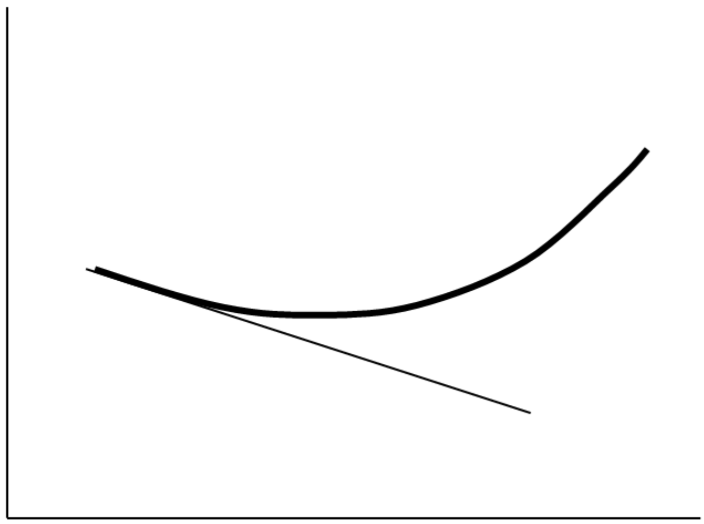


Table 5.82 Quadratic regression results

		RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
YEAR (b)	B	-.077	-.089	-.118	-.110	-.099	-.152
	Std. Error	.033	.027	.030	.041	.036	.047
	Sig.	.020	.001	.000	.008	.006	.001
YEAR ** 2 (a)	B	.011	.012	.012	.014	.012	.019
	Std. Error	.005	.004	.004	.006	.005	.007
	Sig.	.017	.001	.005	.015	.015	.003
Constant (c)	B	.327	.321	.429	.466	.446	.605
	Std. Error	.049	.040	.045	.062	.054	.070
	Sig.	.000	.000	.000	.000	.000	.000

The ratio of the linear term to the quadratic term is critical to the interpretation of the quadratic equation. The value *-b/a* represents the point where the upward effect of the quadratic term cancels out perfectly the downward effect of the linear term. At this point the quadratic equation equals *c*, which is the estimated value of the dependent variable at zero. Beyond the ratio *-b/a*, the quadratic term increases the values of the dependent variables above the intercept (constant). Half of this ratio, i.e. *-b/2a* represents the point at which the quadratic equation evens out – the top of the hyperbola (the graph of the quadratic equation). If $-b/2a>max(X)>-b/a$ then the shape is as outlined in Figure 5.74. If $-b/2a>max(X)<-b/a$ then the curve increases beyond its initial starting level (Figure 5.75).

Figure 5.75 Quadratic equation curve



The ratios–b/2a and –b/a rounded to whole numbers are presented in Table 5.83 and show that the shape of the best fitting curve is like the one presented in Figure 5.75 since $-b/2a>max(X) <-b/a$. Max(X) is 6 as there were six years of data collection. The *–b/2a* ratio shows that the rates of return were declining until the third, fourth and fifth year of the data collection, i.e. 2006/2007, 2007/2008 and 2008/2009 for minimum, most likely and maximum rates of return, respectively, and then started to increase. The *–b/a* ratio shows that if the current trend continues the rates of return will be higher than the intercept (Table 5.83) in 2010/2011 for minimum and most likely rates of return at the point of graduation[57] and in 2011/2012 in the case of the rates of return expected ten years after graduation.

The reason for the convex shape of the curve is likely to have been caused by the change in the tuition fee system, which occurred in 2006/2007. Students seem to be expecting greater returns to compensate for their increased debt. Although the repayments are deferred until after graduation students perceive the debt to be a greater burden than in fact the fees are and

[57] 2013/2014 maximum rates of return at the point of graduation

consequently seem to expect a greater compensation for the incurred debt. This is in line with the rational decision making process, which suggests that individuals posses a model that is used to process relevant information so that an expected future income can be derived (Griffiths and Wall, 2004). If this assumption is accepted, it is likely that students have included the change in the level of tuition fees in their model, which has resulted in an increase of their required compensation in a form of expected returns to their investment in higher education.

Table 5.83 Linear/quadratic ratios

	RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
-b/2a	3	4	5	4	4	4
-b/a	7	7	10	8	8	8

The socio-economic background is represented by the education and income of the respondents' parents. The regression results presented in Table 5.84 show that Huddersfield students' expected rates of return are positively influenced by father's education. Those respondents whose father's education is at a university level tend to expect more than 11 percentage points (pp) higher rates of return than those whose father's education is lower than that, i.e. compulsory or college. Those whose mothers are educated to a university level however tend to expect around 9 pp lower rates of returns that those whose mothers are educated to a lower level. Parental income has not been found to have any statistically significant influence on the expected rates of return.

Table 5.84 Multivariate regression results – rates of return, Huddersfield

		RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
Constant	B	0.455	0.382	0.426	0.405	0.276	0.485
	Std. Error	0.134	0.108	0.118	0.154	0.152	0.198
	Sig.	0.001	0.000	0.000	0.009	0.071	0.015
YEAR	B	0.001	-0.003	-0.032*	-0.008	-0.014	-0.018
	Std. Error	0.009	0.007	0.008	0.010	0.010	0.013
	Sig.	0.904	0.680	0.000	0.429	0.165	0.173
AGE	B	-0.015*	-0.011*	-0.007	-0.006	0.002	-0.001
	Std. Error	0.006	0.005	0.006	0.007	0.007	0.010
	Sig.	0.025	0.045	0.235	0.385	0.761	0.903
FEMALE	B	0.100*	0.070*	0.058*	0.092*	0.045	0.005
	Std. Error	0.031	0.025	0.028	0.036	0.036	0.046
	Sig.	0.001	0.006	0.036	0.011	0.208	0.914
UNIVERSITY father	B	0.141*	0.131*	0.116*	0.111*	0.119*	0.031
	Std. Error	0.038	0.031	0.034	0.044	0.043	0.056
	Sig.	0.000	0.000	0.001	0.011	0.006	0.581
UNIVERSITY mother	B	-0.097*	-0.095*	-0.079*	-0.068	-0.078	-0.041
	Std. Error	0.043	0.035	0.038	0.050	0.049	0.064
	Sig.	0.026	0.007	0.040	0.173	0.114	0.522
HIGH father	B	-0.010	-0.028	-0.042	-0.007	-0.013	-0.034
	Std. Error	0.032	0.026	0.028	0.037	0.037	0.048
	Sig.	0.755	0.271	0.137	0.855	0.718	0.472
HIGH mother	B	-0.006	-0.006	-0.009	-0.004	-0.012	-0.012
	Std. Error	0.046	0.037	0.041	0.053	0.052	0.068
	Sig.	0.904	0.870	0.824	0.934	0.820	0.859
	R-squared	0.057	0.061	0.072	0.029	0.025	0.007
	Adjusted R-squared	0.043	0.048	0.059	0.015	0.011	0.007

In the case of the Czech Republic (Table 5.85) neither age nor gender has been found to have any significant influence on the expected rates of return. YEAR has only been found to have a slight negative (0.5pp) influence on the most likely expected returns at the point of graduation. Contrary to the case of Huddersfield, rates of return expected by the Czech students are not influenced by the education of their parents. Rather it is the parental income that has been found to have a statistically significant[58] positive effect. Moreover, the lower is the probability of obtaining the rates of return the stronger is the effect of parental income. In addition, the effect of parental income tends to be greater on the rates of return expected ten years after graduation than on those expected at the point of graduation. Furthermore, the effect of mothers' income seems to be stronger than that of fathers'. It ranges from 2.2pp to

[58] * = 5% level of significance; ** = 10% level of significance

16.3pp increase in the rates of return when fathers earn more than £30,000 pa when compared to the reference group, i.e. fathers whose income is lower than £30,000 pa (2pp to 23.5pp in case of mothers).

Table 5.85 Multivariate regression results – rates of return, Czech Republic

		RR min	RR ML	RR max	RR10 min	RR10 ML	RR10 max
Constant	B	.129	.149	-.005	.151	.138	.137
	Std. Error	.054	.074	.156	.078	.132	.403
	Sig.	.016	.043	.976	.053	.293	.734
YEAR	B	.000	-0.005*	-.005	-.002	-.004	-.016
	Std. Error	.002	.002	.005	.003	.004	.014
	Sig.	.832	.045	.390	.473	.327	.232
AGE	B	-.009	.004	-.018	.002	.000	-.088
	Std. Error	.007	.010	.020	.010	.017	.052
	Sig.	.208	.675	.386	.866	.993	.093
FEMALE	B	.000	-.001	.009	.001	.002	.014
	Std. Error	.003	.004	.007	.004	.006	.019
	Sig.	.961	.883	.213	.879	.744	.480
UNIVERSITY father	B	.004	-.013	-.024	.018	-.002	-.028
	Std. Error	.008	.011	.023	.011	.019	.058
	Sig.	.572	.208	.285	.117	.908	.632
UNIVERSITY mother	B	-.003	-.011	-.022	-.011	-.030	-.049
	Std. Error	.008	.011	.023	.011	.019	.059
	Sig.	.665	.294	.322	.346	.118	.404
HIGH father	B	0.029*	0.031*	0.047*	0.022**	0.060*	0.163*
	Std. Error	.008	.010	.022	.011	.019	.057
	Sig.	.003	.003	.034	.053	.001	.004
HIGH mother	B	0.020**	0.055*	0.079*	0.050*	0.107*	0.235*
	Std. Error	.011	.015	.031	.016	.027	.081
	Sig.	.068	.000	.012	.002	.000	.004
	R-squared	.009	.011	.007	.009	.013	.011
	Adjusted R-squared	.006	.008	.004	.006	.010	.008

The regression results show that earnings expectations of students in the Czech Republic increase with time, age and parental income for all scenarios (Table 5.86). The earnings expected after completing secondary education grow by 790-950 CZK/month while those expected after completing higher education grow on average by 1,200-1,730 CZK/month every year. With ten years of work experience the expected earnings increase on average by 960-1,500 CZK/month with secondary education and 1,550-1,860 CZK/month with a higher education qualification. The rate of growth seems to be similar at all levels since no difference was reflected in or detected by the rates of return. Thus it is plausible that the growth of expected earnings reflects that of the actual earnings and that the demand for graduates is stable since the rates of return to higher education neither grow nor decline.

The older are the respondents the higher are their earnings expectations at all levels of education and experience. In other words, the earnings expectations are dependent on age. Since hardly any difference in the rate of growth based on the age of respondents was reflected in the rates of return, it is concluded that age influences earnings expectations at all levels of education and experience rather than at the point of graduation from high school only, as was originally hypothesised.

Parental income has been identified as a statistically significant predictor of the earnings expectations at all levels of education and experience. Both parents' income has been found to have a positive effect; however it is mothers' income that seems to have a stronger effect on the students' expectations. For example, those students whose fathers earn more than 30,000 CZK/month expect on average 1,860-5,000 CZK/month more at the point of completing university than those whose fathers earn less than 30,000 CZK/month; while those whose mothers earn more than 30,000 CZK/month expect to earn 2,300-6,000 CZK/month when compared to those whose mothers earn less than that.

The effect of the education of parents is not as straightforward; mothers' education has been found to have no statistically significant effect[59]. Fathers' education on the other hand has been found to have a statistically significant effect on several occasions. The effect was found to be negative since those whose father's education was lower than university level expect slightly higher income. The negative effect was identified at a secondary school level of expectations and at the point of graduation from the university.

Those whose parents are educated to a lower level can see that a certain level of income can be earned even without a university education, while those whose fathers are educated to a university level may think that without the university degree it is not possible to reach as high an income as with the degree. This might suggest that those students whose fathers are university educated may think that they can only reach lower earnings without a university education regardless of experience than those whose parents are educated to a lower level. In other words, they seem to underestimate the effect of secondary qualifications on the level of earnings. On the other hand, those whose parents are educated to either compulsory or high

[59] at 5% level of significance

school level may overestimate the effect of the university education on their future earnings, since they expect higher income at the point of graduation from university than those whose parents are university educated.

Gender was identified by the regression to have a statistically significant effect on the earnings expectations. The results show that women expect lower income at all scenarios regardless of level of education, experience or probability. Since no gender difference was identified in the expected rates of return it is concluded that the gender difference is proportional to the level of expected income, i.e. the higher the income the higher the difference. The absolute difference increases with the level of education, experience and probability but in proportional terms the difference is stable. If the proportional difference, like the absolute one, increased with the level of income the difference would be detected by the rates of return and women would consequently expect lower rates of return than men to their higher education.

Table 5.86 Multivariate regression results – expected earnings, Czech Republic

		SS min	SS ML	SS max	SS10 min	SS10 ML	SS10 max
Constant	B	2485.749	2026.069	5368.75	2704.69	1200.257	-3330.286
	Std. Error	1167.334	1453.409	3297.526	2672.988	3449.42	19650.851
	Sig.	0.033	0.163	0.104	0.312	0.728	0.865
YEAR	B	785.507*	949.662*	946.189*	955.123*	1013.115*	1512.875*
	Std. Error	39.32	48.955	111.071	90.035	116.187	661.903
	Sig.	0.000	0.000	0.000	0.000	0.000	0.022
FEMALE	B	-1171.367*	-1723.902*	-3212.362*	-2917.399*	-3903.366*	-17205.705*
	Std. Error	151.734	188.92	428.625	347.445	448.369	2554.292
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000
AGE	B	325.788*	467.227*	618.857*	616.585*	885.398*	2120.278*
	Std. Error	56.023	69.753	158.257	128.284	165.547	943.096
	Sig.	0.000	0.000	0.000	0.000	0.000	0.025
UNIVERSITY father	B	-397.933*	-281.711	231.678	-927.793*	-962.009**	-5813.657*
	Std. Error	168.595	209.912	476.252	386.052	498.19	2838.117
	Sig.	0.018	0.180	0.627	0.016	0.054	0.041
UNIVERSITY mother	B	61.253	387.491**	471.577	-12.993	597.324	1077.483
	Std. Error	169.947	211.595	480.072	389.148	502.185	2860.877
	Sig.	0.719	0.067	0.326	0.973	0.234	0.706
HIGH father	B	794.000*	1085.631*	2450.377*	2453.621*	2963.852*	10410.209*
	Std. Error	165.741	206.359	468.192	379.519	489.759	2790.086
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000
HIGH mother	B	987.143*	1583.130*	1854.856*	3604.755*	4916.801*	17640.373*
	Std. Error	234.792	292.333	663.25	537.633	693.802	3952.487
	Sig.	0.000	0.000	0.005	0.000	0.000	0.000
	R-squared	0.196	0.215	0.093	0.135	0.132	0.047
	Adjusted R-squared	0.194	0.213	0.09	0.133	0.13	0.045

Table 5.86 continued

		UNI min	UNI ML	UNI max	UNI10 min	UNI10 ML	UNI10 max
Constant	B	4812.909	5211.227	-6103.974	1751.156	-37.519	-29865.446
	Std. Error	2014.971	3159.171	11994	7236.972	9925.356	39113.39
	Sig.	0.017	0.099	0.611	0.809	0.997	0.445
YEAR	B	1196.014*	1371.338*	1725.673*	1549.046*	1864.161*	1658.078
	Std. Error	67.871	106.411	403.996	243.764	334.318	1317.464
	Sig.	0.000	0.000	0.000	0.000	0.000	0.208
FEMALE	B	-2168.653*	-2689.786*	-7817.143*	-5164.373*	-8232.137*	-47438.084*
	Std. Error	261.914	410.641	1559.026	940.689	1290.135	5084.107
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000
AGE	B	480.694*	652.417*	1867.703*	1205.811*	1691.163*	6431.614*
	Std. Error	96.704	151.617	575.624	347.322	476.344	1877.155
	Sig.	0.000	0.000	0.001	0.001	0.000	0.001
UNIVERSITY father	B	-750.812*	-1050.291*	-1377.074	-507.748	-625.87	-3550.625
	Std. Error	291.017	456.27	1732.26	1045.216	1433.491	5649.037
	Sig.	0.010	0.021	0.427	0.627	0.662	0.530
UNIVERSITY mother	B	318.453	351.809	1480.879	-147.435	-301.055	4715.383
	Std. Error	293.35	459.929	1746.151	1053.598	1444.987	5694.338
	Sig.	0.278	0.444	0.396	0.889	0.835	0.408
HIGH father	B	1861.867*	2924.141*	5008.925*	6070.859*	9466.253*	30260.410*
	Std. Error	286.092	448.548	1702.943	1027.527	1409.231	5553.434
	Sig.	0.000	0.000	0.003	0.000	0.000	0.000
HIGH mother	B	2341.517*	4366.716*	6004.784*	10059.862*	15562.382*	31813.085*
	Std. Error	405.283	635.422	2412.421	1455.613	1996.343	7867.098
	Sig.	0.000	0.000	0.013	0.000	0.000	0.000
	R-squared	0.192	0.144	0.037	0.088	0.102	0.08
	Adjusted R-squared	0.19	0.141	0.035	0.086	0.1	0.077

The effect of the independent variables on the earnings expected by students in Huddersfield (Table 5.87) varies by level of education, experience and probability. The regression analysis confirmed what the descriptive analysis suggested; namely that it is the maximum expected earnings at the point of graduation from high school and ten years later that increase over time. When it comes to earnings expected at the point of graduation from university and ten years later, the minimum and most likely earnings increase in time; the changes in time are not significant for maximum expected earnings.

The older are the respondents, the higher will be the earnings they expect at the point of graduation from high school and university at the minimum and most likely[60] level. However, the increase is larger for earnings expected at the point of graduation from high school. This is why age was found to decrease the rates of return[61] to higher education at the point of graduation.

Gender of respondents has been found to have a significant effect on expected earnings at all levels of education and experience, except for those expected immediately after graduation from university. Females expect lower income than men after completing high school and ten years later and ten years after graduation from university.

Table 5.87 Multivariate regression results – expected earnings, Huddersfield

		SS min	SS ML	SS max	SS10 min	SS10 ML	SS10 max
Constant	B	5050.144*	9424.743*	9227.488*	13083.864*	20602.872*	30065.008*
	Std. Error	1283.012	1529.83	4533.645	2895.757	3170.691	5813.574
	Sig.	0.000	0.000	0.042	0.000	0.000	0.000
YEAR	B	14.749	-67.764	998.997*	66.852	199.383	868.000*
	Std. Error	87.283	104.074	308.423	196.998	215.702	395.497
	Sig.	0.866	0.515	0.001	0.734	0.356	0.029
FEMALE	B	-1000.457*	-1054.341*	-1374.611	-2654.702*	-2941.517*	-5749.399*
	Std. Error	301.345	359.316	1064.83	680.135	744.709	1365.451
	Sig.	0.001	0.003	0.197	0.000	0.000	0.000
AGE	B	299.403*	226.172*	270.461	202.137	-21.495	-200.455
	Std. Error	62.521	74.549	220.926	141.111	154.508	283.297
	Sig.	0.000	0.003	0.221	0.153	0.889	0.480
UNIVERSITY father	B	-758.724*	-881.568*	-2137.405**	-1059.204	-1151.233	-1824.428
	Std. Error	362.702	432.476	1281.642	818.618	896.341	1643.472
	Sig.	0.037	0.042	0.096	0.196	0.200	0.267
UNIVERSITY mother	B	756.247**	784.788	3337.448*	-60.893	93.962	1927.205
	Std. Error	418.449	498.948	1478.629	944.439	1034.107	1896.072
	Sig.	0.071	0.116	0.024	0.949	0.928	0.310
HIGH father	B	840.171*	1124.291*	3611.498*	1948.633*	2257.333*	3854.533*
	Std. Error	308.868	368.286	1091.415	697.115	763.302	1399.541
	Sig.	0.007	0.002	0.001	0.005	0.003	0.006
HIGH mother	B	94.954	497.441	932.418	1125.636	2299.398*	4798.682*
	Std. Error	446.962	532.946	1579.384	1008.794	1104.572	2025.272
	Sig.	0.832	0.351	0.555	0.265	0.038	0.018
	R-squared	0.082	0.062	0.067	0.056	0.069	0.089
	Adjusted R-squared	0.069	0.049	0.053	0.042	0.055	0.076

[60] Not statistically significant at any reasonable level for UNI ML
[61] Minimum and most likely level

Table 5.87 continued

		UNI min	UNI ML	UNI max	UNI10 min	UNI10 ML	UNI10 max
Constant	B	11726.046*	17150.992*	26508.975*	20125.893*	29531.167*	60011.719*
	Std. Error	1555.68	2241.037	4097.676	4615.74	6207.804	15029.036
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000
YEAR	B	283.894*	291.165**	-65.278	636.730*	808.215**	1566.737
	Std. Error	105.833	152.457	278.764	314.008	422.316	1022.424
	Sig.	0.008	0.057	0.815	0.043	0.056	0.126
FEMALE	B	-558.795	-824.359	-1458.165	-3499.721*	-5596.503*	-14938.491*
	Std. Error	365.387	526.359	962.433	1084.112	1458.045	3529.913
	Sig.	0.127	0.118	0.130	0.001	0.000	0.000
AGE	B	195.314*	113.591	68.976	360.354	261.243	-163.791
	Std. Error	75.809	109.206	199.681	224.926	302.508	732.368
	Sig.	0.010	0.299	0.730	0.110	0.388	0.823
UNIVERSITY father	B	116.694	1056.175**	895.925	-1180.416	-2039.41	-8607.745*
	Std. Error	439.784	633.531	1158.395	1304.85	1754.919	4248.644
	Sig.	0.791	0.096	0.440	0.366	0.246	0.043
UNIVERSITY mother	B	-236.229	-942.761	-1687.9	449.237	100.975	2868.128
	Std. Error	507.378	730.904	1336.439	1505.404	2024.648	4901.655
	Sig.	0.642	0.198	0.207	0.766	0.960	0.559
HIGH father	B	538.349	243.816	395.156	2432.285*	2812.715**	4727.882
	Std. Error	374.509	539.5	986.461	1111.178	1494.447	3618.041
	Sig.	0.151	0.652	0.689	0.029	0.060	0.192
HIGH mother	B	63.436	553.945	2576.779**	1456.335	3658.837**	11427.887*
	Std. Error	541.952	780.709	1427.506	1607.983	2162.61	5235.659
	Sig.	0.907	0.478	0.072	0.366	0.091	0.030
	R-squared	0.038	0.024	0.015	0.049	0.057	0.065
	Adjusted R-squared	0.024	0.01	0.001	0.035	0.043	0.052

Parental income has been identified to have a positive effect on earnings expectations; however, it is mainly the effect of the fathers’ income that has been found to be statistically significant, especially in relation to the secondary school level earnings expectations. The earnings expected at the point of graduation from university are not statistically significantly influenced by the socio-economic background of the respondents. The earnings ten years after graduation from both secondary school and university have been found to be positively influenced by parental income, but not by parental education. At the point of graduation from high school the effect of parental education is rather curious; fathers’ education seems to have a negative effect on earnings expectation while mothers’ education has a positive influence.

5.11.1 Conclusions

In this section, multivariate multiple regression was used as a tool to uncover factors that influence earnings and rates of return expected by students in Huddersfield and the Czech Republic. Earnings expected at all three levels of probability, both points in time, and both levels of education, were used as dependent variables, while years of data collection, age and gender of respondents, and students' socio-economic background, represented by parental income and education, were used as independent variables, i.e. predictors. The same factors were used for the dependent variables in the form of the rates of return at both points in time and at all three levels of probability. Dummy variables were developed for parental education and income and for respondents' gender.

The regression analysis showed that although in both countries women expect to earn less[62] than men, no gender differences in the rates of return were identified in the case of the Czech Republic. Women in Huddersfield, on the other hand, expect higher rates of return to their higher education, at least at the point of graduation. At the most likely level of probability the difference is on average 7 percentage points ceteris paribus. However, MANOVA showed that women in Huddersfield expected at a highest level of probability (RRmin) 7.7pp higher rates of return than men and most likely they expect 4.7pp higher returns, while the regression showed that on average women expected 10pp and 7pp higher rates of return in the respective cases.

The reason for this disagreement between the results is likely to be the fact that when controlled for other variables, such as socio-economic background, time and age, the effect of gender becomes stronger. Another possible explanation is that multiple regression works only with those respondents for whom all dependent and independent variables are available. Thus for example those who did not answer the question regarding their parental income would not be included in the regression but would be taken into account in MANOVA where only one independent variable (except for the institution, which is given and not provided by the respondents) was examined. The number of respondents MANOVA worked with was 744 and 3049 in the case of Huddersfield and the Czech Republic, respectively, while the regression's number of observations was 495 and 2590 in Huddersfield and the Czech Republic, respectively. It is also apparent that even MANOVA did not use all respondents

[62] differences in earnings expectations between men and women in Huddersfield at the point of graduation from university were not statistically significant

(935 in Huddersfield and 3228 in the Czech sample). The reason for this is that not all respondents provided all the necessary information for the rates of return to be computed. When a multivariate regression is used with FEMALE dummy only, then the regression results are exactly the same as those produced by MANOVA.

