DISSERTATIONES RERUM OECONOMICARUM
UNIVERSITATIS TARTUENSIS
18

DISSERTATIONES RERUM OECONOMICARUM
UNIVERSITATIS TARTUENSIS
18

HETEROGENEITY OF HUMAN CAPITAL AND ITS VALUATION IN THE LABOUR MARKET

KRISTJAN-OLARI LEPING

TARTU UNIVERSITY
PRESS

The Faculty of Economics and Business Administration, the University of Tartu, Estonia

This dissertation is accepted for the defense of the degree of Doctor of Philosophy (in Economics) on Feb 20nd 2008 by the Council of the Faculty of Economics and Business Administration, the University of Tartu.

Supervisors: Professor Raul Eamets