Age has been found to have a statistically significant negative effect on the expected rates of return in Huddersfield. This finding is in line with previous research which found that older respondents are more likely to have higher expected foregone earnings, which will eventually lower their expected rates of return. In the case of the Czech Republic, age has not been found to have any significant influence on the expected rates of return. The reason for this may lie in the age distribution of respondents and in the way students spend their time between the maturita exam and university entry. Rather than going to work Czech students tend to experience other post-secondary education institutions such as language schools, tertiary vocational schools and specialised post-secondary courses. Students tend to spend their time in education rather than in the labour market while waiting to be accepted by a university. Another reason for the insignificance of the age effect on rates of return may be the actual age distribution which suggests that there is a smaller gap between the youngest and the oldest students. Consequently, a couple of years of outside-education experience may not have any significant effect on earnings, whether actual or expected.

It is hypothesised that the returns are influenced by time. The YEAR has only been found to have a slight negative (0.5pp) influence on the most likely expected returns at the point of graduation in the case of the Czech Republic. However, in Huddersfield, the effect of time was not statistically significant when a linear regression line is estimated. A quadratic model was found to best describe the relationship between the rates of returns and YEAR. The reason for the convex shape of the curve is likely to be caused by the change in the tuition fee system, which occurred in 2006/2007. Students seem to be expecting greater returns to compensate for their expected increased debt. Although the repayments are deferred until after graduation, students seem to perceive the debt being a greater burden that in fact the deferred tuition fees are, and thus seem to expect a greater compensation for the incurred debt.

Rates of return expected by students in Huddersfield were found to be positively influenced by fathers' education and negatively influenced by mothers' education, while rates of return expected by the Czech students were not found to be influenced by the education of their parents at all. On the other hand, parental income has not been found to have any statistically significant influence on the rates of return expected by students in Huddersfield but has been found to have a statistically significant positive effect on the rates of return expected by the Czech students with the effect of mothers' income being stronger than that of fathers'.

Parental income has been identified as a statistically significant predictor of the earnings expectations with both parents' income having a positive effect; however it is the mothers' income that seems to have a stronger effect on the students' expectations in the Czech Republic while the effect of the father's income was found to be statistically significant in the case of Huddersfield. The effect of education of parents is not as straightforward; in the Czech Republic, the earnings expected ten years after graduation from both secondary school and university have not been found to be influenced by parental education. At the point of graduation from high school, fathers' education was found to have a negative effect on earnings expectations while mothers' education has a positive influence.

In Huddersfield, the mother's education has been found to have no statistically significant effect. The effect of the fathers' education on the other hand was found to be negative at a secondary school level of expectations and at the point of graduation from university. Thus it is concluded that those students whose fathers are university educated seem to underestimate the effect of secondary qualifications while those whose parents are educated to either compulsory or high school level seem to overestimate the effect of university education on their future earnings.

No statistically significant effect of time on expected rates of return was identified but a positive effect was found on earnings expectations. Therefore it is plausible that in the Czech Republic the growth of expected earnings reflects that of the actual earnings, and that the demand for graduates is in balance with the graduate supply since the rates of return to higher education neither grow nor decline.

The findings of this and the previous chapters are discussed in Chapter 6. Policy implications of the findings and the limitations of the study are addressed in Chapter 7.

CHAPTER 6

DISCUSSION AND CONCLUSIONS

6.1 Background

The development of the Czech and English education systems has not been parallel, mainly due to the differing political establishments in the post-war history. The Czech Republic was a part of the former Soviet Union block where communist ideology prevailed behind the ‘iron curtain’ and thus prevented, unlike in Western Europe, the influence of markets on the development of the education system. Although the Czech Republic has been criticised for low enrolment rates of students to higher education (approximately half the UK rate) (OECD, 2010), the number of enrolled HE students have been growing and the capacities of higher education institutions has been expanding (Urbánek et al., 2005). However, as the number of students increases, so do the costs for HEIs and this consequently creates more pressure on higher education funding. Therefore the question of the efficient financing of higher education has become one of the most important political and economic challenges in both the Czech Republic and England.

Private contributions to public higher education funding, particularly in the form of tuition fees, have been debated extensively in both countries. In England tuition fees have been in place since 1998 with a major change occurring in 2006, when the original up front fees were tripled, capped, and deferred until after graduation and their repayment became income-contingent. The British parliament voted in December 2010 to raise the cap to a basic threshold of £6,000 with a maximum of £9,000 per year for undergraduate courses. In addition it was proposed to introduce the rate of interest equal to the government’s cost of borrowing (inflation plus 2.2%), to extend the repayment period from 25 to 30 years and to increase the repayment threshold from £15,000 to £21,000 per annum. These changes are set to be implemented from the academic year 2012/2013 (Willets, 2010). In the Czech Republic the so called White Book of Tertiary Education suggested an extensive reform of tertiary education, and in particular its financing, with a strong focus on private contributions to public HE funding particularly in terms of deferred tuition fees (Matějů et al., 2008a). The suggested reforms received government approval in January 2009 and are being transformed in to an act which is likely to come into effect in 2013.

6.2 Discussion of the results

The theory of human capital suggests that education and training are the most important investments in human capital (Becker, 1993). The economic effects of education are emphasised in the economics literature and from an individual point of view, investments in education may be more profitable than many other types of investments (cf. Glewwe, 1996). The evidence from labour economics highlights consistently that more educated individuals tend to have higher wages and thus that there are positive private rates of return to education (cf Nonneman and Cortens, 1997). It has been shown that generally students act according to the theory of human capital, and that by the end of their compulsory education pupils are aware of the relationship between educational qualifications and average earnings (Williams and Gordon, 1981; Menon, 1997; 2008). Consequently, it has been concluded that students are aware of the financial benefits of higher education and that information available to students regarding their future earnings is being used rationally (Dominitz and Manski, 1996; Wolter, 2000).

This study has shown that students act according to the theory of human capital since on average over 97% of students expect at least a 0% rate of return, i.e. at least what they invested in their higher education. In the case of Huddersfield nearly 7% of students expected negative returns to their investment while in the Czech Republic the proportion varied between 1.05% (Prague) and 2.35% (Pardubice). Positive rates of return are expected by 96% of students in Prague, 94% in Liberec, 92% in Pardubice and over 91% in Huddersfield (Table 5.2). Thus a very large majority of students expect their investment in higher education to be profitable.

The existence of positive rates of private returns to education provides an incentive for individuals to invest in their human capital (Blundell et al., 1999; Sianesi and Reenen, 2000). Thus the demand for education will exist as long as there are returns on the investment; in other words individuals will invest in their human capital if they are compensated by sufficiently high future earnings (Becker, 1993; Blundell et al., 1999). According to the law of supply and demand of human capital in the labour market, if too many graduates appear in the market (and the demand for them remains constant) there will be an excess supply of those with that particular level of schooling, and consequently their wages will decrease. However, endogenous growth theory suggests that the supply of graduates will be balanced by the demand for educated labour, resulting in a generally stable graduate wage premium (Eicher, 1996; Griffiths and Wall, 2004).

The rates of return expected by the Czech students have been found to decrease from year to year on average by 0.5 pp, *ceteris paribus*. If the assumption that students' expectations formation is (at least partially) rational is accepted, then the expected wage premium in the form of the rate of return should be in line with what the endogenous growth theory suggests, i.e. while the participation rate is increasing (resulting in an increased supply of graduates) the demand for educated labour is increasing too, and thus the wage premium remains relatively stable. The results of this study seem to suggest that this is the case in the context of the expectations of Czech students at the three surveyed institutions. In Huddersfield however time was not found to have any linear effect on the rates of return; rather it is the quadratic model and the convex shape of the curve that describes and fits best the development of the ex ante rates of return. In Huddersfield the expected rates of return had been declining significantly until 2007/2008 (Sections 5.4.1.6 and 5.11). Such a trend is likely to be explained by the rapidly growing participation in higher education with graduates 'absolutely pouring' into the British labour market (Clare, 2005). It is certainly conceivable that at least some of the fresh graduates end up in 'non-graduate' jobs and that they obtain these jobs at the expense of less qualified workers (Ischinger, 2007). Since 2007/2008 however, the expected rates of return have been increasing as students seem to expect greater returns to compensate for their increased debt because of the threefold rise in tuition fees in 2006/2007 (despite the repayments being deferred until after graduation).

Psacharopoulos (1994) suggests that the benchmark of the rate of return for education is 8.7%. Becker (1964) identified that the rate of return to an average university entrant is 10 – 12% per year and found out that the gains from university education vary considerably between as well as within groups. There is evidence of substantial heterogeneity in returns across disciplines (O'Leary and Sloane, 2005); in the case of some subjects, negative returns have been found (Finnie and Frenette, 2003). Hussain et al. (2009) estimated rates of return to various degree subjects for a 1999 cohort of graduates from Graduate Cohort Studies in the UK. They found 'Natural Sciences' and 'Humanities' to produce the lowest rates of return (1.58% and 1.66% respectively) while 'Math and Computing' and 'Medicine and related subjects' demonstrated the highest rates of return (26.51% and 27.02% respectively). Business studies were found to lead to a 20.61% rate of return. All the rates of return reported by Hussain et al. (2009) however represent how much higher rates of return are for various degree subjects than of an Arts degree, which was in their study the omitted reference category. The potential variations in earnings expectation caused by degree subjects are eliminated in this research by focusing on one subject area[63] only.

Most studies have concluded that students are able to respond meaningfully to questions eliciting their earnings expectations, can make realistic estimates at both a group and an individual level and that there is a close association between expected and actual rates of return to education (Dominitz and Manski, 1996; Webbink and Hartog, 2004; Williams and Gordon, 1981). This research shows that in Huddersfield the most likely expected rate of return was on average 23%, which is very similar to the findings of Hussain et al. (2009). In the Czech Republic the expected rates of return were lower; students in Prague most likely expected their rates of return to be on average 18% while in Liberec and Pardubice the rates of return were expected to be 15% and 14% respectively. The main reason for English students' higher expected rates of return is their foregone earnings, which are relatively larger in the Czech Republic due to the traditionally longer full time post high school university studies. Given the hybrid[64] expectation formation assumption of this study, the reported rates of return are very likely to continue to be in a similar range, at least in the foreseeable future. It is however very difficult to predict what effect will the policy changes[65] will have on students' expectations. If this study's results are taken as an indicator, then students at all surveyed institutions are likely to expect a greater compensation for the increased debt which they will accrue.

The rates of return at each level of education have been found to vary by gender with females generally experiencing higher rates of return than males at all levels, i.e. there is a greater advantage for women to invest in education (Psacharopoulos 1985; 1999; Maani, 1991; Nonneman and Cortens, 1997; Blundell et al., 1999; Daoud, 2005). Under the 'old tuition fee

[63] Business and Economics related degree programmes
[64] partially adaptive, partially rational
[65] Increase of tuition fees in 2012 in England; introduction of tuition fees in 2013 in the Czech Republic

system' in England, male graduates were found to expect a rate of return on their investment of around 9% p.a. and female graduates 13% p.a.; under the 'new system' graduates were expected to earn returns of 7.3% p.a. and 10.3% p.a. by male and female graduates respectively (O'Leary and Sloane, 2005). Although no statistically significant gender differences were identified in the Czech samples, expected rates of return in Huddersfield were found to vary by gender with women expecting statistically significantly higher returns at the point of graduation. Female students expected at the point of graduation 7pp[66] higher most likely rates of return than men, ceteris paribus (section 5.11).

In so far as education is treated as an investment rather than a consumption decision, regularly updated information on returns to different degree programmes can make an important contribution to the educational decisions of future students. Although it is students' expectations that influence their decision to undertake more schooling, economists have been reluctant to collect subjective data (Becker, 1993; Manski, 1993). Some findings have revealed a tendency to 'self-enhance' – particularly by males – when compared with students' perceptions of average expected returns to schooling (Smith and Powell; 1990); other studies discovered that female estimates were more accurate when compared to the actual returns and that men again have a tendency to overestimate their returns (Botelho and Pinto; 2004). It has also been found that students in general tend to overestimate the effect of age (Carvajal et al.; 2000).

Age has been found to have a statistically significant negative effect on the ex ante rates of return in Huddersfield. This finding is in line with previous research which found that older respondents are more likely to have higher foregone earnings which will eventually lower their expected rates of return (Nerdrum and Erikson, 2001). In the case of the Czech Republic however age has not been found to have any significant influence on the expected rates of return (section 5.11). The reason for this may lie in the age distribution of respondents and in the way students spend their time between the maturita exam and university entry; Czech students tend to spend their time in education when waiting to be accepted to a university rather than in the labour market and thus have no income and experience that could subsequently increase their income. Another plausible reason for the insignificance of the age effect on rates of return is the age distribution; the range, i.e. the difference between the age

[66] Regression results; MANOVA showed 4.7pp difference; for explanation of the difference in result see section 5.11.1

of the youngest and the oldest is smaller in the case of the Czech sample and in the Huddersfield sample 95% of students were aged 24 or less while in the Czech sample the proportion was 99% (Figure 5.2). Thus the very small proportion of mature students in the Czech sample may have caused the effect of age to be identified as insignificant.

Smith and Powell (1990) and Blau and Ferber (1991) focused on gender differences in earnings expectations and found that at the time of graduation women expected to earn as much as men. However, they found that it is later in their careers that women's expected earnings profiles start to become flatter when compared to men, which complies with the finding that the gender pay gap tends to increase with age (Blau and Ferber, 1991). Gender differences in earnings expectations of the surveyed samples have been found to be statistically significant within each surveyed institution with women expecting lower earnings than men (section 5.7). The gender differences occur at every level of education, experience and probability; in fact they tend to increase with the level of education, experience and probability at all surveyed institutions, i.e. it has been found that there are gender differences in earnings expectations and that the gender-pay gap increases with the level of education and experience.

Earnings expectations have been found to be related to a family's socio-economic background. For example, Oosteerbeek and van Ophem (2000) have shown that children from different social backgrounds have different attitudes towards schooling and consequently expect different rates of return from it. In fact it was found that students from high-income families tend to overestimate their returns (Webbink and Hartog, 2004). In this study the socio-economic background is approximated by parental income and parental education. Rates of return expected by students in Huddersfield were found to be influenced by parental education but not by parental income. On the other hand, the rates of return expected by the Czech students were not found to be influenced by parental education but were found to be influenced by parental income with the effect of mothers' income being stronger than that of fathers' (section 5.11).

When it comes to expected earnings however, the fathers' level of education was found to have a negative effect on the level of earnings expected by both the Czech and Huddersfield[67] students (section 5.11). A plausible explanation is that students whose fathers are educated to a lower than a university level can see that a certain level of income can be earned even

[67] SS only

without a university education, and therefore expect higher earnings after completing secondary education than children of university educated fathers; at the same time they expect higher income at the point of graduation from university than those whose fathers are university educated. On the other hand, those whose fathers are educated to a university level may believe that without a university degree it is not possible to reach as high an income as with a degree and therefore expect lower earnings after completing secondary education than children of fathers who are educated to either compulsory or high school level (section 5.11). In other words, children of university educated fathers seem to underestimate the effect of secondary qualifications on the level of earnings, while those whose fathers are educated to either a compulsory or high school level seem to overestimate the effect of a university education on their future earnings.

Becker (1964) found that education makes age-earnings profiles steeper, which Mincer (1974) found to be mainly a function of labour market experience. This suggests that more investment in human capital leads to a faster and further growth of earnings (Wasmer, 2001). Brunello et al. (2001) have identified a significant trade off between earnings of university graduates at the time of labour market entry and ten years afterwards. This study's results show that students' earnings expectations increase statistically significantly with the level of education and experience (section 5.6). At the same time it has been found that earnings are expected to grow faster and further with university than with secondary education (section 5.6). These findings are further supported by the expected rates of return which show that students on average expect to benefit from their university education more in the medium term than immediately after graduation since the rates of return expected at the point of graduation were on average 9.7 percentage points lower than those expected ten years later (section 5.6). In addition, a rather interesting finding was discovered; students on average value a university education as much as ten years of post-secondary education labour market experience since no statistical difference between the two has been identified (section 5.6).

The differences in expected earnings between the levels of education and the levels of experience account only for the effect of the examined factors, (i.e. education and experience) since the research was designed so that each respondent served as his or her own control. This is a great advantage when compared to research designs which are usually adopted when studying actual rates of return, where either different groups of people are compared, and thus the individual differences are likely to cause variance in the results, or if a longitudinal approach is adopted, the influence of external factors over the years can interfere with the findings. By using the within-subject design the differences between individuals were removed. Moreover, since the students were asked at the same time about their expectations regarding different levels of their future income in current prices, external factors such as time, price inflation and personal development, in terms of additional training, do not affect the findings.

The results tend to suggest that those students who intend to work either in the capital or abroad seem to expect higher earnings than those who plan to work in the place of study or elsewhere in the country of study[68] (section 5.9). Two possible explanations of the differences are found plausible. Since students have been found to be well informed about labour market conditions the earnings in the graduate job location might influence their future expectations (cf. Smith and Powell, 1990). It is plausible that if students are aware[69] of the fact that earnings are higher in the capital than anywhere else in the country, then their expectations would be higher if they intended to work in the capital and lower if they intended to work elsewhere in the country (section 5.9). Another possible explanation may be associated with the risk of earning an income in certain places. If students intend to work abroad or in the capital, they are likely to require a higher wage premium to compensate for the incurred risk of the greater competition which they would have to face there and of the greater variance of their earnings which is likely to occur.

Finance theory[70] suggests that if investors behave rationally they will require a higher expected average rate of return if the expected risk is higher (Markowitz, 1952). The overall concept of risk is that as it increases, the expected return to the investment will increase as a result of the risk premium earned – in other words, investors should expect a higher return on an investment when that particular investment carries a higher level of risk or uncertainty associated with the return. When evaluating investments, investors should estimate both the expected return and the uncertainty of future returns, i.e. risk (Markowitz, 1952; Hartog et al., 2004).

Indeed this study has shown that there is a positive relationship between expected risk and expected returns, and thus that respondents behave rationally as investors (section 5.10). The

[68] outside the capital
[69] During interviews students provided good estimates of the level of earnings in different regions including the region of study and the capital city
[70] In particular the Modern Portfolio Theory (Markowitz, 1952)

analysis has provided evidence that students expect to benefit from their investment in higher education more in the medium term than at the point of labour market entry (section 5.6). In addition, the further in the future were the estimates made, the larger was the standard deviation of the estimates (Appendix 5.1 and Appendix 5.3). As a result, a question arose whether the increase in the ex ante rates of return was caused by the uncertainty of future returns, i.e. by the greater risk borne by the investors when estimating returns ten years after graduation, or whether there was a genuine increase expected in the rates of return, i.e. whether students would expect higher rates of return even if the investment was risk-free (section 5.10).

Regression analysis was used to identify risk-free rates of return and as a result it was concluded that the expected rates of return were indeed lower immediately after graduation than ten years later for both men and women at all surveyed institutions (Table 5.80). In effect, students do not expect to benefit from their investment in higher education more in the medium term to only compensate for the increased risk in terms of uncertainty of obtaining the returns in the future, but genuinely even if the risk is eliminated. It is noteworthy that on several occasions the gender differences in the mean rate of return are the opposite to those in risk-free rates of return. This tends to suggest that conclusions on gender differences if presented without the context of risk might be misleading. Do women in Huddersfield expect higher or lower rates of return to their investment in higher education than men? When the risk is taken into account then women in Huddersfield expect higher rates of return; when the risk is eliminated then women expect lower rates of return (Table 5.80). Thus, when gender differences in expected rates of return are being discussed they should be in the context of the expected risk. The inclusion of the risk-free rates of return seems to be the appropriate way of doing so.

Hartog et al. (2007) simulated risk of investment in human capital and estimated the ex ante risk of university education using the coefficient of variation. Their best guess was a coefficient of variation of about 0.3, which they found to be comparable with that of a randomly selected financial portfolio with some 30 stocks (Hartog et al., 2007). Students in the surveyed samples expect greater variance in the income which they expect to earn with a university education than in the income which they would expect to earn with a high school education (Table 5.78). Similarly, the coefficient of variation is greater for earnings expectations with experience than without (Table 5.79). Subsequently, it seems that students are less sure of the relative position in the earnings distribution at which they will end up. As a result, at least partially, expected earnings increase with education and experience to compensate for the expected risk, i.e. variance in expected earnings. In this study the estimate of individual ex ante risk associated with a university education is a coefficient of variation of 0.35 (Table 5.75).

Diaz-Serrano and Hartog (2006) reported on the existence of a risk-return trade-off across educational choices in the Spanish labour market. Periera and Martins (2002) identified a rather large compensation to be received to face the risk associated with the investment in education; for every 2pp increase in risk there was a 1pp increase in average rates of return. This study shows that the required compensation for incurred risk seems to be higher for women than men (Table 5.80). On average, regardless of place of study, for an approximately 1.1pp increase in risk there is a 1pp increase in the average expected rate of return to higher education for men, and for a nearly 2pp increase in risk there is a 1pp increase in the average expected rate of return to higher education for women. The average compensation for women varies between institutions from 1pp to 1.3pp while that for men varies between 1.3pp and 1.9pp (Table 5.80).

6.3 Conclusions

This research has contributed to the body of knowledge by examining expected earnings and by estimating rates of return to and risk of the investment to higher education expected by students in Huddersfield, Prague, Liberec and Pardubice. It has been found that a majority of respondents expect positive returns to their investment in higher education, which suggests that students act according to the theory of human capital. Students’ expectations appear to be realistic since their expected earnings increase with education and experience, which is the trend in actual earnings too. In addition, it has been found that students at all surveyed institutions expect similar earnings at the point of graduation from university to earnings they would expect to earn with ten years’ labour market experience.

Similarly to the findings of previous research, this study has identified that factors such as age, gender, socio-economic background and place of study have a significant effect on the expected earnings as well as the ex ante rates of return.

Students in Huddersfield have been found to expect higher earnings and higher rates of return then their Czech peers. Within the Czech sample, it was students from Prague whose expected earnings and rates of return were higher than those of students in Liberec and Pardubice. At all surveyed institutions, females expected lower earnings than males and the expected gender-pay gap has been found to increase with the level of education and experience. Expected rates of return on the other were found to be higher for women in Huddersfield at the point of graduation, while no statistically significant gender differences were identified in the Czech samples. In addition, age has been found to have a statistically significant negative effect on the ex ante rates of return in Huddersfield but none in the case of the Czech samples.

Rates of return expected by students in Huddersfield were found to be influenced by parental education but not by parental income. On the other hand, the rates of return expected by the Czech students were not found to be influenced by parental education but were found to be influenced by parental income, with the effect of mothers' income being stronger than that of fathers'. The fathers' level of education was found to have a negative effect on the level of earnings expected by both the Czech and Huddersfield. It is concluded that children of university educated fathers seem to underestimate the effect of secondary qualifications on the level of earnings, while those whose fathers are educated to either a compulsory or high school level seem to overestimate the effect of a university education on their future earnings.

The discussion chapter has outlined that the results of this study tend to be in line with previous research conducted in the area of investment in human capital. It has been shown that the average rate of return expected by Huddersfield students is similar to the average rate of return estimated for Business Studies graduates in the UK. Additionally, the risk associated with the investment in higher education, and the compensation required to face the risk, are also similar to the estimates provided by scarce previous research in this area. A comparison of Czech expectations with results of previous research however was not possible as this is the first study which has ever focused on the ex ante rates of return and risk associated with business/economics education in the Czech Republic.

CHAPTER 7

CONCLUDING REMARKS

7.1 Introduction

This chapter summarises the key findings and discusses the contribution of this study to the body of knowledge on expected returns to higher education and the findings' policy implications. The limitations of the research and suggestions for further research are also addressed.

Increasing participation in higher education has been putting pressure on its funding. Despite the introduction of tuition fees in England as a private contribution to higher education funding, the demand for higher education has continued to grow. The theory of human capital says that individuals will only invest in additional schooling if there is a positive return to such investment (Becker, 1993). Subsequently, it is the expectations of the returns that influence the decision regarding the investment in education. Therefore even if the perceived costs outweigh the perceived returns, the demand for higher education may decline regardless of whether or not there are actual returns to higher education. The purpose of this study was to estimate the expected rates of return and to examine the factors that influence the expectations. In order to do so, the theory of human capital and finance theory were used and the education systems of the countries, where the participating institutions are located, were introduced.

7.2 Summary of key findings

The results show that there are positive returns to higher education and thus that students act according to the theory of human capital (section 5.2), and that there is a relationship between risk and return and thus that students behave rationally as investors (section 5.10). Attention was paid to the influence of gender and the socio-economic background of respondents, place and country of study, and time on the earnings expectations and the expected rates of return (section 5.11).

The expected earnings were found to increase with education and experience (section 5.6), at least partially, to compensate for the expected risk (section 5.10). An estimate of individual ex ante risk associated with university education is the coefficient of variation of 0.35, which is similar to a randomly selected financial portfolio of 30 stocks (section 5.10). Risk-return trade-off is large; men expect greater compensation for the expected risk – for a 1.1pp increase in risk they expect a 1pp increase in rate of return. Women expect for every 2pp increase in risk a 1pp increase in the rate of return to their investment in higher education (section 5.10).

A university education was found to be related to a faster and further growth of expected earnings and to be valued similarly by the respondents as ten years of post-secondary labour market experience (section 5.6). Students expect to benefit from their university education more in the medium term than immediately after graduation, since both the estimated expected rates of return as well as the risk-free rates of return were higher ten years after graduation than at the point of labour market entry (section 5.6).

Women were found to expect lower earnings than men on all occasions at all surveyed institutions (section 5.7). Moreover, the gender-pay gap was found to increase with education and experience (section 5.7). Rates of return to education were found to be higher for women than men in Huddersfield, while no gender differences in the rates of return were identified in the Czech samples (sections 5.7 and 5.11). The risk-free rates of return were however lower for women than men in all surveyed institutions which suggests that women expect higher risk to their investment in higher education than men (section 5.10).

Both expected earnings and rates of return were found to be higher for students in Huddersfield than for students in the Czech Republic (section 5.7). In addition, students in Prague expect higher earnings and rates of return than students in Liberec and Pardubice (section 5.7). At the most likely level, students in Huddersfield expect on average around a 23% rate of return, while students in the Czech Republic expect between 14% and 18%. The median most likely rate of return expected at the point of graduation was 10% in all Czech surveyed institutions. The median of the rate of return expected ten years after graduation was the highest in Prague (15%); students in Liberec and Pardubice expected 12% and 13%, respectively.

The socio-economic background of respondents was found to have effect on the expected earnings and the rates of return (section 5.11). Those students whose fathers are university educated seem to underestimate the effect of secondary qualifications on the level of earnings while those whose fathers are educated to either a compulsory or high school level seem to overestimate the effect of a university education (section 5.11). Students from high income families expect higher earnings than those from low income families. Age has been found to have a statistically significant negative effect on the ex ante rates of return in Huddersfield and the rates of return expected by the Czech students have been found to decrease slightly from year to year (section 5.11).

7.3 Contribution to knowledge

Having presented and discussed the major findings of the study it is appropriate to reflect on the overall contribution of the research to the body of knowledge on rates of return to higher education. Much has been written about the returns to investment in human capital (cf. Psacharopoulos, 1981; 1985; Becker, 1993). However, the previous research focused mainly on estimating the actual returns to such investment, rather than on perceptions and expectations, since economists have been reluctant to collect subjective data.

To the author's knowledge this is the first study which compares expected returns in the Czech Republic and England. This study uses unique survey data collected for the purpose of examining expected rates of return in order to contribute to the filling of a gap in the literature on expectations. Furthermore, this research contributes to filling a gap in the literature by applying finance theory in conjunction with human capital theory to elaborate on the investment in human capital by taking into account the risk of such investment. Worldwide, only a few studies have attempted to include the risk of the investment when estimating returns to education (cf. Hartog et al, 2004; Hartog and Diaz-Serrano, 2007). This study not only attempts to estimate the expected risk-return trade-off of the investment in higher education but also does so *ex-ante* rather than *ex-post*, which is to the author's knowledge the first attempt in the context of England or the Czech Republic. In addition, a risk-free rate of return is estimated and proposed to be used as an indicator that is complementary to risk-unadjusted rates of return normally used in the literature on human capital. Finally, ex ante risk is calculated which is the first time this has ever been done in the world-wide context of earnings expectations.

Not only the data and theoretical approach is unique; the study also contributes to the body of knowledge methodologically; firstly by adjusting the short-cut method for calculating rates of return, developed by Psacharopoulos (1981), to the conditions of different tuition fee systems. Although foregone earnings have been identified as the major costs of higher education, up-front tuition fees, if applicable, ought to be included as direct costs of the investment in human capital. Deferred tuition fees on the other hand are not viewed in this study as direct costs per se; rather they are seen as a reduction of the future benefits of an investment in higher education.

Secondly it contributes in term of methodological approach by using within-subjects design, in which each respondent serves as his or her own control, which leads to the elimination of the variance caused by individual differences. This is a great advantage when compared to the research designs which are usually adopted when studying actual rates of return where either different groups of people are compared, so the individual differences are likely to cause variance in the results, or if a longitudinal approach is adopted the influence of external factors over the years can interfere with the findings. Moreover since the students were asked about their expectations regarding different levels of their future income at the same time, the influence of time and personal development in terms of additional training do not influence the findings. Thus the differences in earnings expectations between levels of education or experience can be accounted for by the effect of the examined factors, i.e. education and experience rather than individual heterogeneity.

7.4 Policy implications

This study has shown that students act according to the theory of human capital and rationally as investors (sections 5.7 and 5.10). It is thus their expectations of the cost, benefits and risk of the investment in their human capital, which influence their decision to undertake extra schooling in the form of higher education. This implies that once the perceived costs and/or risk outweigh the perceived benefits regardless of whether or not there are actual returns to higher education, the demand for higher education may decline. This is why students' expectations 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 and expectations.

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, this study's results suggest that students expect a higher wage premium to compensate for the expected 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.

7.5 Limitations of the study

Like any research this study has its limitations. The major limitation lies in the degree to which the results of the study can be generalised, due to the non-probability sampling strategies adopted and the limited availability of participating institutions. The fact that there is only one English institution in the sample which is analysed in this study is a limitation of the research. Differences have been identified between institutions surveyed in the Czech Republic and for instance, Naylor et al. (2007) found that there are significant differences in earnings across UK graduates according to the university attended and the subject studied. Thus it is desirable to obtain data from other English business schools to find out whether or not any differences occur between institutions in England in terms of expectations.

Moreover, since differences between Czech institutions and that in Huddersfield were identified, it is also desirable to obtain data from institutions in other countries to see if there is a national pattern or if the differences can account for the effect of institution rather than a country. Data have been collected in one other English institution, four institutions in Poland and two in Portugal while arrangements have been made in Romania and Turkey. Given the limited and different time frames associated with these geographical locations and the desire to observe the development of expected earnings and rates of return over time, this study focused only on the data collected for more than three years.

Another limitation lies in the design of the questionnaire, particularly when it comes to questions regarding parental income and education. It has been discovered in the qualitative analysis that some students' parents had no formal education. No such option was however offered to the respondents. The fact that some students' parents may be deceased was not taken into account in relation to parental income. For this reason, a 'not applicable' option should have been included to distinguish between students who do not know what their parental income is and those who cannot answer. Nevertheless this limitation is unlikely to have had any major implications for the analysis since the proportion of students who did not respond to the parental income question was small after the methodological change (sections 5.3 and 5.4). It would however bring more information about the students and their background particularly from the descriptive point of view. Another piece of information that is missing in the questionnaire is regarding students' region of origin. This information, together with those regarding the place of study and job location, could be analysed to see which factor influences the expectations the most. Is it the situation in the employment market location of their home, university or intended graduate job that has the major influence on students' expectations? It is proposed that an additional question is included in the questionnaire; namely students' estimates of average income in the home region, region of study and the capital city to see whether students are aware of the regional differences in their countries.

7.6 Proposals for further research

Menon (1997; 2008) estimated ex-ante rates of return of high school leavers and found that those who were planning to enter higher education expected higher returns than those who had decided to enter the labour market, which is in line with the theory of human capital. It would be interesting to replicate the research to find out whether a similar pattern can be observed in other countries than Cyprus. The results could be then compared to those obtained by this study to find out whether indeed those who choose to enter higher education expect higher returns to higher education than those who choose to enter the labour market.

In addition, it would be interesting to include risk in the above proposed research. Would the risk-free rate of return, too, be lower for those who decided to enter the labour market or do those who have decided to enter the labour market expect their investment in extra schooling to be more risky than those who have decided to enter higher education? Thus is the reluctance of those who decided to enter the labour market linked to lower returns on the investment, or to the higher risk associated with the investment?

A comparison of actual and expected earnings and rates of return suggests itself. The major problem this study would face if an attempt to compare expected and actual returns was made would be the different methodologies adopted by different studies. The issue could be overcome by the approaches suggested below; however, it was not within the scope of this study to adopt either of them. There is a possibility to use aggregate data collected by statistical offices and other bodies involved in collection of data on the labour market. It would be necessary to select the candidates who are comparable to the respondents in this study in terms of their education, years of labour market experience, gender, university attended and socio-economic background. Alternatively, if universities in this study keep records of their graduates, the information about them could be used since their characteristics are likely to be similar to those of the respondents in this study. The data would then be subject to the same analysis and to the same method of calculating the rates of return as in this study so that the results were comparable.

Students surveyed at the University of Economics in Prague expect the highest earnings and rates of return of all the Czech samples in this study. Several reasons for this seem possible particularly in terms of regional earnings on which students seem to base their expectations. It was suggested earlier to modify the current questionnaire by including information concerning students' home region to find out which regional factor is the strongest in influencing the expectations, i.e. place of study, home region or graduate job location.

This study has shown that the socio-economic background of the surveyed students, which was represented by family income and parental education, is higher in Prague than in Liberec, and in Liberec it is higher than in Pardubice. Mangan et al. (2010) have identified a strong association between social class background and the type of university to which high school students intend to apply. This relationship is explained by association between social class and factors that directly affect the choice of university such as examination grades, fear of debt and proximity of high-ranking university (Mangan et al., 2010). Moreover, Davies et al. (2008) have found that students from working class families tend to live at home during their undergraduate studies and thus tend to choose a local university. In addition, quality and prestige of a university has been found in previous research to have effect on actual earnings of graduates (Naylor, 2007; Hussain et al., 2009). The University of Economics in Prague is the most prestigious of all the Czech surveyed institutions. Faculties of Economics at the Technical University of Liberec and at the University of Pardubice are regional universities and are of similar ranking. Students from Liberec and Pardubice expect similar earnings and rates of return to each other but lower than those expected by students in Prague. Thus a potential relationship between students' expectations and the institutional prestige seems worth exploring in more detail.

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APPENDICES

Appendix 4.1

<u>DOTAZNÍK k očekávané návratnosti investice do vzdělávání</u>

Zkuste odhadnout výši hrubé měsíční mzdy, jakou očekáváte v případě, že **nyní končíte vysokou školu jako čerstvý absolvent VŠ** a jakou výši mzdy předpokládáte **10 let po ukončení studia**. Rovněž sdělte, zda znáte **příjmy absolventů VŠ ekonomického směru**. Na závěr odhadněte **své případné příjmy bez absolvování VŠ – po nástupu a po 10 letech**. Při odhadu ignorujte inflaci – uvažujte mzdu podle nynější cenové hladiny.

Údaje o respondentovi – zaškrtněte, prosím, příslušnou odpověď

1/ žena ☐
muž ☐

2/ věk ……..

3/ Doplňte, prosím, údaje o Vámi odhadované výši hrubé mzdy (v tisících Kč) <u>ihned</u> po ukončení VŠ a nástupu do zaměstnání:

a/ minimální očekávaná mzda……………………… **TIS. KČ**

b/ očekávaná mzda
(alespoň ve výši min. očekávané mzdy)…………… **TIS. KČ**

c/ maximální výše mzdy, kterou podle Vašeho názoru jako vysokoškolák
při nástupu můžete dosáhnout………………………… **TIS. KČ**

4/ Doplňte, prosím, údaje o očekávané výši hrubé mzdy <u>za 10 let</u> od dokončení vysoké školy

a/ minimální očekávaná mzda……………………… **TIS. KČ**

b/ očekávaná mzda
(alespoň ve výši min. očekávané mzdy)…………… **TIS. KČ**

c/ maximální výše mzdy, kterou dle Vašeho názoru jako vysokoškolák
po 10 letech můžete dosáhnout……………………… **TIS. KČ**

5) Jaký byste očekávali výdělek, kdybyste na vysokou školu nenastoupili a šli rovnou do zaměstnání? Doplňte, prosím, údaje o Vaší možné hrubé mzdě v takovém případě - v tis. Kč.

a/ minimální očekávaná mzda bez VŠ po nástupu……… **TIS. KČ**

b/ očekávaná mzda
(alespoň ve výši min. očekávané mzdy)……………… **TIS. KČ**

c/ maximální výše mzdy, kterou dle Vašeho názoru bez VŠ vzdělání
můžete ihned po nástupu dosáhnout………………… **TIS. KČ**

6) Jaký byste očekávali výdělek po 10 letech zaměstnání bez vysokoškolského vzdělání? Doplňte, prosím, údaje o Vaší možné hrubé mzdě v takovém případě - v tis. Kč.

a/ minimální očekávaná mzda po 10 letech……………… **TIS. KČ**

b/ očekávaná mzda
(alespoň ve výši min. očekávané mzdy)……………… **TIS. KČ**

c/ maximální výše mzdy, kterou dle Vašeho názoru bez VŠ vzdělání můžete po 10 letech dosáhnout…………………………………………… **TIS. KČ**

7/ Doplňte, prosím, údaje o vzdělání Vašeho otce:
(zaškrtněte okénko)
základní................. ….. ☐
středoškolské/vyučen....... ☐
vysokoškolské................. ☐

8/ Doplňte, prosím, údaje o vzdělání Vaší matky:
(zaškrtněte okénko)
základní........................... ☐
středoškolské/vyučena..... ☐
vysokoškolské................ ☐

9/ Jaká je přibližně výše měsíční hrubé mzdy Vašeho otce?

☐ 0 - 10 000 Kč
☐ 10 000 – 15 000 Kč
☐ 15 000 – 20 000 Kč
☐ 20 000 – 30 000 Kč
☐ 30 000 – 40 000 Kč
☐ 40 000 – 50 000 Kč
☐ 50 000 a více

10/ Jaká je přibližně výše hrubé mzdy Vaší matky?

☐ 0 - 10 000 Kč
☐ 10 000 – 15 000 Kč
☐ 15 000 – 20 000 Kč
☐ 20 000 – 30 000a Kč
☐ 30 000 – 40 000 Kč
☐ 40 000 – 50 000 Kč
☐ 50 000 a více

11/ Výdělek Vašeho otce Vám připadá:

☐ Velmi vysoký
☐ Vysoký
☐ Přiměřený
☐ Nízký
☐ Velmi nízký

12/ Výdělek Vaší matky Vám připadá:

☐ Velmi vysoký
☐ Vysoký
☐ Přiměřený
☐ Nízký
☐ Velmi nízký

13/ Kde byste chtěli po ukončení univerzity pracovat? (zaškrtněte maximálně 2 možnosti)

☐ Praha
☐ Pardubický kraj
☐ Liberecký kraj
☐ Středočeský kraj
☐ jinde v České republice (prosím specifikujte)
……………………

☐ Evropská unie
☐ Severní Amerika
☐ Austrálie nebo Nový Zéland
☐ jinde v zahraničí (prosím specifikujte)
……………………

☐ zatím nevím
☐ je mi to jedno

DĚKUJEME VÁM

Appendix 4.2

<u>Questionnaire on Students' Perceptions of Returns to Higher Education</u>

When answering the following questions please do not include inflation in your salary expectations and consider them in current prices. Also all perception questions should be filled as honestly as possible and according to what *you* think, feel and expect.

---

1. **You are:**

☐ Female ☐ Male

2. **Your age is: ……………**

---

3. **What are *your* salary expectations immediately after you graduate from the university and get a job? Please specify your expectations regarding:**

- **Minimum salary £……………………p.a.**
- **Most likely salary £……………………p.a.**
- **Maximum salary which you think you can earn as a 'fresh' graduate £……………………p.a.**

4. **What are *your* salary expectations 10 years after university graduation? Please specify your expectations regarding:**

- **Minimum salary £……………………p.a.**
- **Most likely salary £……………………p.a.**
- **Maximum salary £……………………p.a.**

5. **What salary would *you* expect if you now decided not to study at the university and to find a job? Please specify your expectations regarding:**

- **Minimum salary £……………………p.a.**
- **Most likely salary £……………………p.a.**
- **Maximum salary which you think you can earn now without a university degree £……………………p.a.**

6. **What salary would *you* expect in 10 years if you decided not to study at the university?**

- **Minimum salary £……………………p.a.**
- **Most likely salary £……………………p.a.**
- **Maximum salary which you think you could earn in 10 years without a university degree £……………………p.a**

7. What is your father's highest level of education?

- ☐ School
- ☐ College
- ☐ University

8. What is your mother's highest level of education?

- ☐ School
- ☐ College
- ☐ University

9. What approximately is your father's salary p.a.?

- ☐ £0-10,000
- ☐ £10,000 – 20,000
- ☐ £20,000 – 30,000
- ☐ £30,000 – 40,000
- ☐ £40,000 – 50,000
- ☐ £50,000 and more

10. What approximately is your mother's salary p.a.?

- ☐ £0-10,000
- ☐ £10,000 – 20,000
- ☐ £20,000 – 30,000
- ☐ £30,000 – 40,000
- ☐ £40,000 – 50,000
- ☐ £50,000 and more

11. Your father's salary seems high to *you*

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

12. Your mother's salary seems high to *you*

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

---

11. Where do *you* intend (would like) to work after you graduate from the university? Please tick max 2 options.

- ☐ North England
- ☐ Midlands
- ☐ South England
- ☐ London
- ☐ Elsewhere in the UK ……………………(please specify)

- ☐ European Union
- ☐ North America
- ☐ Australia or New Zealand
- ☐ Elsewhere abroad ………………….(please specify)

- ☐ I don't know
- ☐ I don't care

Thank you for your cooperation

Appendix 4.3

Case Processing Summary			
		N	%
Cases	Valid	3800	91.3
	Excluded	363	8.7
	Total	4163	100.0

Reliability Statistics	
Cronbach's Alpha	N of Items
.676	12

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
UNI min	412430.8230	137946960099.212	.507	.668
UNI ML	406899.9809	135170215137.439	.612	.660
UNI max	393200.4678	121719043820.031	.584	.629
UNI10 min	395641.0993	125362958186.322	.733	.632
UNI10 ML	384714.5204	116159733472.475	.777	.606
UNI10 max	333140.2441	58836468837.643	.421	.869
SS min	420615.8033	139854780230.713	.445	.674
SS ML	416962.4414	138797135138.505	.493	.671
SS max	409346.7836	136175121667.365	.442	.664
SS10 min	412511.6776	132627126201.285	.675	.653
SS10 ML	407232.5993	127225546409.530	.671	.639
SS10 max	390856.2704	110438811842.715	.582	.609

Appendix 5.1

Expected earnings with standard deviations – higher education

			UNI						UNI 10					
			minimum		most likely		maximum		minimum		most likely		maximum	
			Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.
Huddersfield	2004/2005	male	16,723	5,370	21,091	7,991	29,572	12,990	29,598	13,914	37,935	18,834	60,690	39,545
		female	16,279	4,609	20,172	6,496	28,109	12,321	27,218	8,227	33,409	9,690	46,215	19,011
	2005/2006	male	15,984	3,173	19,644	4,673	34,012	31,448	27,356	7,872	33,544	11,969	55,000	38,866
		female	13,667	3,812	16,875	4,395	39,714	82,788	22,238	5,991	29,619	16,904	36,588	11,635
	2006/2007	male	15,136	3,205	19,227	6,426	25,952	14,761	25,758	6,718	33,212	7,313	50,226	23,447
		female	14,137	2,772	17,481	6,604	22,750	12,070	24,132	8,851	31,284	18,757	50,222	31,885
	2007/2008	male	17,077	4,471	20,625	5,724	27,064	10,556	30,510	12,095	38,424	15,803	66,340	55,484
		female	15,985	2,772	18,836	3,287	23,955	5,318	27,561	9,127	35,522	14,904	49,468	28,070
	2008/2009	male	17,278	3,635	21,480	5,160	28,707	9,120	33,210	13,814	44,202	22,587	73,041	45,234
		female	16,707	3,962	20,962	5,180	27,550	9,282	28,129	8,568	35,176	11,017	53,225	27,631
	2009/2010	male	17,353	4,125	20,256	4,656	26,877	7,339	32,056	12,382	38,391	15,686	60,898	33,940
		female	16,582	4,756	20,135	5,757	26,056	9,331	27,989	8,338	34,345	10,226	51,465	23,462
Prague	2004/2005	male	17,536	5,865	22,274	8,809	34,574	17,520	34,405	21,534	45,000	34,698	140,556	172,623
		female	14,752	3,860	18,744	4,406	27,779	8,606	28,231	27,609	33,496	24,305	76,526	128,618
	2005/2006	male	19,238	10,354	25,088	16,539	42,915	44,767	38,207	26,736	52,375	44,071	151,621	191,790
		female	16,419	5,089	21,448	15,819	32,520	36,138	29,240	21,197	39,004	40,876	94,232	16,636
	2006/2007	male	19,864	6,044	24,968	7,406	41,298	28,066	37,720	28,560	55,616	91,434	136,811	190,018
		female	17,782	5,080	22,493	7,322	43,764	18,108	31,495	14,884	39,543	19,705	83,616	69,302
	2007/2008	male	21,765	6,257	28,912	9,393	73,235	164,832	44,397	25,153	65,941	50,705	562,424	1,717,590
		female	19,821	4,496	24,935	6,839	44,205	52,997	34,845	25,608	46,800	51,796	111,855	138,631
	2008/2009	male	22,516	5,993	27,876	6,984	40,330	13,989	43,021	19,471	60,021	30,558	118,196	75,295
		female	21,613	5,959	26,391	7,981	37,680	17,106	36,151	14,594	45,683	25,498	89,347	67,642
	2009/2010	male	32,089	23,233	50,667	67,212	90,267	164,970	70,511	96,581	109,289	149,215	290,442	344,163
		female	22,602	7,138	28,488	8,944	39,732	16,513	39,337	15,716	50,759	22,864	92,760	76,054
Liberec	2004/2005	male	17,300	6,992	21,613	7,722	35,421	16,699	29,854	13,078	37,049	14,947	82,632	51,383
		female	15,560	3,379	18,693	3,872	26,088	8,542	23,313	6,834	29,393	9,199	54,635	26,316
	2005/2006	male	16,052	7,407	20,621	9,649	33,321	18,679	30,517	19,590	40,621	30,508	98,889	183,698
		female	14,413	5,219	17,848	5,402	26,763	10,651	22,363	7,853	28,367	12,632	52,870	37,926
	2006/2007	male	17,853	10,479	22,362	14,221	37,319	31,664	29,424	18,869	37,712	25,659	95,983	150,462
		female	16,500	5,095	20,703	10,304	31,437	18,799	30,514	42,268	36,434	43,778	66,764	91,552
	2007/2008	male	19,200	5,606	22,875	5,740	31,850	10,287	30,250	10,264	39,050	13,725	100,000	99,565
		female	17,116	5,165	20,256	5,451	30,093	12,763	26,791	7,677	32,721	8,878	55,698	24,606
	2008/2009	male	21,077	5,163	26,308	6,500	41,577	25,286	25,647	14,245	47,157	27,498	105,098	109,579
		female	19,694	4,763	23,384	5,817	33,032	10,449	29,325	7,764	35,669	10,764	60,298	34,787
	2009/2010	male	21,355	6,675	27,032	11,473	37,607	20,696	38,452	32,501	53,290	64,223	124,311	211,414
		female	17,750	4,921	22,259	8,880	31,177	16,162	27,329	10,193	32,977	12,549	54,922	35,453
Pardubice	2004/2005	male	14,431	3,740	18,764	6,415	28,722	13,223	25,917	9,222	33,250	13,935	94,444	175,445
		female	12,394	3,457	15,641	4,330	23,274	8,584	20,845	6,642	25,746	8,473	45,453	25,946
	2005/2006	male	14,429	3,763	17,524	5,231	31,150	21,100	22,095	6,587	26,857	9,717	59,429	52,866
		female	13,271	3,546	16,134	4,043	21,772	6,127	20,500	6,618	25,298	7,453	40,456	19,965
	2006/2007	male	16,110	4,865	20,720	7,129	36,634	27,160	30,317	20,603	40,390	40,336	102,634	127,353
		female	14,131	4,225	17,444	5,007	23,612	6,466	21,636	8,099	26,364	10,167	42,929	29,207
	2007/2008	male	22,077	9,742	29,154	15,747	46,667	34,201	37,692	19,855	45,167	20,391	83,750	50,907
		female	17,000	4,469	20,148	4,940	29,321	12,361	26,605	8,706	32,135	12,071	55,131	32,410
	2008/2009	male	19,313	3,535	22,125	4,425	31,875	7,719	30,438	4,871	36,563	7,831	81,563	45,230
		female	17,780	4,597	21,596	6,212	31,211	30,296	29,991	18,535	36,275	23,105	58,991	39,785
	2009/2010	male	23,884	17,227	31,672	27,363	65,052	180,121	49,471	97,524	68,216	180,956	139,030	328,815
		female	19,028	4,727	25,110	7,385	36,989	18,626	30,578	10,465	39,133	15,046	66,034	56,911

Colour coding:
Red – standard deviation equal or larger than the expected earnings
Purple – standard deviation at least 1/2 of the value of expected earnings
Green – standard deviation at least 1/3 of the value of expected earnings
Black – standard deviation smaller than 1/3 of the value of expected earnings

Appendix 5.1 continued

Expected earnings with standard deviations – secondary education

			SS						SS 10					
			minimum		most likely		maximum		minimum		most likely		maximum	
			Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.	Earnings	Std. Dev.
Huddersfield	2004/2005	male	10,866	3,892	13,816	5,131	18,417	11,419	17,492	11,230	21,489	12,561	28,919	18,346
		female	9,863	4,029	12,139	4,391	14,898	5,665	12,109	5,971	17,270	6,458	23,248	12,945
	2005/2006	male	11,044	2,449	13,922	3,732	18,179	6,120	17,544	5,596	21,478	5,992	29,324	15,519
		female	9,289	3,015	11,417	2,735	14,294	3,981	16,625	7,658	18,813	8,456	26,375	15,705
	2006/2007	male	11,182	4,109	14,530	7,692	20,032	13,042	16,727	6,100	20,303	6,873	28,065	12,575
		female	9,444	2,269	11,912	3,500	15,468	6,399	14,194	7,405	20,212	16,136	26,012	20,448
	2007/2008	male	11,728	3,531	14,348	3,898	20,406	7,484	18,294	6,461	21,939	7,650	32,963	19,365
		female	10,583	3,423	13,270	3,663	18,800	9,123	15,992	6,835	19,475	7,734	28,242	18,828
	2008/2009	male	11,041	3,107	13,580	3,285	19,821	8,633	17,871	7,656	22,504	7,767	31,880	14,776
		female	10,382	3,770	13,656	4,464	19,688	8,340	16,174	6,144	20,923	7,106	28,783	12,088
	2009/2010	male	11,348	3,420	13,612	3,872	21,823	14,114	17,926	5,155	21,393	6,548	33,184	15,969
		female	10,034	3,541	12,925	3,983	20,296	19,202	14,894	5,472	18,353	6,187	25,882	12,881
Prague	2004/2005	male	10,936	3,666	14,208	5,243	22,518	15,670	18,759	12,347	25,000	26,877	50,363	110,204
		female	9,361	2,516	17,303	4,926	15,954	10,579	19,840	13,099	29,874	19,789	19,238	10,354
	2005/2006	male	11,425	4,267	14,789	4,632	22,636	13,128	19,178	10,751	23,794	12,451	42,920	36,600
		female	9,984	3,076	12,786	4,171	18,260	7,444	15,040	5,504	18,964	6,974	32,748	38,919
	2006/2007	male	12,073	4,061	15,886	6,575	24,826	20,860	20,723	18,287	26,517	23,401	56,200	106,329
		female	10,670	3,134	14,022	5,512	19,271	5,648	16,657	5,317	20,457	6,246	37,553	70,221
	2007/2008	male	13,546	4,367	17,727	5,832	24,303	7,756	21,364	8,112	27,364	10,006	115,576	242,265
		female	11,663	3,559	14,964	3,707	21,811	6,537	17,296	4,684	21,191	5,127	38,069	31,701
	2008/2009	male	14,856	5,590	18,784	5,587	26,052	8,995	25,485	16,077	31,495	18,175	55,330	99,374
		female	13,835	4,161	16,866	4,706	23,197	7,454	19,768	6,169	23,928	6,829	36,472	18,364
	2009/2010	male	16,644	4,686	22,444	7,200	34,400	21,725	28,818	16,109	40,046	42,145	106,744	190,420
		female	13,933	4,472	17,604	4,656	24,018	7,379	20,768	6,855	25,268	7,735	33,563	11,199
Liberec	2004/2005	male	10,932	5,004	13,188	6,381	19,675	10,186	17,854	7,575	21,829	8,611	42,513	38,585
		female	9,720	2,640	12,020	2,976	16,392	4,319	14,607	3,820	17,213	4,035	26,851	16,876
	2005/2006	male	9,224	3,337	12,776	8,117	20,554	16,840	14,897	8,389	19,069	8,730	75,143	185,681
		female	9,401	2,770	11,405	2,748	16,065	4,569	14,222	5,143	17,353	5,025	27,582	18,820
	2006/2007	male	10,534	2,611	13,364	3,642	22,288	19,774	15,853	3,753	19,716	5,259	28,612	13,912
		female	9,979	2,217	12,208	3,008	18,227	10,098	15,387	5,017	18,430	5,613	28,702	41,104
	2007/2008	male	11,950	3,967	14,900	4,678	20,600	8,804	17,450	5,698	21,200	7,403	33,750	15,012
		female	11,686	2,932	14,012	3,401	20,048	13,552	16,714	4,330	20,119	4,784	28,250	13,776
	2008/2009	male	13,431	3,517	16,216	3,941	22,412	5,923	20,696	4,941	25,120	5,961	33,686	7,829
		female	12,176	3,401	14,802	3,668	19,484	5,229	17,976	4,983	21,203	5,360	29,893	13,106
	2009/2010	male	12,645	3,158	16,161	4,774	22,355	8,080	19,661	7,337	24,661	12,318	56,705	127,418
		female	11,530	3,206	14,339	3,734	19,073	7,213	16,794	6,379	20,274	7,655	29,748	24,991
Pardubice	2004/2005	male	10,019	4,532	12,583	5,130	19,735	15,974	16,361	6,875	19,569	8,527	32,700	20,921
		female	7,965	2,383	9,770	3,209	14,190	6,504	12,292	3,873	14,994	4,450	22,772	17,301
	2005/2006	male	9,333	2,972	11,333	3,261	17,452	6,289	15,381	3,853	17,667	3,483	31,810	24,211
		female	9,202	2,352	11,080	2,850	15,092	5,728	13,287	3,650	16,059	4,107	25,163	31,156
	2006/2007	male	9,939	3,564	12,293	3,431	18,689	8,434	16,667	5,873	19,615	6,715	32,051	25,543
		female	9,480	2,191	11,328	2,442	15,833	4,495	13,745	3,904	16,602	4,696	21,526	6,592
	2007/2008	male	13,846	4,670	16,083	4,852	22,250	6,771	19,462	5,739	25,500	8,597	40,167	18,615
		female	11,796	3,746	14,012	4,060	19,988	10,750	16,456	4,848	19,075	4,841	28,094	12,800
	2008/2009	male	14,250	3,376	16,344	3,609	25,438	20,281	19,333	3,677	22,933	4,217	43,933	35,656
		female	11,662	3,213	14,232	3,761	18,796	5,139	18,318	11,117	21,458	13,763	28,738	20,031
	2009/2010	male	14,304	4,965	17,928	6,413	24,544	12,294	32,739	95,518	47,246	180,416	83,896	322,374
		female	12,306	3,704	15,756	4,147	36,989	18,626	18,409	6,162	22,546	6,600	37,161	52,899

Colour coding:
Red – standard deviation equal or larger than the expected earnings
Purple – standard deviation at least 1/2 of the value of expected earnings
Green – standard deviation at least 1/3 of the value of expected earnings
Black – standard deviation smaller than 1/3 of the value of expected earnings

Appendix 5.2

Earnings expectations – 5% trimmed mean

			UNI			UNI 10			SS			SS 10		
			minimum	most likel	maximum	minimum	most likel	maximum	minimum	most likel	maximum	minimum	most likel	maximum
Huddersfield	2004/2005	male	16,518	20,587	28,617	28,785	36,150	55,985	10,647	13,664	17,212	16,542	20,497	26,604
		female	15,980	19,683	26,785	26,646	32,710	44,594	9,726	12,030	14,711	14,047	17,236	22,329
	2005/2006	male	15,946	19,336	28,834	26,494	32,019	49,758	11,093	13,938	17,884	17,130	21,165	27,356
		female	13,630	16,806	22,235	21,680	26,508	35,654	9,155	11,407	14,216	16,361	18,181	24,472
	2006/2007	male	15,130	18,401	23,600	26,111	32,904	49,516	10,834	13,383	17,971	16,453	19,992	27,183
		female	14,137	16,509	20,964	23,202	28,319	46,932	9,428	11,593	14,748	13,448	17,458	22,700
	2007/2008	male	16,829	20,228	25,902	29,333	36,910	59,947	11,607	14,084	19,738	18,121	21,573	30,189
		female	16,111	18,823	23,739	26,694	33,827	45,977	10,488	13,181	17,778	15,467	18,869	25,511
	2008/2009	male	17,274	21,255	27,971	31,918	41,057	66,999	11,018	13,509	18,835	17,347	21,977	30,225
		female	16,625	20,477	26,328	27,369	34,407	49,792	10,291	13,451	18,870	15,895	20,557	27,942
	2009/2010	male	17,185	19,924	26,367	31,040	36,915	57,300	11,249	13,357	19,704	17,789	21,251	31,755
		female	16,540	19,958	25,049	27,519	33,812	49,031	10,015	12,819	17,955	14,493	17,999	24,357
Prague	2004/2005	male	17,183	21,233	32,277	31,532	40,041	112,896	10,681	13,795	19,768	17,095	21,429	35,847
		female	14,674	18,693	27,014	24,823	30,262	57,117	9,271	11,775	17,022	14,455	17,909	27,070
	2005/2006	male	17,979	22,897	36,755	34,191	45,064	124,099	11,080	14,405	20,618	17,828	22,237	37,865
		female	16,043	20,083	28,745	26,904	34,037	66,457	9,851	12,596	17,511	14,632	18,483	27,523
	2006/2007	male	19,524	24,340	37,113	33,382	43,267	103,915	11,769	15,084	21,550	18,598	23,467	38,926
		female	17,521	21,811	32,492	29,865	37,217	73,944	10,567	13,718	19,012	16,288	19,985	30,354
	2007/2008	male	21,614	28,052	44,722	41,128	57,856	263,552	13,327	17,306	23,611	20,960	26,603	71,707
		female	19,656	24,404	37,403	31,713	40,284	88,536	11,539	14,906	21,342	17,233	21,219	22,090
	2008/2009	male	22,426	27,696	39,006	41,272	56,881	111,581	14,516	18,450	25,261	23,250	28,726	43,835
		female	21,612	25,903	35,686	34,744	42,632	82,339	13,773	16,647	22,542	19,564	23,471	34,138
	2009/2010	male	28,253	37,870	59,272	51,938	82,698	251,460	16,580	21,574	31,704	26,717	31,793	74,012
		female	22,216	27,847	37,866	37,912	48,900	83,404	13,736	17,520	23,428	20,461	24,900	33,108
Liberec	2004/2005	male	16,611	20,889	33,962	28,539	35,894	77,442	10,356	12,367	18,111	17,039	20,932	36,493
		female	15,548	18,630	25,194	22,978	28,600	53,146	9,574	11,948	16,392	14,474	17,070	24,062
	2005/2006	male	15,397	19,579	31,032	27,979	36,830	64,383	9,155	11,739	18,163	13,931	18,464	40,318
		female	13,917	17,493	25,769	21,694	26,823	47,031	9,349	11,297	15,805	13,968	17,087	25,024
	2006/2007	male	16,648	20,699	32,251	27,199	34,142	67,835	10,444	13,143	18,863	15,728	19,291	26,575
		female	15,140	19,473	28,657	25,356	30,601	54,754	9,905	11,995	16,860	15,099	18,169	24,545
	2007/2008	male	19,222	22,806	31,722	29,444	37,722	81,667	11,833	14,889	19,556	16,889	20,389	32,778
		female	16,789	19,903	28,888	26,390	32,358	54,923	11,605	14,035	18,143	16,574	20,013	26,452
	2008/2009	male	20,791	25,983	38,355	34,194	43,644	87,162	13,390	16,073	22,184	20,595	24,767	33,550
		female	19,480	22,982	32,307	28,862	34,848	56,210	12,120	14,729	19,217	18,001	21,136	28,518
	2009/2010	male	20,780	25,726	35,173	33,405	43,342	81,298	12,443	15,654	21,389	18,993	23,011	37,295
		female	17,546	21,648	29,606	26,490	31,861	50,433	11,290	14,088	18,549	16,318	19,646	26,527
Pardubice	2004/2005	male	14,367	17,991	27,377	25,340	31,698	60,340	9,380	11,870	16,994	15,512	18,411	30,040
		female	12,229	15,377	22,616	20,419	25,080	43,012	7,739	9,461	13,421	12,068	14,696	20,587
	2005/2006	male	14,474	17,212	28,389	21,561	26,225	53,532	9,101	11,315	17,196	15,159	17,574	28,950
		female	13,090	15,971	21,457	19,948	24,761	38,437	9,046	10,930	14,481	13,103	15,875	20,744
	2006/2007	male	16,050	20,252	33,096	26,904	33,042	85,088	9,888	12,147	17,841	16,464	19,372	27,856
		female	13,833	17,035	23,118	20,867	25,295	38,821	9,333	11,298	15,514	13,615	16,321	21,101
	2007/2008	male	21,197	27,393	42,407	35,492	43,519	80,000	13,829	15,926	22,333	19,402	25,389	39,796
		female	16,850	20,135	28,143	25,901	30,833	52,299	11,497	13,807	18,929	16,229	19,028	26,785
	2008/2009	male	19,236	22,028	31,250	30,208	36,292	80,347	14,167	16,104	21,875	19,537	22,982	39,370
		female	17,556	20,915	28,184	28,184	33,843	53,220	11,464	13,982	18,490	17,100	20,020	26,060
	2009/2010	male	21,469	27,102	40,676	34,543	42,243	82,921	13,851	17,295	22,827	20,697	24,590	32,164
		female	18,944	24,637	34,900	29,969	37,815	58,722	12,117	15,617	34,900	18,169	22,311	29,890

Appendix 5.3

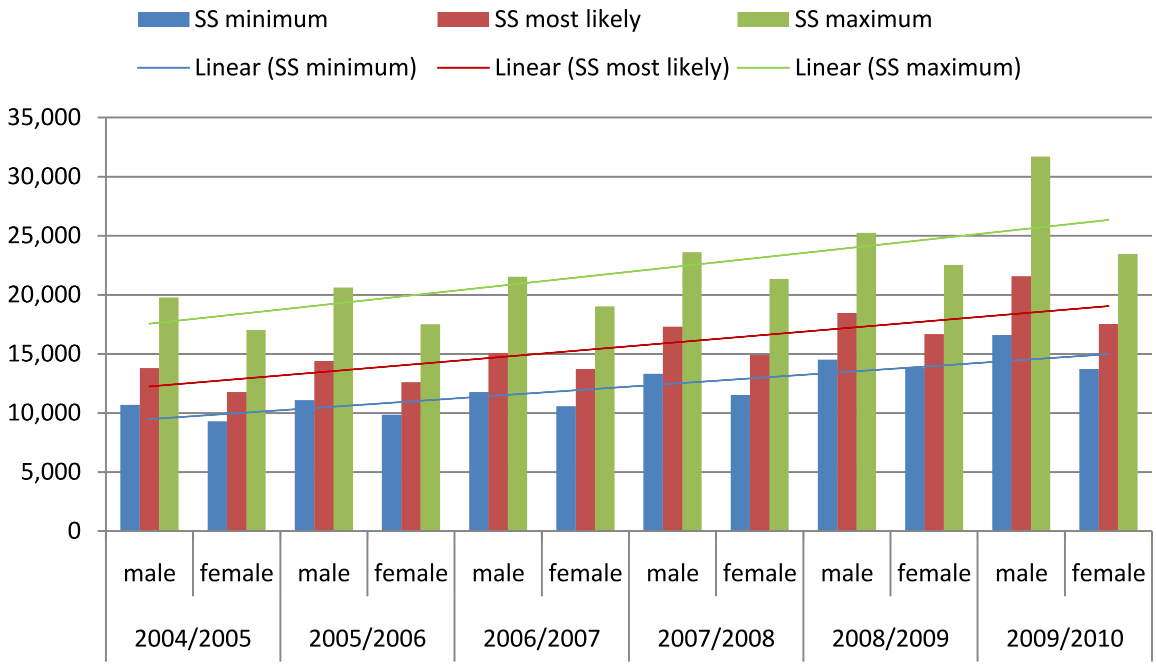
<u>Expected rates of return with standard deviations</u>

			Expected rate of return at graduation						Expected rate of return 10 years after graduation					
			Minimum		most likely		maximum		Minimum		most likely		maximum	
			IRR	Std.dev.	IRR	Std.dev.	IRR	Std.dev.	IRR	Std.dev.	IRR	Std.dev.	IRR	Std.dev.
Huddersfield	2004/2005	male	0.22	0.25	0.22	0.32	0.27	0.30	0.32	0.41	0.31	0.32	0.46	0.44
		female	0.35	0.74	0.32	0.62	0.41	0.71	0.48	0.76	0.46	0.75	0.50	0.77
	2005/2006	male	0.16	0.09	0.17	0.11	0.32	0.50	0.21	0.16	0.21	0.15	0.37	0.38
		female	0.21	0.27	0.15	0.11	0.57	1.49	0.18	0.14	0.21	0.14	0.21	0.22
	2006/2007	male	0.21	0.28	0.14	0.14	0.14	0.20	0.20	0.16	0.22	0.17	0.26	0.25
		female	0.20	0.17	0.17	0.13	0.19	0.18	0.37	0.84	0.20	0.17	0.32	0.26
	2007/2008	male	0.18	0.20	0.13	0.17	0.14	0.32	0.23	0.23	0.25	0.40	0.31	0.46
		female	0.21	0.23	0.15	0.17	0.12	0.19	0.27	0.28	0.26	0.23	0.24	0.30
	2008/2009	male	0.21	0.17	0.21	0.17	0.18	0.20	0.32	0.30	0.31	0.32	0.42	0.44
		female	0.28	0.33	0.21	0.23	0.17	0.21	0.30	0.34	0.25	0.25	0.32	0.37
	2009/2010	male	0.21	0.18	0.18	0.14	0.13	0.17	0.31	0.43	0.28	0.30	0.36	0.53
		female	0.31	0.39	0.24	0.29	0.18	0.28	0.34	0.33	0.31	0.26	0.32	0.43
Prague	2004/2005	male	0.13	0.10	0.12	0.10	0.14	0.17	0.18	0.14	0.18	0.16	0.52	1.14
		female	0.12	0.07	0.13	0.08	0.13	0.10	0.17	0.15	0.15	0.09	0.28	0.40
	2005/2006	male	0.14	0.12	0.13	0.12	0.19	0.30	0.20	0.19	0.23	0.24	0.54	0.82
		female	0.15	0.19	0.18	0.63	0.23	1.17	0.21	0.29	0.27	1.06	0.58	3.53
	2006/2007	male	0.14	0.10	0.13	0.09	0.16	0.13	0.20	0.24	0.24	0.60	0.44	0.63
		female	0.15	0.11	0.14	0.10	0.17	0.20	0.19	0.18	0.19	0.16	0.34	0.37
	2007/2008	male	0.14	0.10	0.13	0.08	0.45	1.68	0.21	0.14	0.28	0.25	1.40	3.64
		female	0.17	0.13	0.15	0.10	0.23	0.54	0.27	0.67	0.28	0.71	0.52	1.20
	2008/2009	male	0.17	0.56	0.11	0.07	0.12	0.10	0.17	0.14	0.21	0.17	0.35	0.33
		female	0.12	0.08	0.12	0.08	0.13	0.12	0.19	0.16	0.18	0.16	0.31	0.29
	2009/2010	male	0.21	0.30	0.29	0.80	0.38	1.10	0.25	0.37	0.32	0.44	0.91	1.56
		female	0.14	0.13	0.13	0.10	0.15	0.16	0.21	0.18	0.22	0.21	0.41	0.62
Liberec	2004/2005	male	0.15	0.15	0.15	0.12	0.20	0.20	0.15	0.14	0.16	0.13	0.26	0.25
		female	0.13	0.09	0.12	0.08	0.13	0.10	0.13	0.08	0.15	0.11	0.24	0.19
	2005/2006	male	0.21	0.35	0.22	0.43	0.22	0.53	0.26	0.35	0.26	0.36	0.25	0.45
		female	0.12	0.12	0.12	0.11	0.14	0.12	0.14	0.15	0.13	0.10	0.20	0.19
	2006/2007	male	0.14	0.15	0.14	0.15	0.18	0.27	0.17	0.19	0.18	0.20	0.48	1.03
		female	0.14	0.10	0.14	0.11	0.16	0.17	0.21	0.43	0.19	0.31	0.27	0.29
	2007/2008	male	0.13	0.09	0.12	0.06	0.12	0.07	0.15	0.08	0.18	0.10	0.39	0.38
		female	0.10	0.06	0.09	0.06	0.13	0.13	0.13	0.11	0.13	0.10	0.20	0.15
	2008/2009	male	0.13	0.10	0.13	0.08	0.15	0.10	0.16	0.15	0.19	0.21	0.39	0.58
		female	0.14	0.10	0.13	0.09	0.15	0.12	0.14	0.13	0.15	0.14	0.23	0.23
	2009/2010	male	0.15	0.12	0.14	0.14	0.14	0.13	0.19	0.22	0.20	0.22	0.35	0.84
		female	0.12	0.08	0.12	0.09	0.14	0.19	0.14	0.12	0.13	0.10	0.19	0.18
Pardubice	2004/2005	male	0.12	0.10	0.12	0.08	0.13	0.12	0.13	0.10	0.15	0.09	0.37	1.07
		female	0.12	0.09	0.13	0.09	0.15	0.12	0.16	0.13	0.16	0.13	0.23	0.21
	2005/2006	male	0.12	0.09	0.12	0.11	0.15	0.18	0.11	0.13	0.11	0.13	0.19	0.19
		female	0.10	0.08	0.10	0.08	0.11	0.09	0.12	0.11	0.13	0.11	0.20	0.25
	2006/2007	male	0.15	0.17	0.15	0.13	0.22	0.30	0.17	0.18	0.19	0.25	0.49	0.85
		female	0.11	0.11	0.12	0.10	0.11	0.09	0.13	0.11	0.13	0.11	0.22	0.29
	2007/2008	male	0.13	0.10	0.16	0.14	0.22	0.22	0.19	0.14	0.17	0.14	0.31	0.45
		female	0.10	0.08	0.10	0.07	0.12	0.12	0.14	0.12	0.15	0.13	0.23	0.34
	2008/2009	male	0.08	0.05	0.07	0.04	0.10	0.08	0.12	0.09	0.12	0.06	0.26	0.29
		female	0.11	0.08	0.11	0.08	0.14	0.03	0.14	0.11	0.15	0.13	0.23	0.23
	2009/2010	male	0.16	0.35	0.17	0.36	0.23	0.41	0.15	0.17	0.15	0.18	0.35	0.65
		female	0.13	0.12	0.13	0.11	0.15	0.16	0.16	0.17	0.17	0.18	0.23	0.26

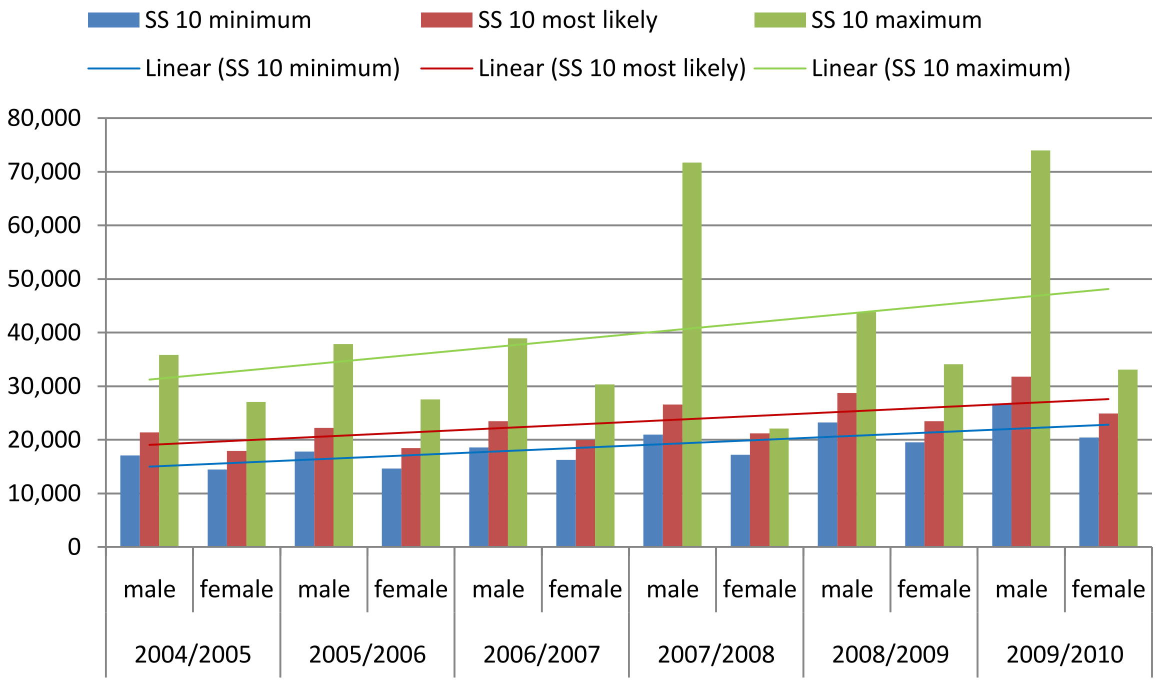
Colour coding:
Red – standard deviation is equal or larger than the rate of return
Purple – standard deviation is equal or larger than ½ of the rate of return

Appendix 5.4

Earnings expected immediately after graduation from high school – Prague sample

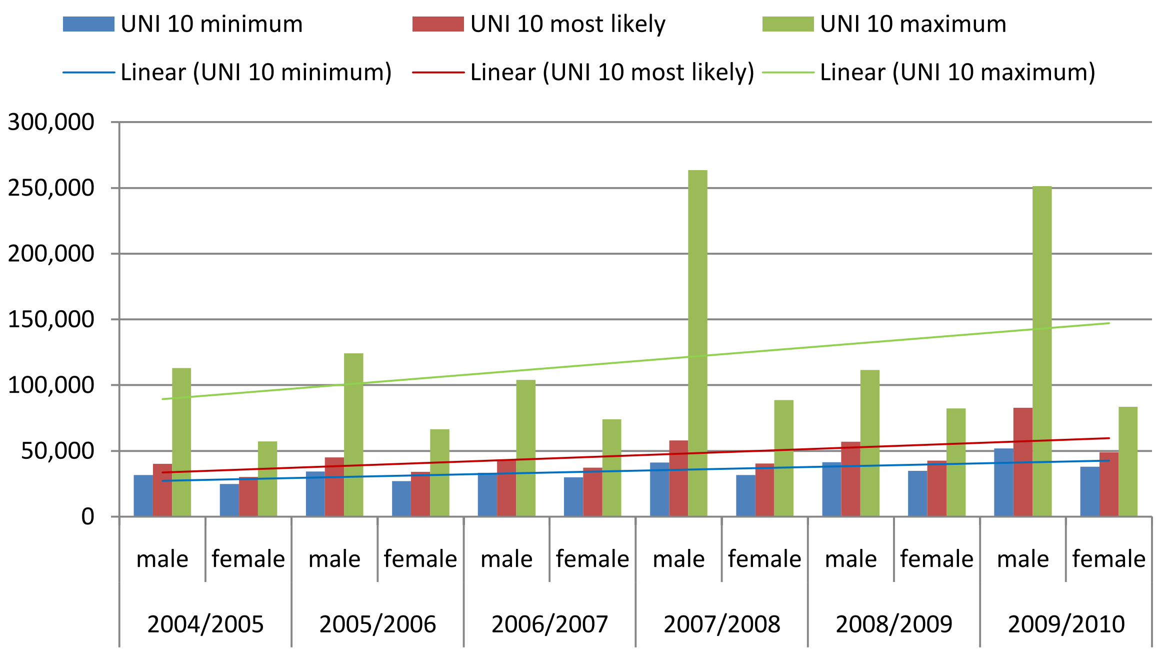


Earnings expected ten years after graduation from high school – Prague sample



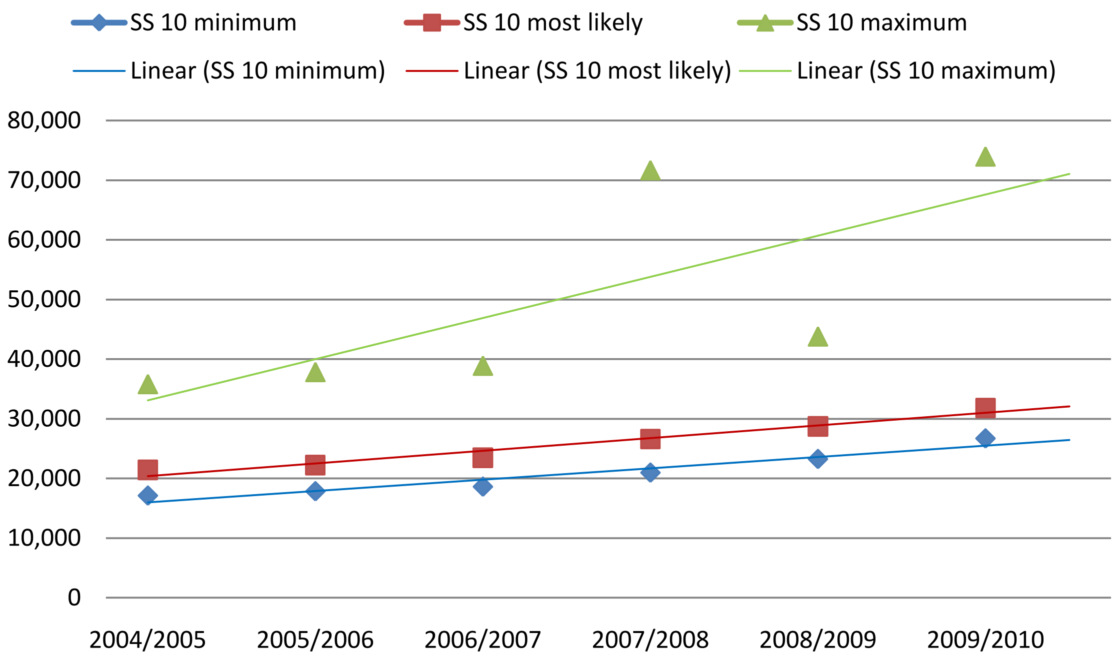
Appendix 5.4 continued

Earnings expected ten years after graduation from university – Prague sample

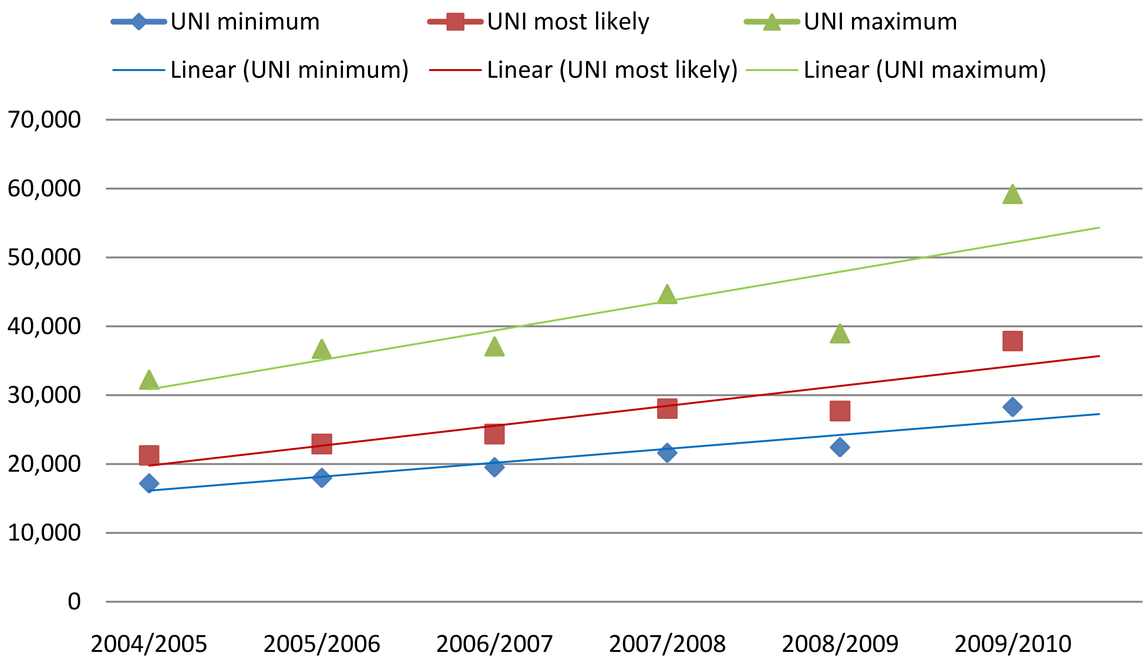


Appendix 5.5

<u>Development in time of earnings expectations ten years after graduation from high school – males, Prague sample</u>

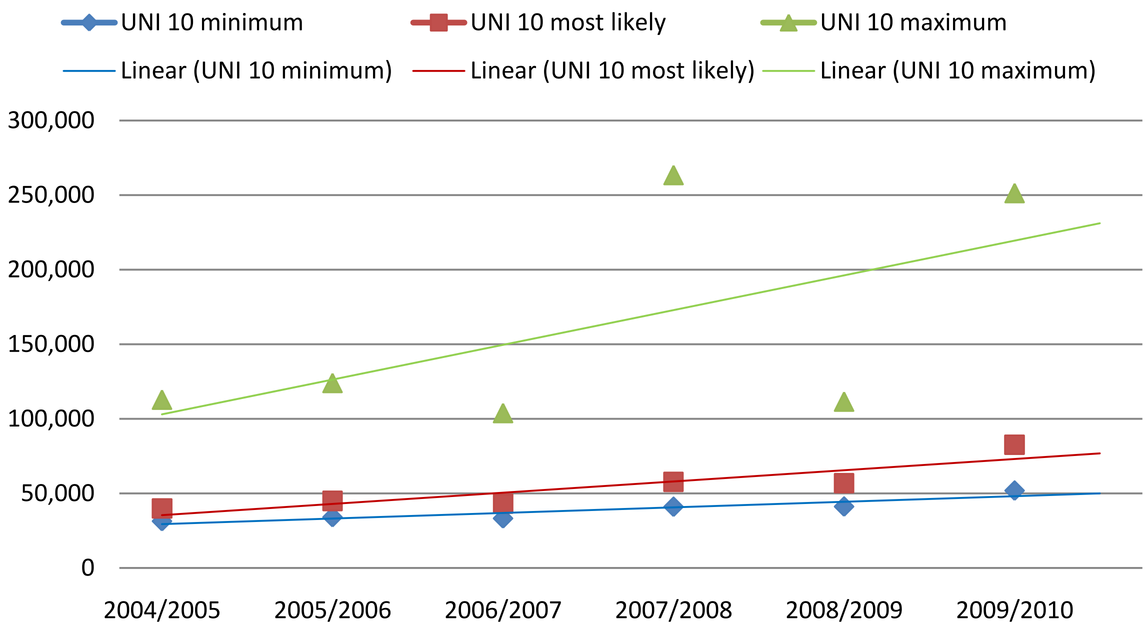


<u>Development in time of earnings expectations immediately after graduation from university – males, Prague sample</u>

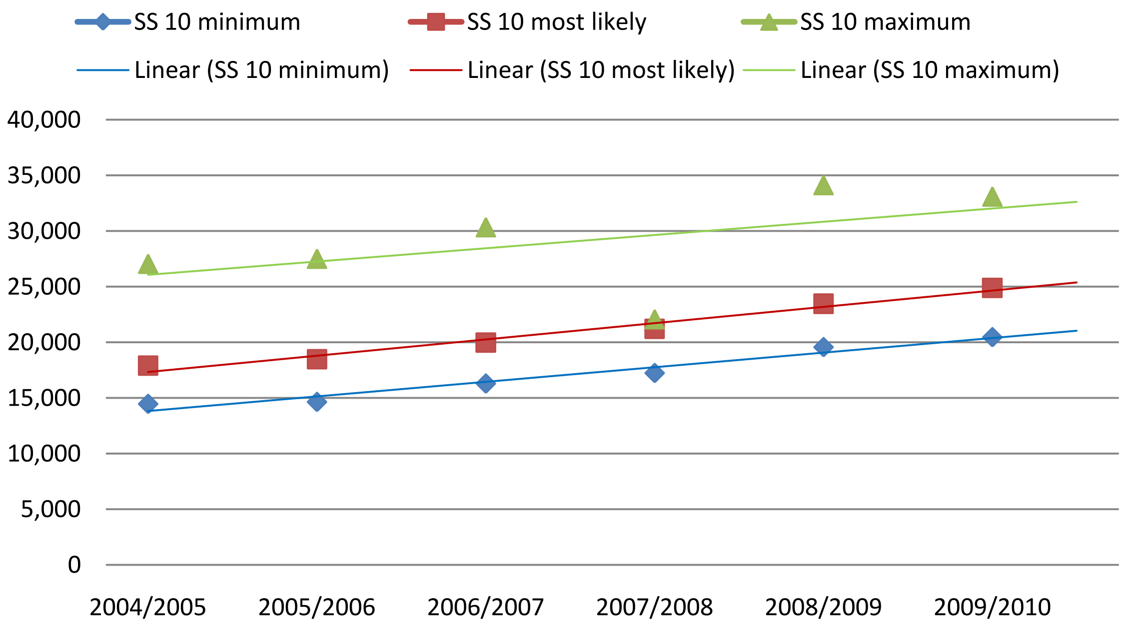


Appendix 5.5 continued

Development in time of earnings expectations ten years after graduation from university – males, Prague sample

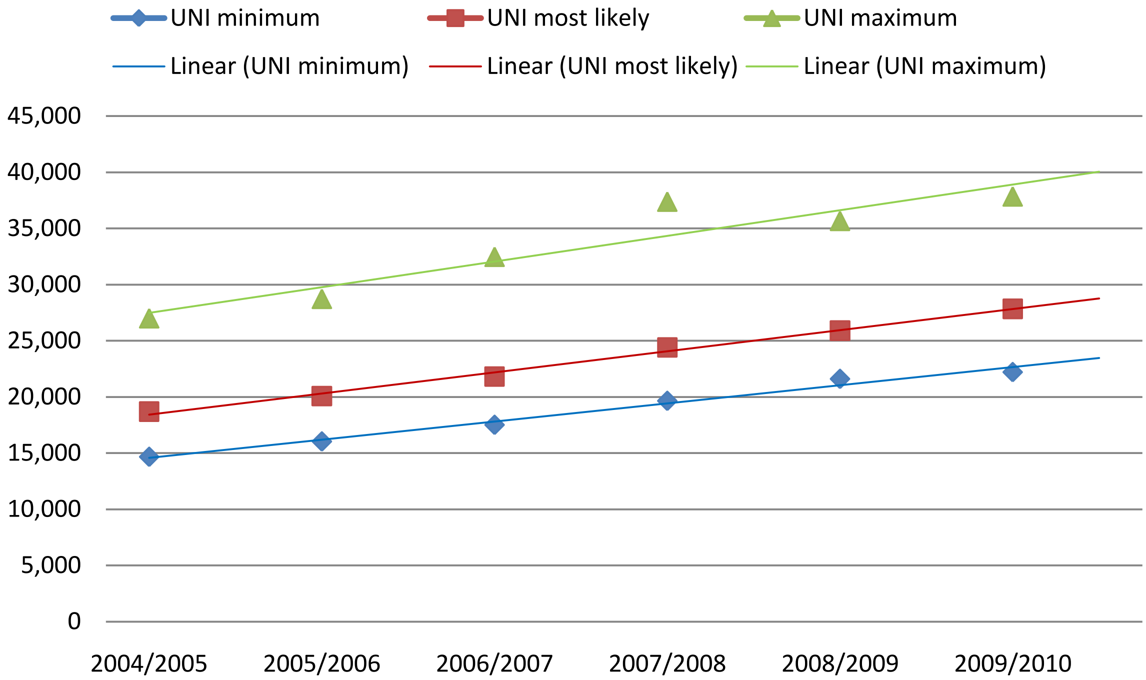


Development in time of earnings expectations ten years after graduation from high school – females, Prague sample

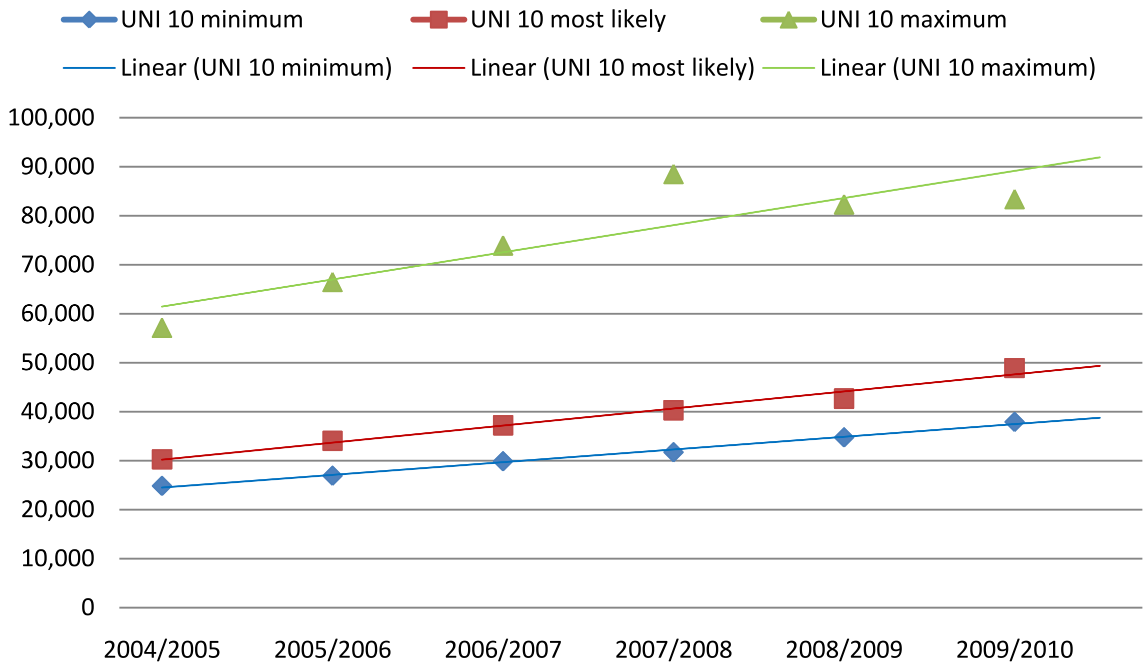


Appendix 5.5 continued

Development in time of earnings expectations immediately after graduation from university – females, Prague sample

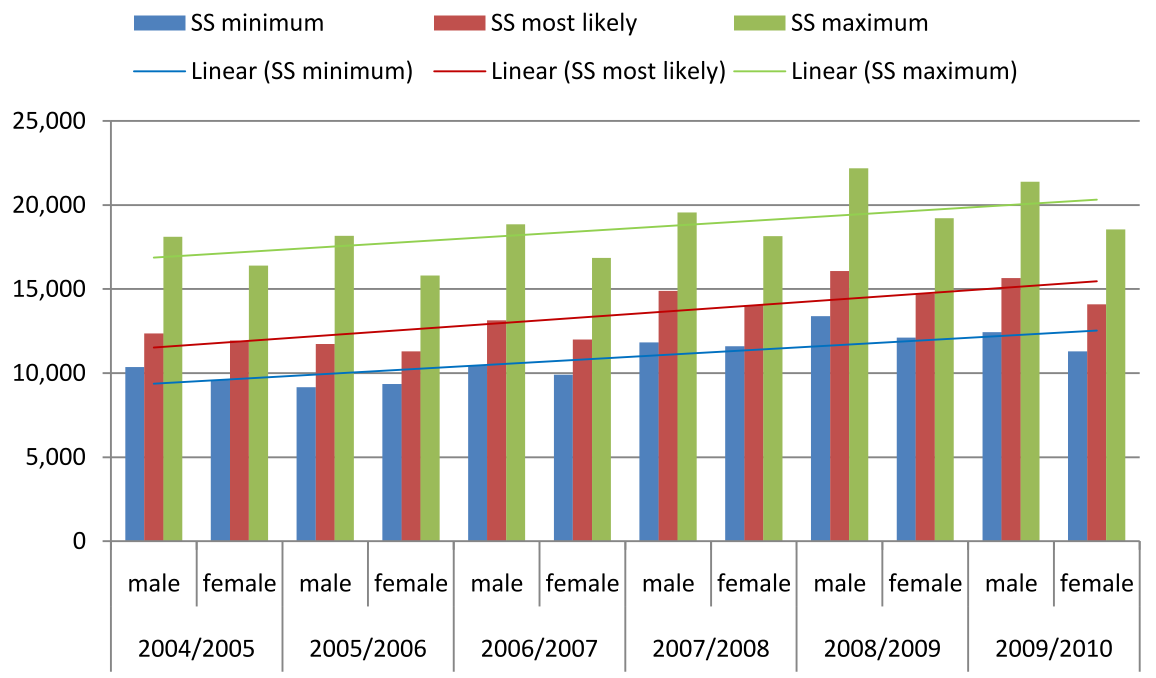


Development in time of earnings expectations ten years after graduation from university – females, Prague sample

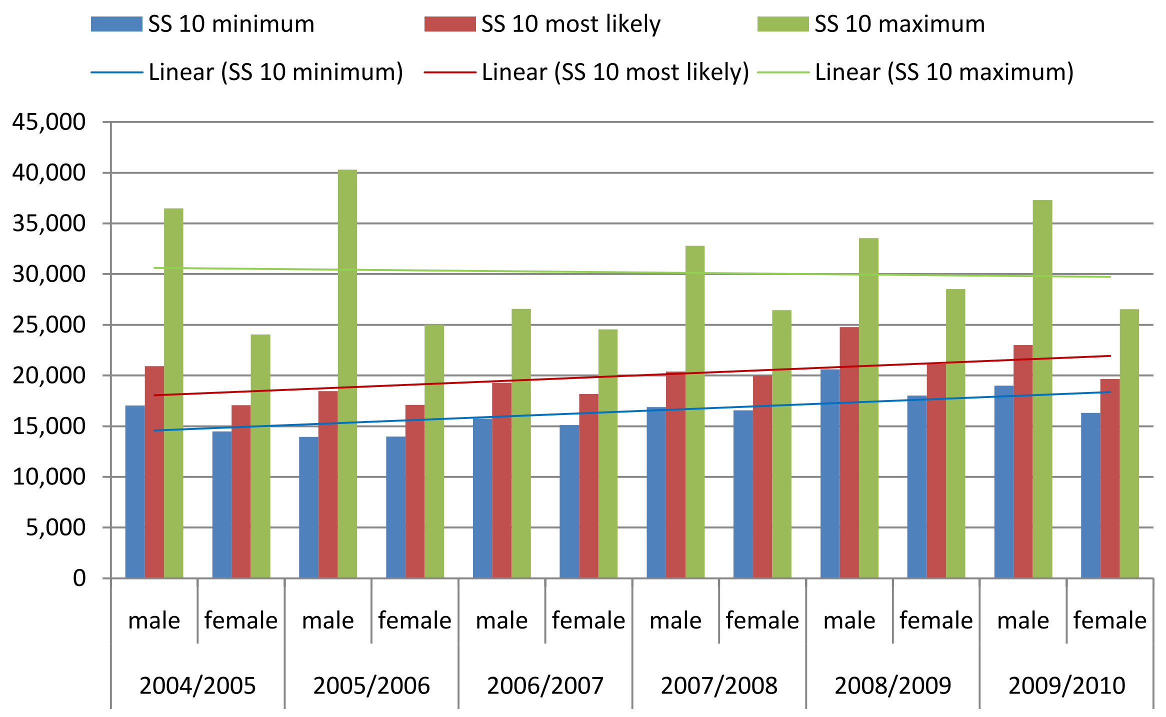


Appendix 5.6

Earnings expected immediately after graduation from high school– Liberec sample

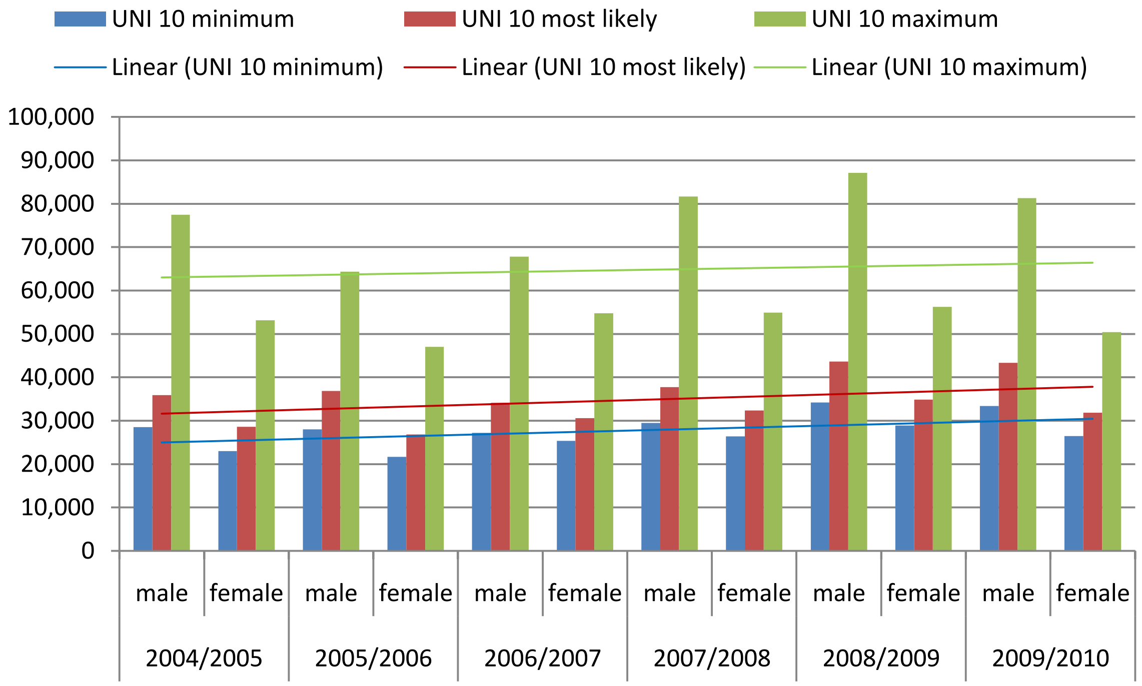


Earnings expected ten years after graduation from high school – Liberec sample



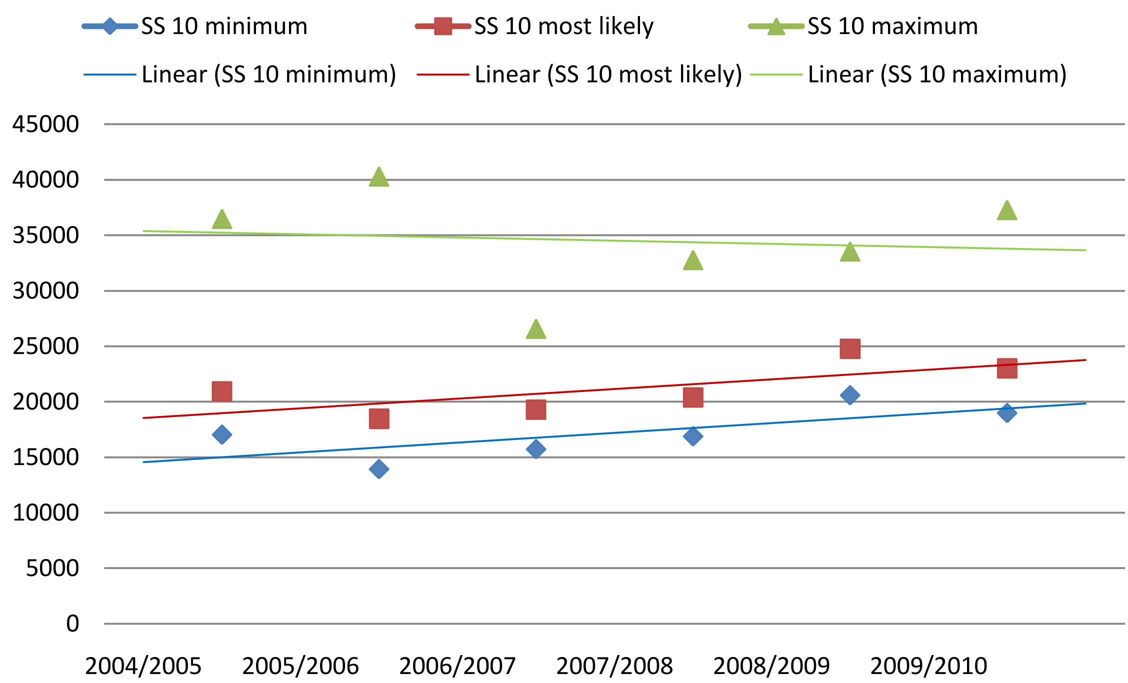
Appendix 5.6 continued

Earnings expected ten years after graduation from university – Liberec sample

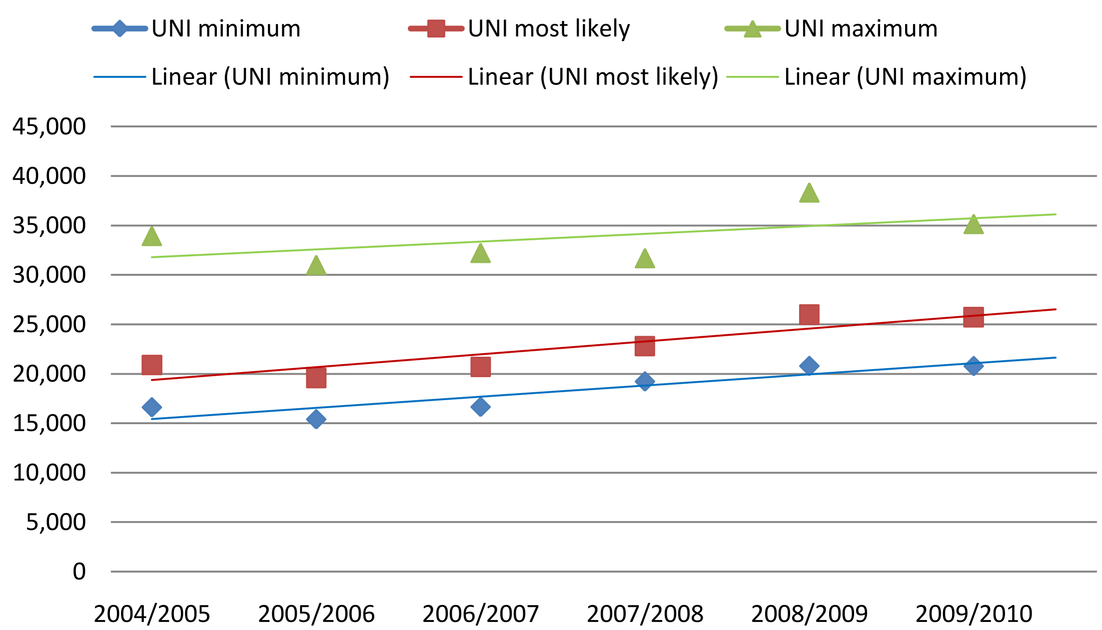


Appendix 5.7

<u>Development in time of earnings expectations ten years after graduation from high school – males, Liberec sample</u>

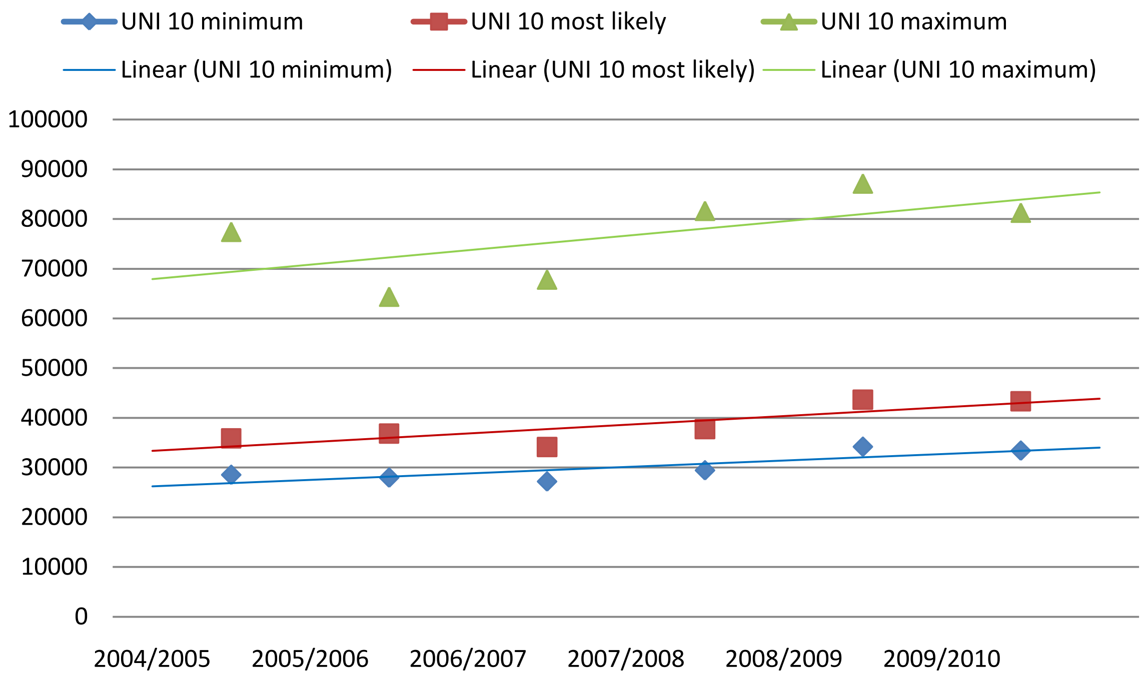


<u>Development in time of earnings expectations immediately after graduation from university – males, Liberec sample</u>

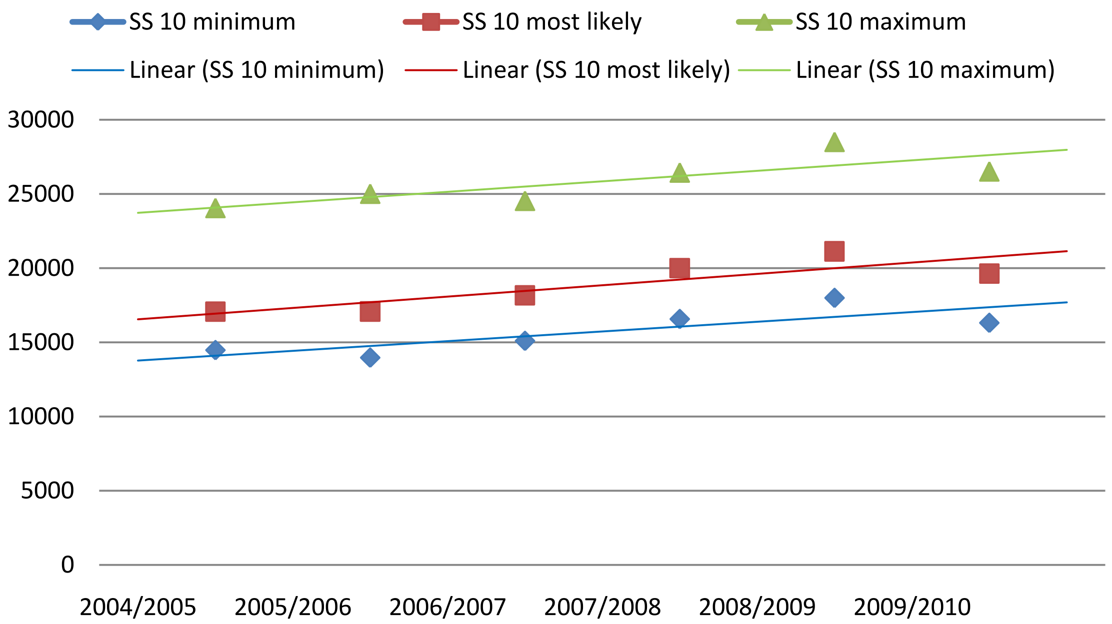


Appendix 5.7 continued

Development in time of earnings expectations ten years after graduation from university – males, Liberec sample

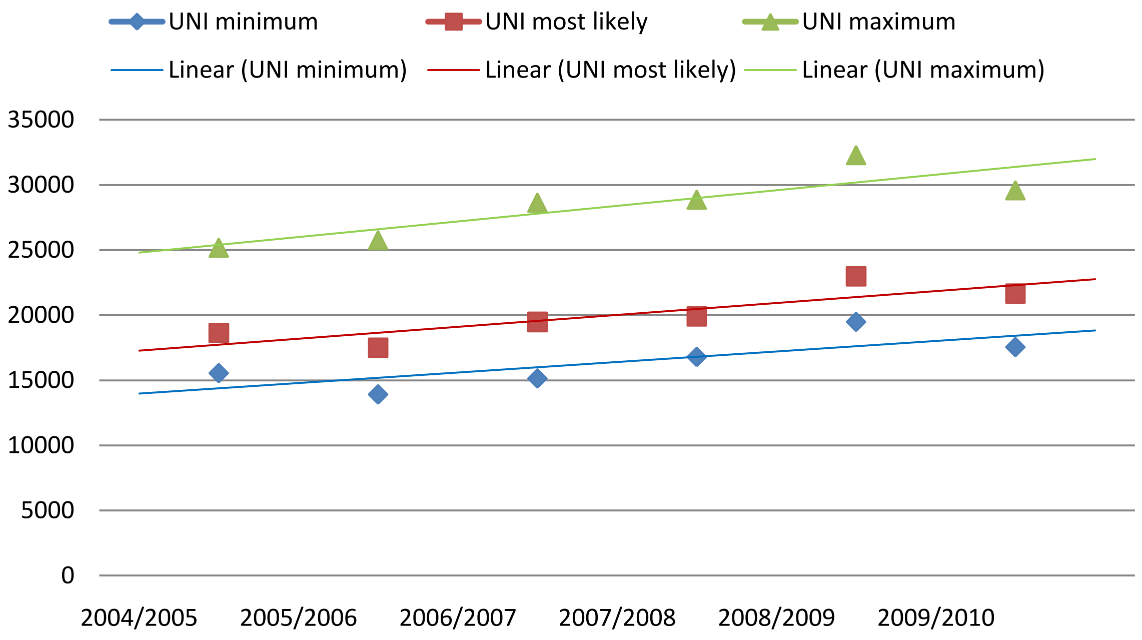


Development in time of earnings expectations ten years after graduation from high school – females, Liberec sample

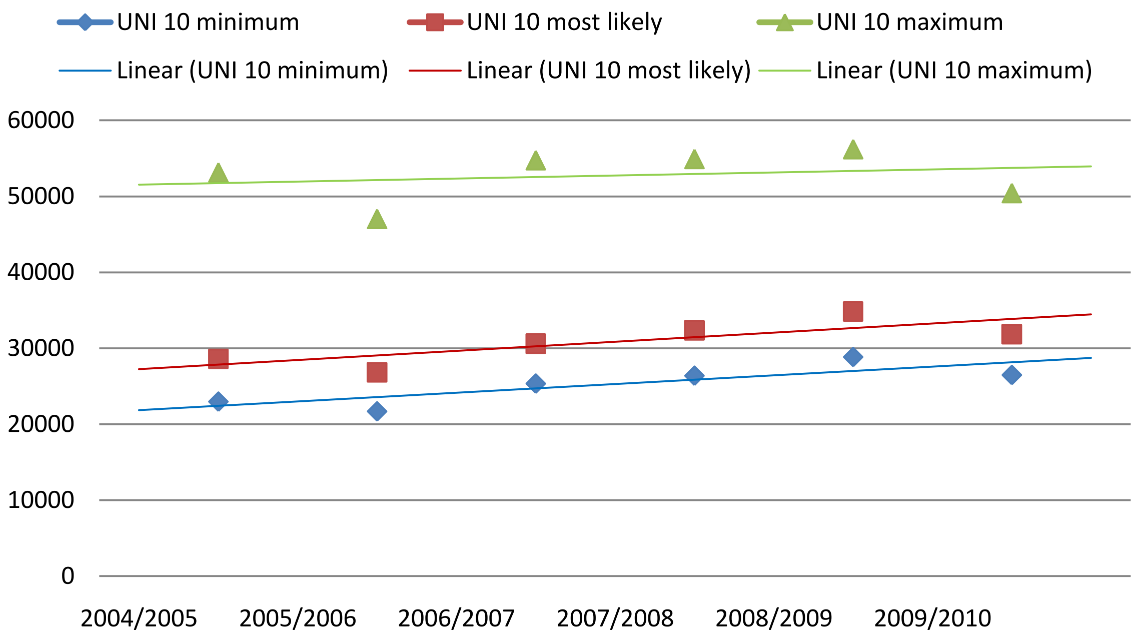


Appendix 5.7 continued

Development in time of earnings expectations immediately after graduation from university – females, Liberec sample

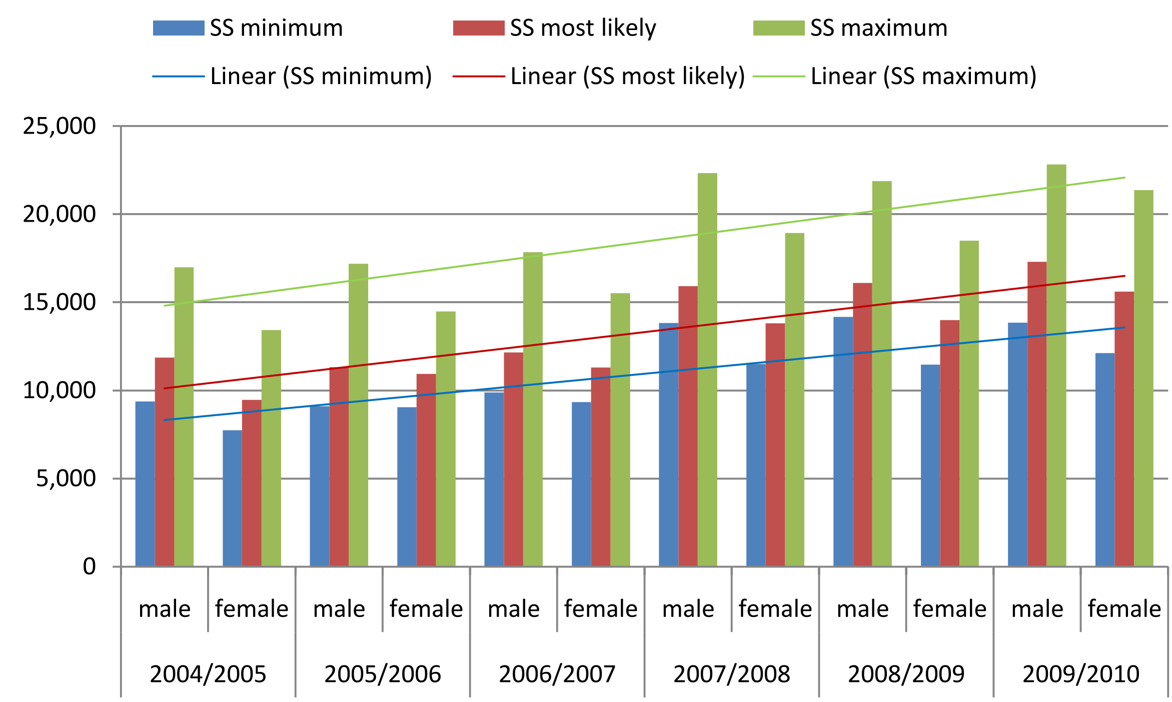


Development in time of earnings expectations ten years after graduation from university – females, Liberec sample

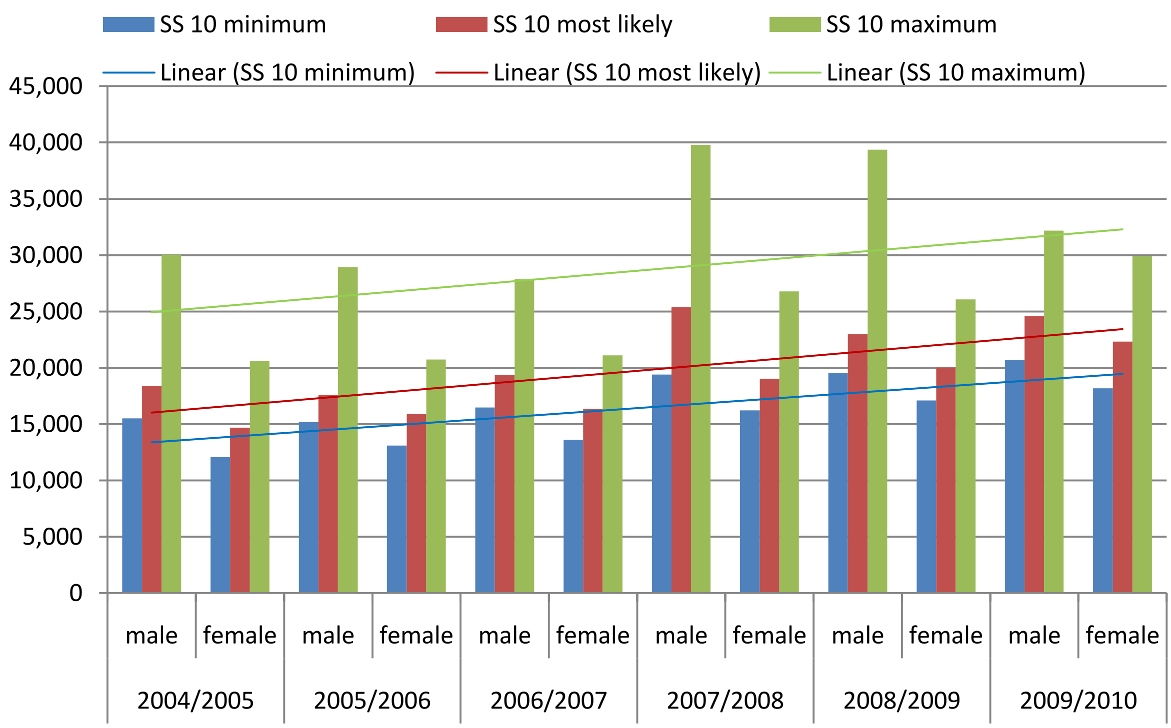


Appendix 5.8

<u>Earnings expected immediately after graduation from high school – Pardubice sample</u>

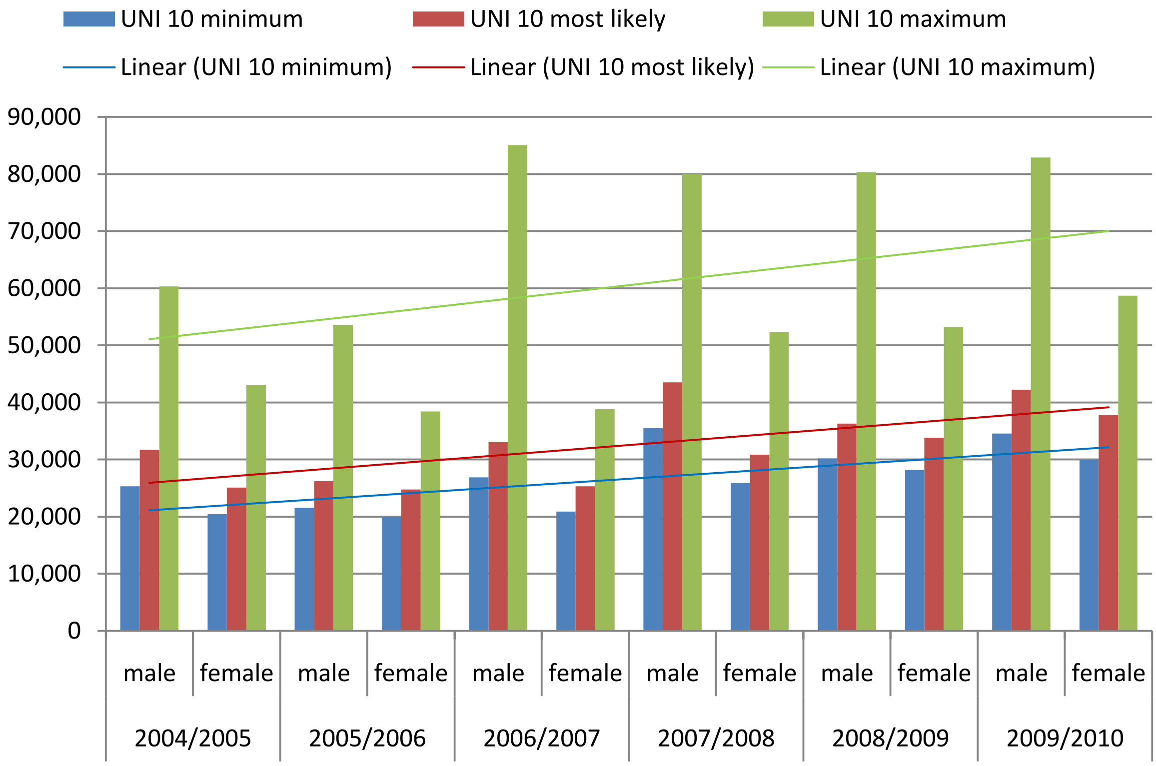


<u>Earnings expected ten years after graduation from high school – Pardubice sample</u>



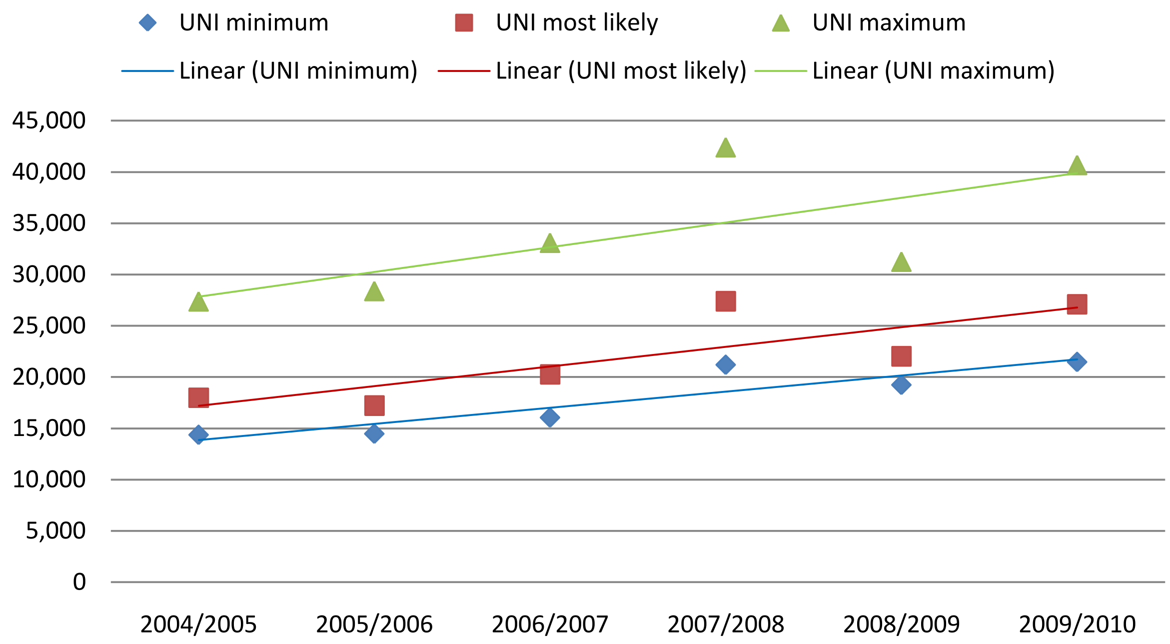
Appendix 5.8 continued

Earnings expected ten years after graduation from university – Pardubice sample

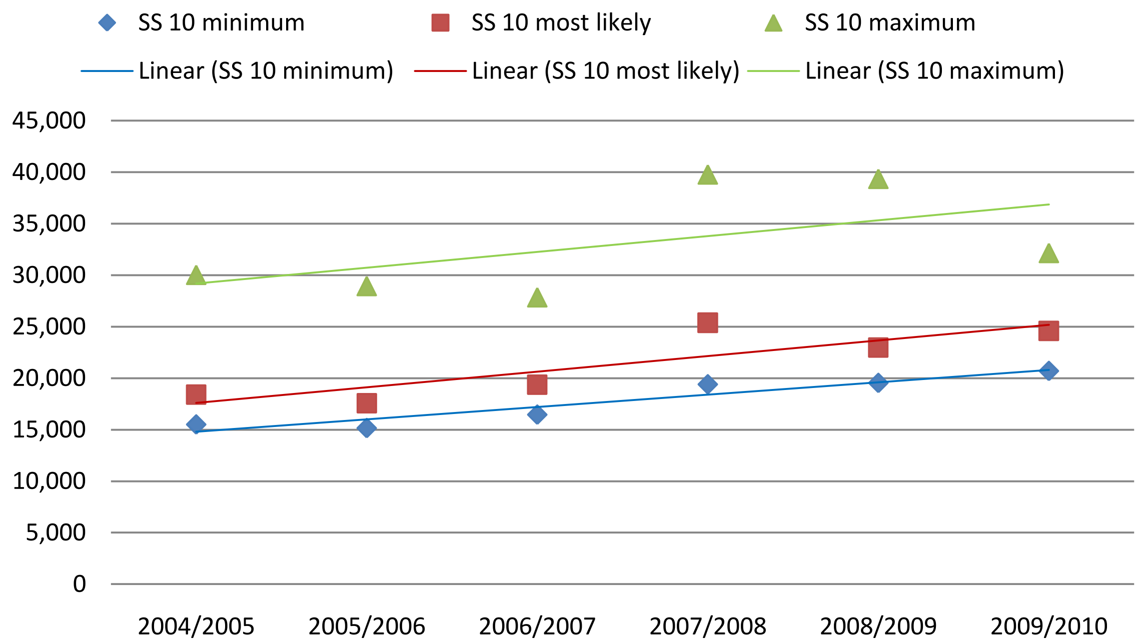


Appendix 5.9

Development in time of earnings expectations immediately after graduation from university – males, Pardubice sample

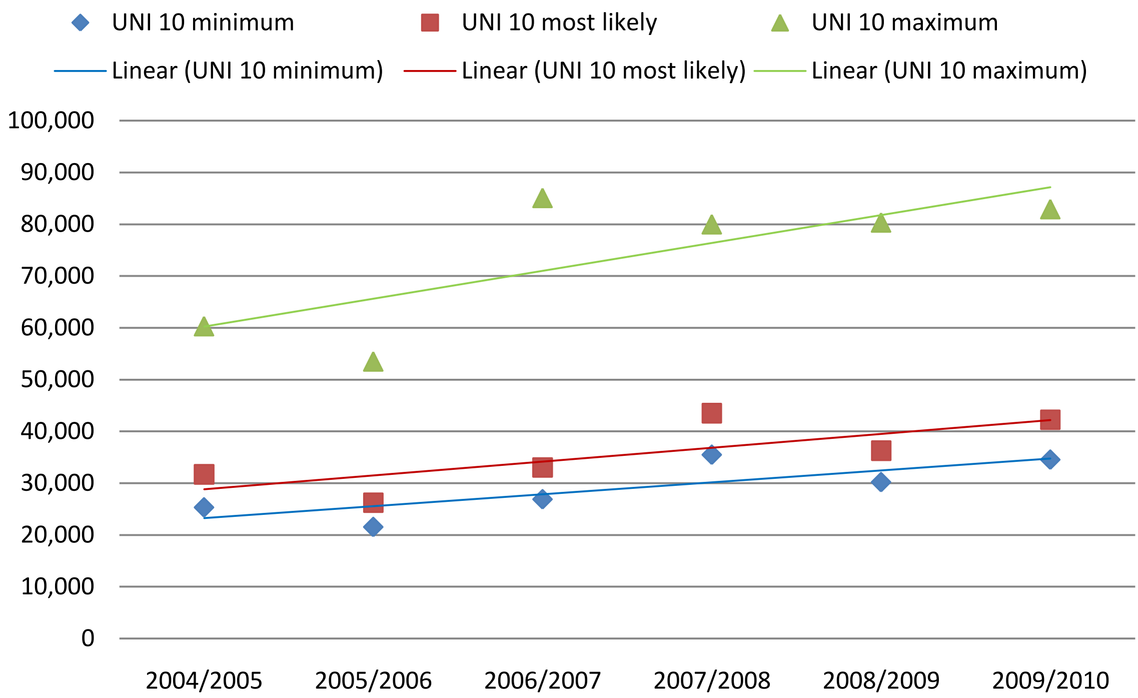


Development in time of earnings expectations ten years after graduation from high school – males, Pardubice sample

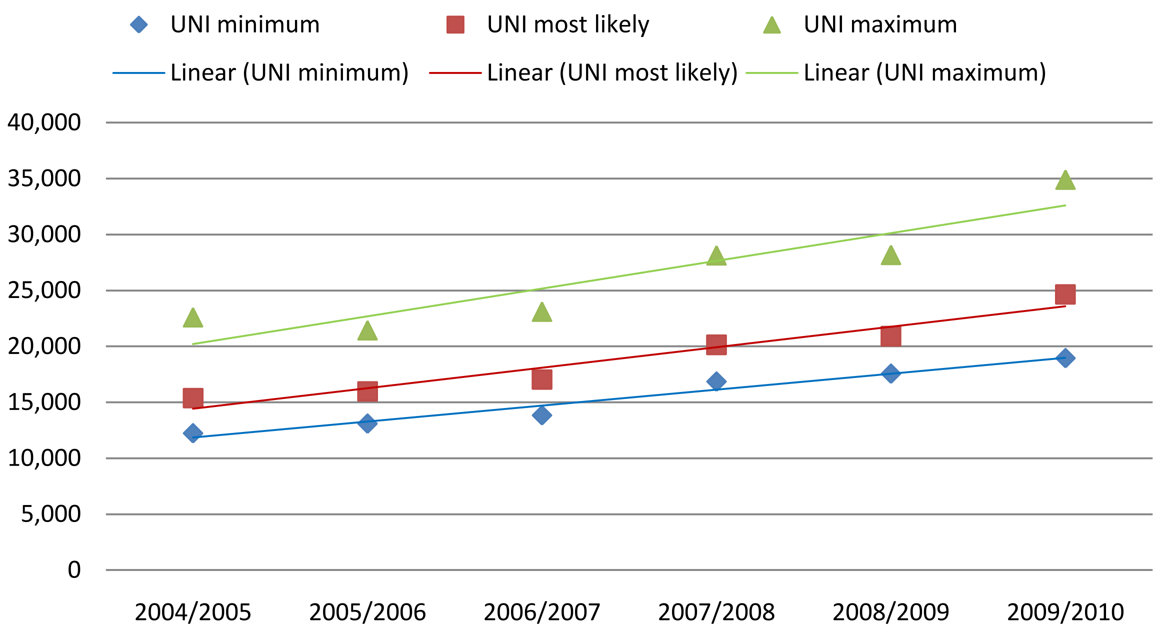


Appendix 5.9 continued

Development in time of earnings expectations ten years after graduation from university – males, Pardubice sample

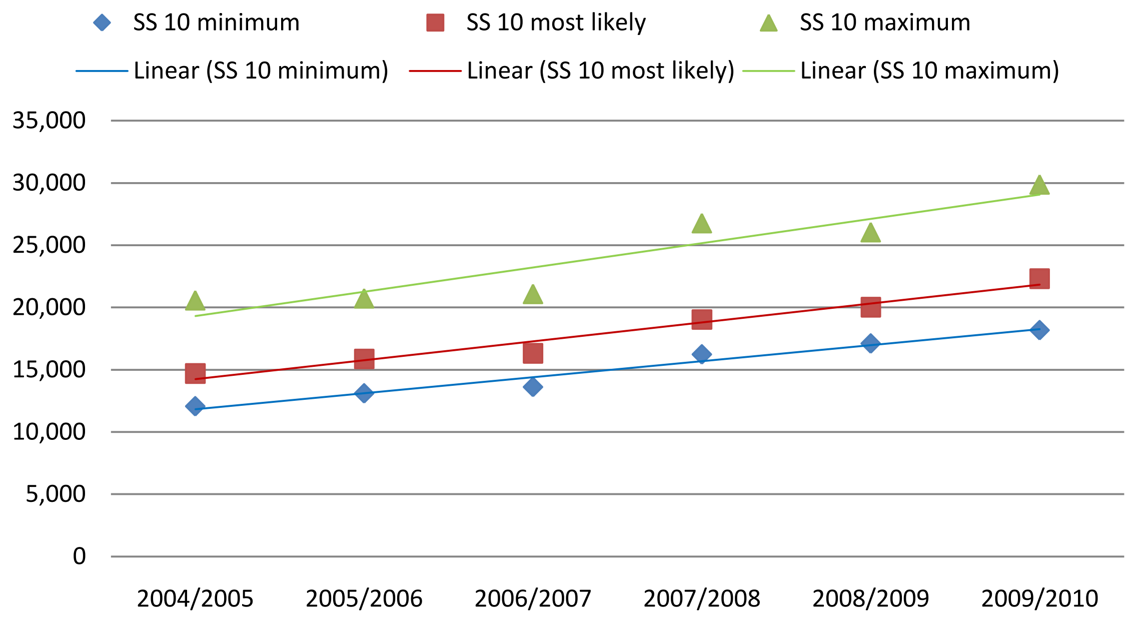


Development in time of earnings expectations immediately after graduation from university – females, Pardubice sample

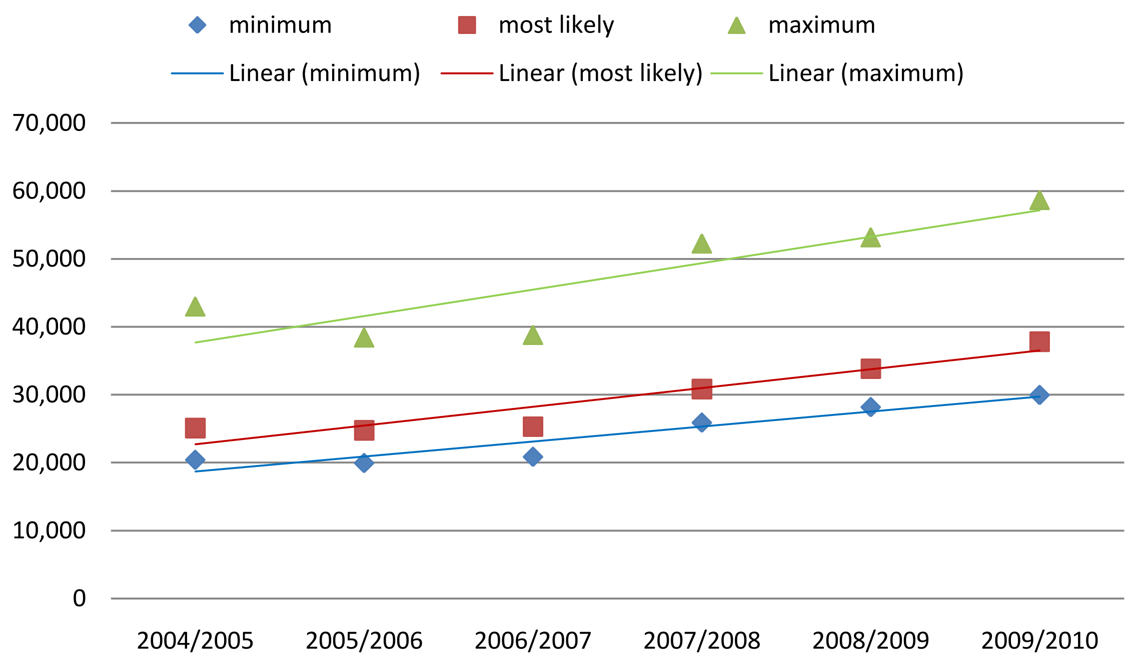


Appendix 5.9 continued

Development in time of earnings expectations ten years after graduation from high school – females, Pardubice sample

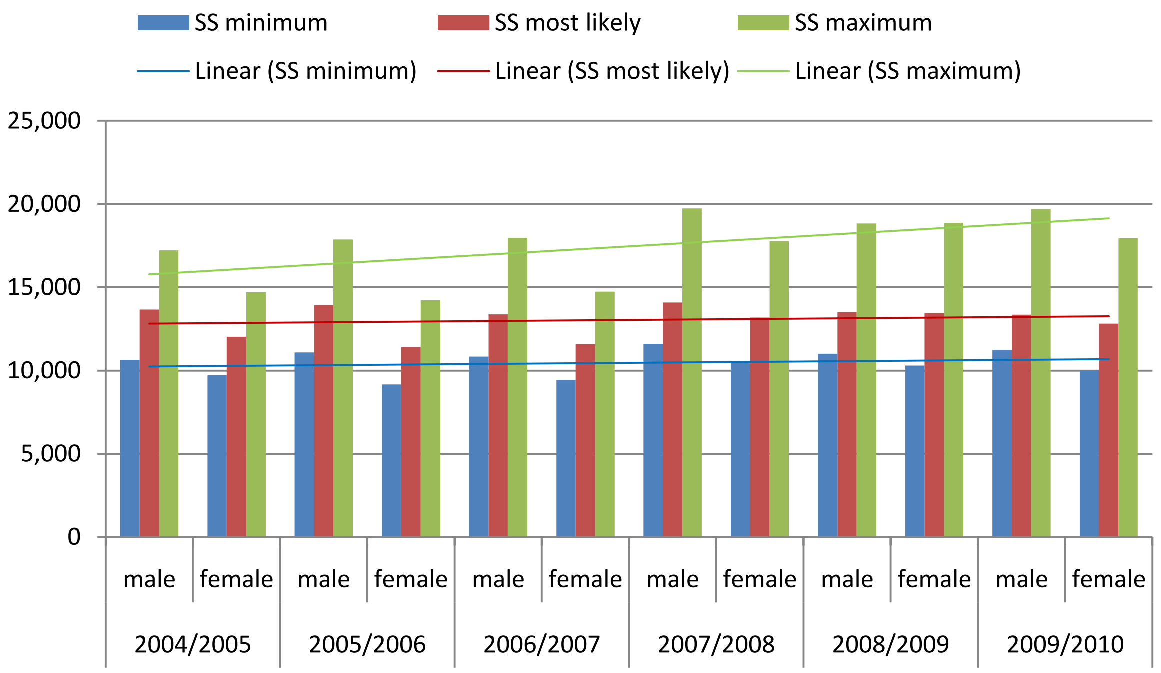


Development in time of earnings expectations ten years after graduation from university – females, Pardubice sample

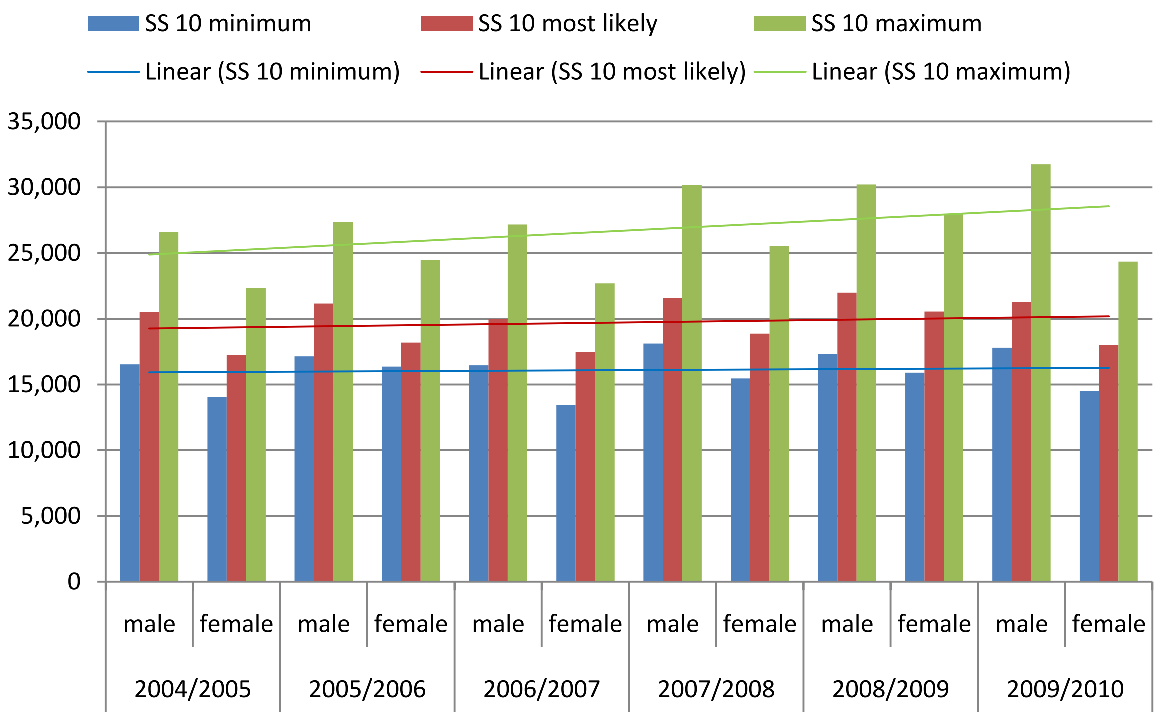


Appendix 5.10

Earnings expected immediately after graduation from high school – Huddersfield sample

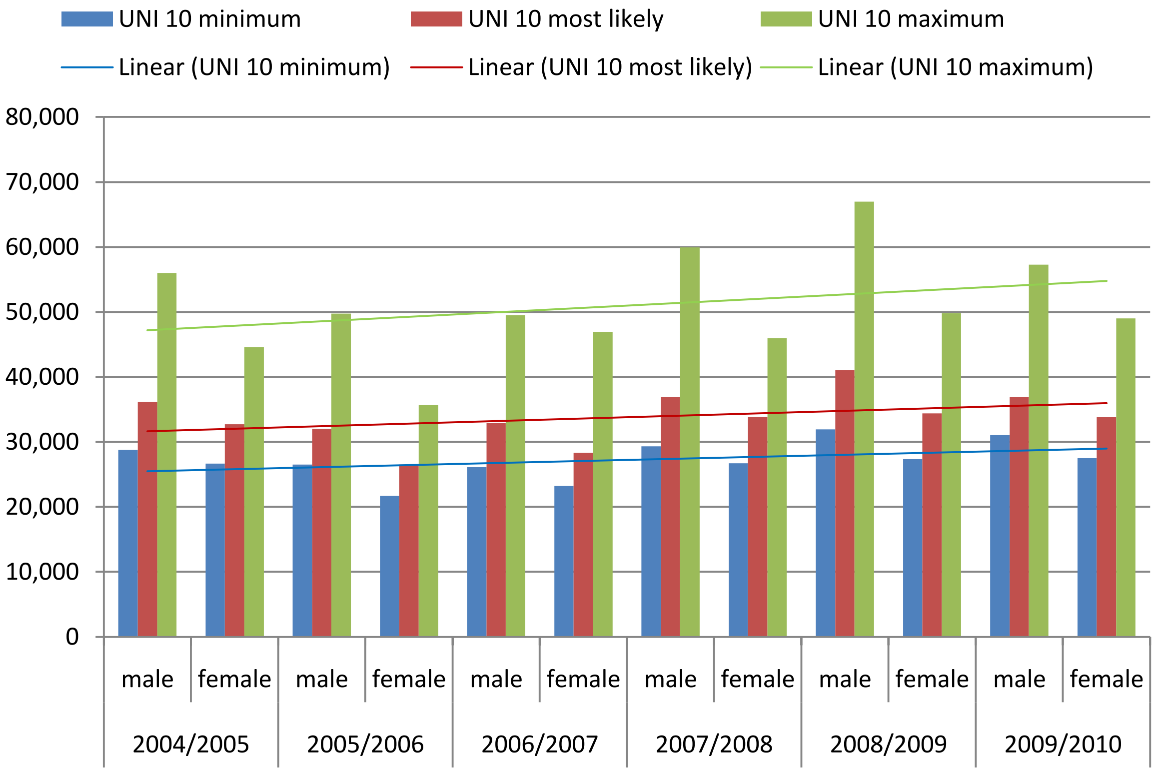


Earnings expected ten years after graduation from high school – Huddersfield sample



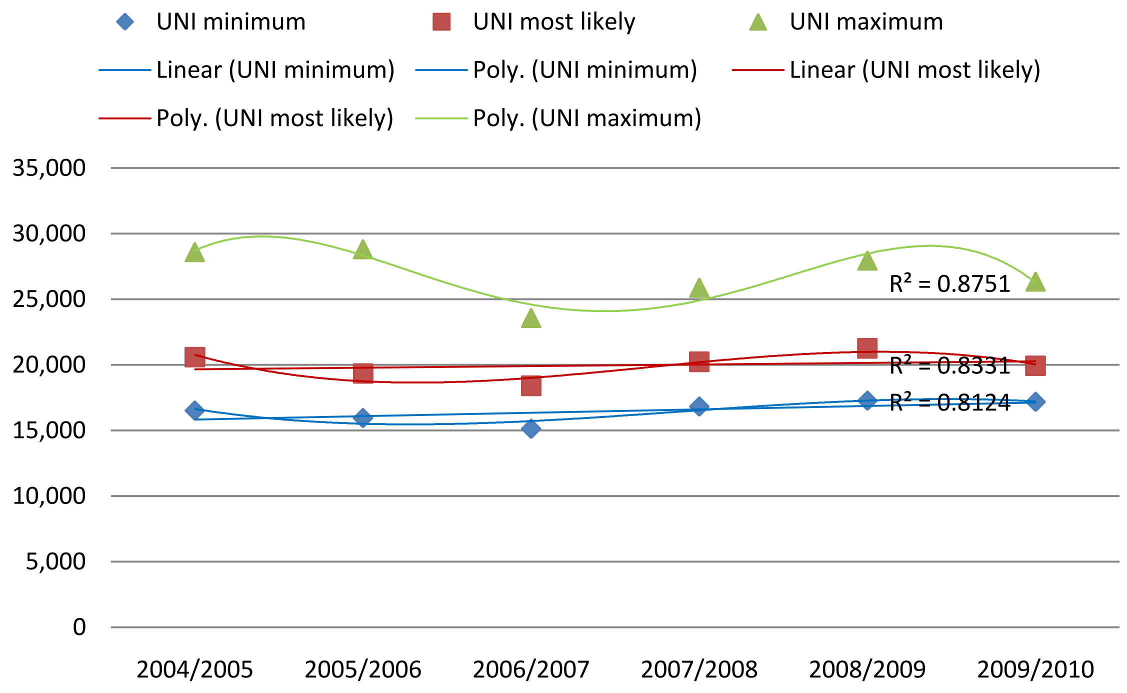
Appendix 5.10 continued

Earnings expected ten years after graduation from university – Huddersfield sample

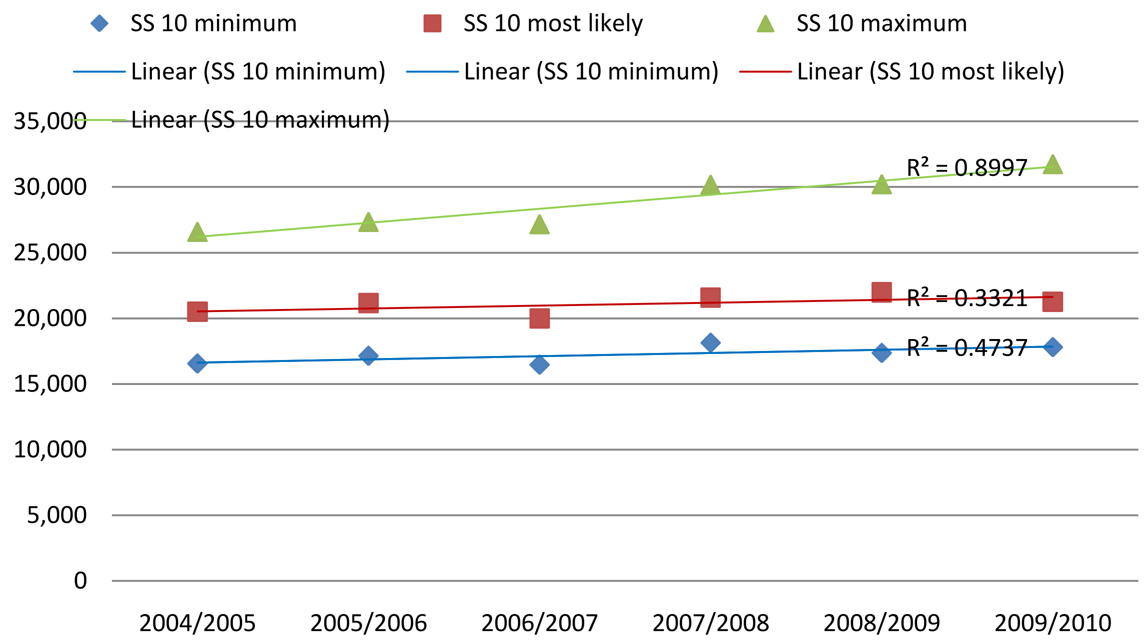


Appendix 5.11

<u>Development in time of earnings expected immediately after graduation from university – males, Huddersfield sample</u>

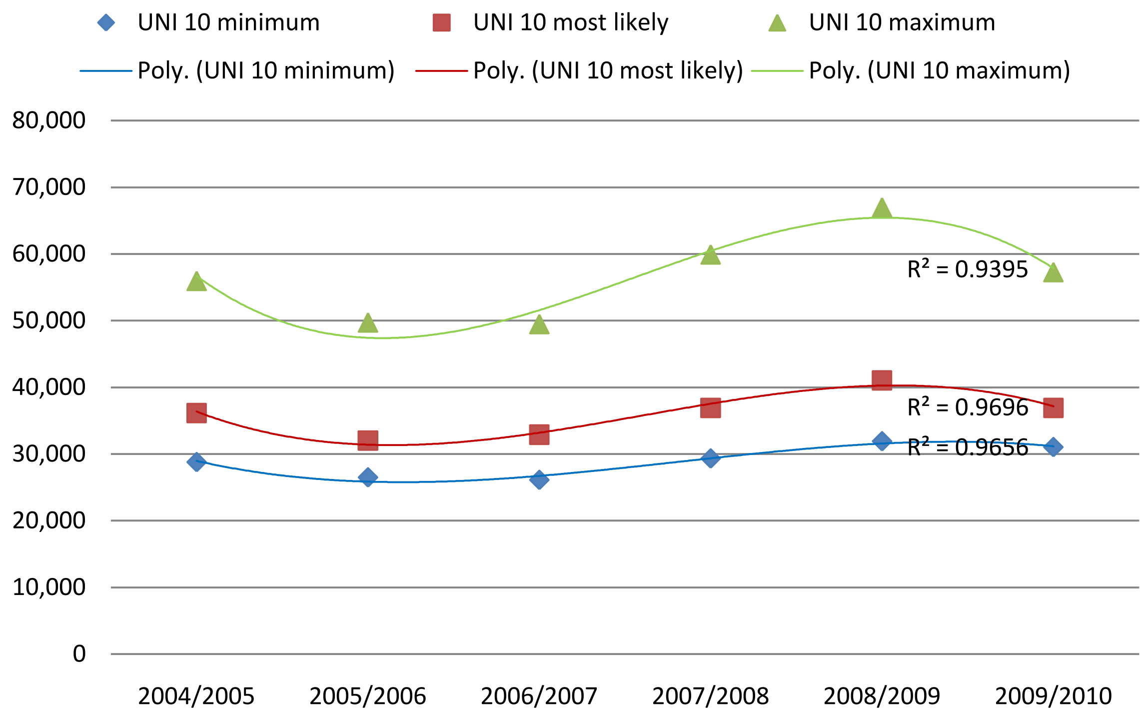


<u>Development in time of earnings expected ten years after graduation from high school – males, Huddersfield sample</u>

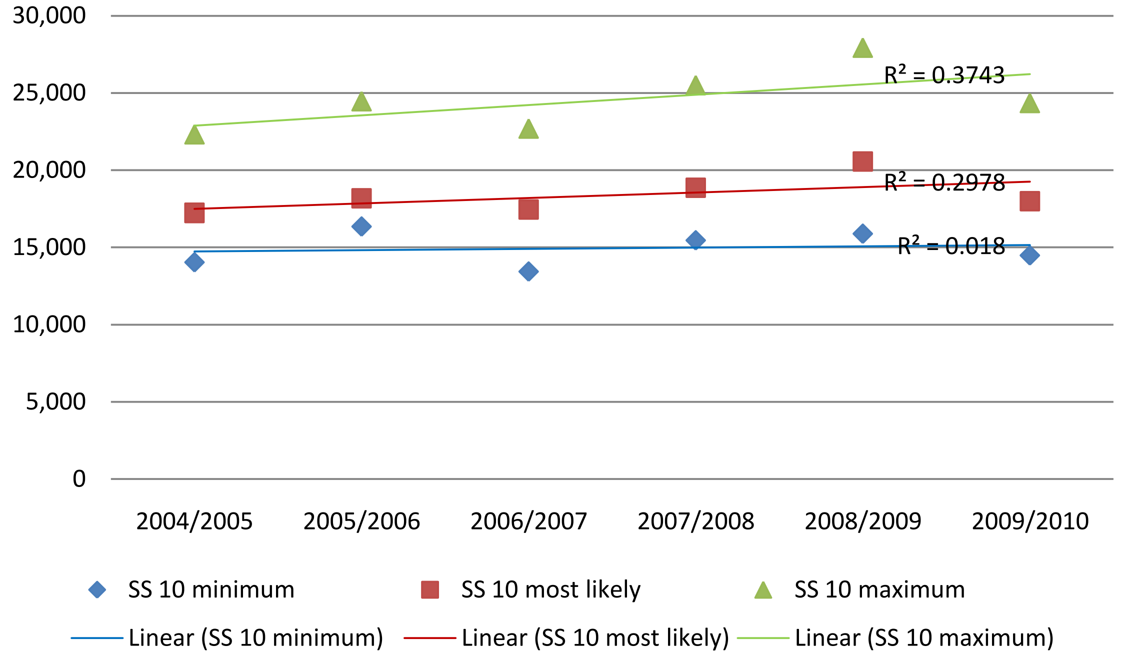


Appendix 5.11 continued

Development in time of earnings expected ten years after graduation from university – males, Huddersfield sample

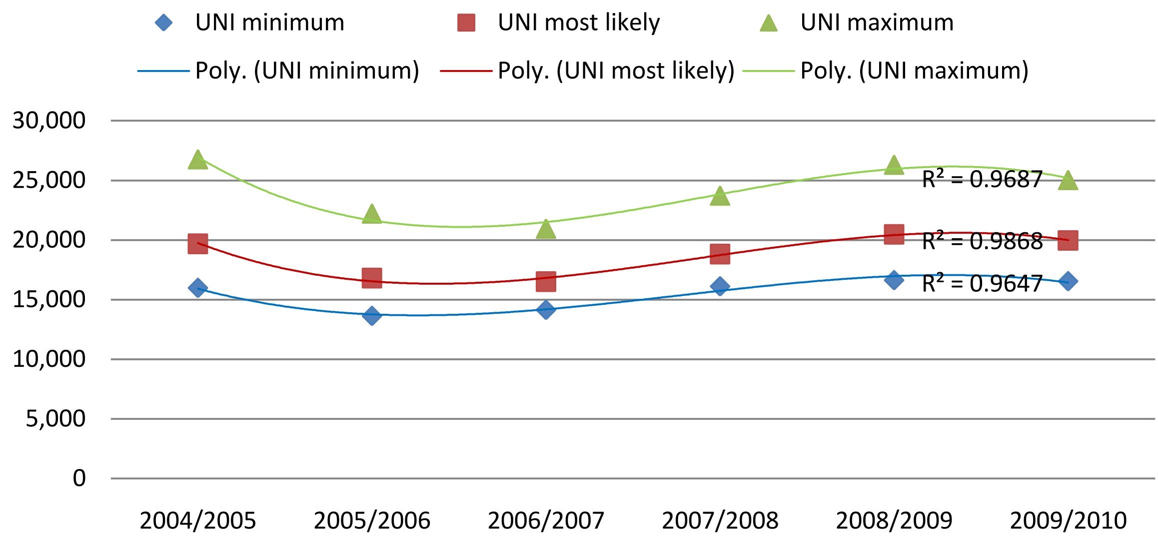


Development in time of earnings expected ten years after graduation from high school – females, Huddersfield sample

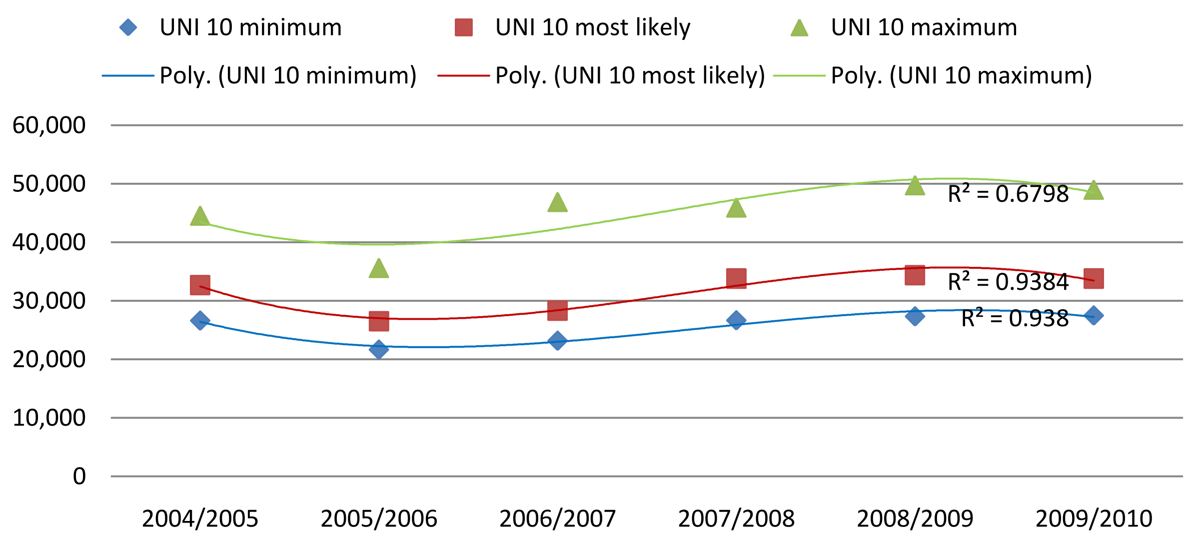


Appendix 5.11 continued

Development in time of earnings expected immediately after graduation from university – females, Huddersfield sample



Development in time of earnings expected ten years after graduation from university – females, Huddersfield sample



Appendix 5.12

Table 1 Estimated marginal means – Huddersfield males

UNI minimum			UNI most likely			UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
9	10	15950	3	18	19361	3	18	24000
3	17	16559	4	28	20071	9	10	25400
4	28	16679	2	20	20400	10	5	26000
2	21	16714	1	48	20490	2	20	27000
12	19	16868	7	18	20500	1	50	27520
11	42	17393	9	10	20600	6	4	28000
5	8	17500	12	18	20667	7	17	28059
1	50	17570	11	41	21085	12	18	28444
7	18	17611	5	8	21500	11	42	28476
10	5	18000	10	5	21600	8	40	28538
8	41	18122	8	41	22085	4	27	28704
6	4	19000	6	4	24750	5	8	29625
Total	**263**	**17317**	**Total**	**259**	**20842**	**Total**	**259**	**27732**

IRR UNI minimum			IRR UNI most likely			IRR UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
10	5	15.20%	10	5	15.20%	6	4	-1.75%
6	4	15.50%	8	40	16.95%	9	8	9.00%
8	40	18.05%	2	19	17.05%	10	5	12.80%
9	8	18.63%	6	4	18.50%	12	17	14.47%
2	21	19.62%	9	8	18.50%	4	27	14.67%
11	39	20.46%	11	37	18.78%	1	44	14.80%
4	25	20.48%	4	26	18.88%	8	39	14.90%
5	7	21.57%	3	17	20.41%	3	17	15.00%
12	18	21.72%	5	7	20.43%	2	19	15.16%
1	45	23.29%	12	17	20.94%	11	36	18.64%
7	18	23.39%	7	18	21.56%	5	6	19.67%
3	17	26.24%	1	44	21.91%	7	16	19.94%
Total	**247**	**21.00%**	**Total**	**242**	**19.36%**	**Total**	**238**	**15.35%**

Appendix 5.12 continued

Table 2 Estimated marginal means – Huddersfield females

UNI minimum			UNI most likely			UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
9	9	14778	12	4	18000	12	5	23000
11	33	15788	9	8	18563	6	7	23571
1	38	15816	6	7	18857	11	33	24061
12	5	16600	1	37	19108	1	37	24135
3	6	16667	11	33	19273	9	9	25556
2	19	16711	8	21	20714	8	18	26056
6	7	16714	2	19	21263	2	19	26895
4	19	17132	4	19	21579	3	6	29000
7	12	17333	3	6	22833	7	12	29167
8	21	17476	10	5	23600	10	5	31000
10	6	17667	7	11	23636	4	19	31895
5	11	19727	5	11	23727	5	11	35455
Total	**186**	**16645**	**Total**	**181**	**20555**	**Total**	**181**	**26807**

IRR UNI minimum			IRR UNI most likely			IRR UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
7	12	16.08%	12	4	6.00%	12	5	-1.80%
12	5	16.40%	9	7	9.43%	6	7	9.57%
10	5	16.80%	7	11	14.00%	1	32	10.69%
4	18	20.78%	5	11	17.36%	7	12	12.00%
6	7	21.00%	10	5	18.20%	9	7	12.57%
3	6	21.50%	6	7	18.57%	8	17	15.41%
9	8	23.00%	8	19	19.00%	4	18	17.89%
8	19	27.53%	1	33	20.91%	10	5	19.20%
1	34	33.29%	4	18	21.83%	3	6	20.33%
5	11	35.00%	3	6	24.67%	11	29	20.69%
11	30	36.33%	11	28	26.18%	5	11	20.82%
2	17	44.06%	2	17	43.88%	2	17	35.06%
Total	**172**	**29.49%**	**Total**	**166**	**22.45%**	**Total**	**166**	**17.22%**

Appendix 5.12 continued

Table 3 Estimated marginal means – Prague males

UNI minimum			UNI most likely			UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
10	3	18333	10	3	22667	11	8	37375
12	5	20000	11	8	26875	9	5	39000
11	8	21500	12	5	28400	4	52	40288
9	5	21600	9	5	29200	10	3	43333
4	52	23865	4	52	29481	12	5	49000
1	27	26148	1	27	31259	3	19	65895
3	19	27105	3	19	48632	1	27	76852
8	20	32050	8	20	50100	8	20	76900
Total	**139**	**25453**	**Total**	**139**	**35065**	**Total**	**139**	**56324**

IRR UNI minimum			IRR UNI most likely			IRR UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
10	3	5.67%	10	3	4.67%	9	5	4.40%
9	5	6.80%	9	5	6.00%	10	3	8.67%
4	52	11.21%	1	27	10.59%	11	8	10.13%
12	5	12.40%	4	52	10.71%	4	52	11.48%
11	8	13.63%	11	8	13.63%	12	5	21.80%
3	19	16.68%	12	5	19.20%	8	20	22.80%
8	20	25.40%	8	20	27.10%	1	27	33.00%
1	27	34.30%	3	19	36.16%	3	19	36.26%
Total	**139**	**18.39%**	**Total**	**139**	**16.70%**	**Total**	**139**	**20.65%**

Appendix 5.12 continued

Table 4 Estimated marginal means – Prague females

UNI minimum			**UNI most likely**			**UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
10	3	16000	10	3	18333	10	3	26667
9	6	17167	9	6	21833	9	6	31167
1	33	21788	3	26	25615	1	33	34606
3	26	21846	1	33	26561	3	26	34885
4	96	21943	4	96	27276	4	96	37875
8	30	23000	8	30	29300	8	29	45655
11	12	23417	11	12	29375	11	12	48750
Total	**206**	**21920**	**Total**	**206**	**27080**	**Total**	**205**	**38346**

IRR UNI minimum			**IRR UNI most likely**			**IRR UNI maximum**		
Job	N	Mean	Job	N	Mean	Job	N	Mean
10	3	8.67%	3	26	9.31%	1	33	9.18%
3	26	9.65%	10	3	9.33%	10	3	10.00%
9	6	11.83%	1	33	10.42%	9	6	11.00%
4	94	12.13%	9	6	11.50%	3	26	12.04%
1	33	12.15%	4	94	11.71%	4	94	12.83%
8	30	18.07%	11	12	16.08%	8	29	18.59%
11	12	19.17%	8	30	17.33%	11	12	23.00%
Total	**204**	**13.04%**	**Total**	**204**	**12.24%**	**Total**	**203**	**13.46%**

Appendix 5.12 continued

Table 5 Estimated marginal means – Liberec males

UNI minimum			**UNI most likely**			**UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
9	3	15333	9	3	17333	9	3	20333
11	14	18286	1	8	21750	3	4	31250
1	8	18625	11	14	21786	1	8	31500
4	19	19947	4	19	23737	4	19	32316
3	4	21250	3	4	23750	2	12	33750
2	12	22000	2	12	26417	6	5	40000
8	16	22313	8	16	28813	8	15	41133
5	6	22500	6	5	30400	11	13	42000
6	5	22600	10	6	30833	10	6	44167
7	18	24000	5	6	31667	5	6	45000
10	6	24500	7	18	31944	7	18	48722
Total	111	21288	**Total**	111	26640	**Total**	110	38855

IRR UNI minimum			**IRR UNI most likely**			**IRR UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
9	3	5.67%	9	3	6.33%	3	4	8.25%
3	4	10.75%	3	4	8.25%	9	3	9.00%
10	6	10.83%	1	8	9.38%	1	8	10.50%
4	19	11.68%	4	19	10.89%	4	19	11.79%
1	8	13.63%	10	6	11.33%	5	6	12.33%
2	12	14.00%	2	12	13.42%	2	12	13.08%
5	6	14.33%	5	6	14.67%	10	6	14.17%
11	13	15.08%	11	13	15.31%	8	16	15.20%
8	16	15.88%	8	16	16.19%	11	12	15.38%
7	18	15.89%	7	18	18.50%	6	5	18.00%
6	5	22.20%	6	5	21.60%	7	18	19.78%
Total	110	14.15%	**Total**	110	14.09%	**Total**	110	14.29%

Appendix 5.12 continued

Table 6 Estimated marginal means – Liberec females

UNI minimum			UNI most likely			UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
1	71	16815	1	71	20204	12	3	29333
3	15	17133	5	10	22000	10	11	29636
12	3	17333	12	3	22000	1	72	29931
10	11	18273	2	42	22405	5	10	30300
4	38	18289	10	11	22545	3	15	30400
2	42	18357	11	36	22639	2	41	30415
5	10	18500	3	15	22667	11	37	30730
7	34	18588	4	38	22711	7	34	31265
11	37	18595	7	34	23147	4	38	32184
8	38	19921	9	25	23960	9	25	33200
9	25	20320	6	16	24625	6	17	35353
6	17	20824	8	39	25769	8	39	37795
Total	341	18457	**Total**	340	22684	**Total**	342	31880

IRR UNI minimum			IRR UNI most likely			IRR UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
1	71	9.49%	9	25	8.96%	12	3	10.33%
2	41	9.88%	1	71	9.38%	2	40	10.40%
9	25	10.76%	2	41	9.76%	10	11	10.91%
3	15	11.13%	3	15	11.20%	9	25	11.16%
10	11	12.27%	12	3	11.33%	7	33	13.15%
12	3	12.33%	6	16	12.25%	11	37	13.95%
11	37	12.68%	10	11	12.27%	3	15	14.20%
7	34	13.74%	11	36	12.94%	5	10	14.30%
5	10	14.70%	5	10	13.70%	1	71	15.00%
6	17	15.71%	7	34	13.94%	6	17	16.35%
4	38	16.24%	4	38	14.50%	4	38	16.63%
8	38	16.34%	8	39	15.51%	8	39	19.64%
Total	340	12.57%	**Total**	339	11.96%	**Total**	339	14.43%

Appendix 5.12 continued

Table 7 Estimated marginal means – Pardubice males

UNI minimum			**UNI most likely**			**UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
3	3	18333	2	6	22333	2	6	22333
2	6	18583	4	8	23500	4	8	23500
4	8	19750	3	3	23667	3	3	23667
5	7	19786	5	7	24000	5	7	24000
1	15	20000	6	1	25000	6	1	25000
6	1	20000	9	4	25000	9	4	25000
10	5	21000	10	5	25200	10	5	25200
9	4	21250	1	14	25500	1	14	25500
8	10	24800	12	3	29333	12	3	29333
12	3	25000	8	10	30000	8	10	30000
7	8	26000	7	7	32857	7	7	32857
11	14	30929	11	14	34929	11	14	34929
Total	**84**	**23060**	**Total**	**82**	**27756**	**Total**	**82**	**27756**

IRR UNI minimum			**IRR UNI most likely**			**IRR UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
12	3	3.00%	12	3	3.00%	6	1	4.00%
2	6	5.67%	2	6	5.67%	2	5	6.60%
4	8	8.63%	4	8	8.63%	5	7	10.14%
1	15	9.07%	1	15	9.07%	3	3	10.33%
9	4	9.75%	9	4	9.75%	12	3	11.33%
10	5	10.80%	10	5	10.80%	4	8	11.75%
5	7	10.86%	5	7	10.86%	1	15	12.47%
6	1	13.00%	6	1	13.00%	10	5	14.40%
3	3	13.33%	3	3	13.33%	7	7	17.14%
7	8	13.50%	7	8	13.50%	9	4	17.75%
8	10	22.80%	8	10	22.80%	8	10	27.40%
11	14	32.21%	11	14	32.21%	11	14	28.64%
Total	84	14.96%	**Total**	84	14.96%	**Total**	82	16.98%

Appendix 5.12 continued

Table 8 Estimated marginal means – Pardubice females

UNI minimum			UNI most likely			UNI maximum		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
1	37	16892	1	37	16892	1	37	21622
8	16	17875	8	16	17875	11	32	21969
4	17	17941	4	17	17941	4	17	22118
9	24	18083	9	24	18083	10	8	22500
11	32	18156	11	32	18156	8	16	22625
2	6	18667	2	6	18667	12	4	23000
10	8	18750	10	8	18750	9	24	23208
12	4	18750	12	4	18750	5	8	24125
5	8	19000	5	8	19000	3	9	24778
3	9	19444	3	9	19444	2	6	24833
7	20	19575	7	20	19575	6	14	25000
6	14	20214	6	14	20214	7	20	26600
Total	195	**18305**	**Total**	195	**18305**	**Total**	195	**23164**
IRR UNI minimum			**IRR UNI most likely**			**IRR UNI maximum**		
Job Location	N	Mean	Job Location	N	Mean	Job Location	N	Mean
12	3	4.00%	12	3	8.33%	12	3	6.00%
1	37	9.89%	1	37	9.92%	11	32	9.56%
9	24	11.29%	11	32	11.16%	1	37	10.73%
4	17	11.82%	2	6	11.33%	4	17	10.88%
11	32	11.97%	10	8	11.50%	3	9	11.11%
2	6	12.00%	5	8	12.25%	8	16	11.13%
8	16	13.63%	4	17	12.29%	2	6	11.17%
3	9	15.33%	9	24	12.58%	9	24	12.71%
10	8	15.88%	3	9	12.67%	10	8	13.63%
6	14	17.50%	8	16	13.06%	5	8	14.00%
5	8	17.75%	7	20	13.20%	7	20	14.20%
7	20	29.40%	6	14	17.14%	6	14	18.57%
Total	194	14.24%	**Total**	194	12.09%	**Total**	194	11.96%

Appendix 5.13

Multivariate Tests					
Effect	Value	F	Hypothesis df	Error df	Sig.
Education	.923	330.535[a]	1.000	3985.000	.000
Education * Gender	.993	26.991[a]	1.000	3985.000	.000
Education * UNI	.970	41.484[a]	3.000	3985.000	.000
Education * Gender * UNI	.999	1.328[a]	3.000	3985.000	.263
Experience * Gender	.988	47.963[a]	1.000	3985.000	.000
Experience * UNI	.969	42.613[a]	3.000	3985.000	.000
Experience * Gender * UNI	.998	2.482[a]	3.000	3985.000	.059
Education * Experience	.896	463.196[a]	1.000	3985.000	.000
Education * Experience * Gender	.997	12.521[a]	1.000	3985.000	.000
Education * Experience * UNI	.991	11.850[a]	3.000	3985.000	.000
Education * Experience * Gender * UNI	.999	1.140[a]	3.000	3985.000	.331

Mauchly's Test of Sphericity							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Education	1.000	.000	0	.	1.000	1.000	1.000
Experience	1.000	.000	0	.	1.000	1.000	1.000
Education * Experience	1.000	.000	0	.	1.000	1.000	1.000

Tests of Within-Subjects Effects					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Education	9.996	1.000	9.996	330.535	.000
Education * Gender	.816	1.000	.816	26.991	.000
Education * UNI	3.764	3.000	1.255	41.484	.000
Education * Gender * UNI	.121	3.000	.040	1.328	.263
Error(Education)	120.517	3985.000	.030		
Experience	12.176	1.000	12.176	400.180	.000
Experience * Gender	1.459	1.000	1.459	47.963	.000
Experience * UNI	3.890	3.000	1.297	42.613	.000
Experience * Gender * UNI	.227	3.000	.076	2.482	.059
Error(Experience)	121.249	3985.000	.030		
Education * Experience	8.463	1.000	8.463	463.196	.000
Education * Experience * Gender	.229	1.000	.229	12.521	.000
Education * Experience * UNI	.650	3.000	.217	11.850	.000
Education * Experience * Gender * UNI	.062	3.000	.021	1.140	.331
Error(Education*Experience)	72.808	3985.000	.018		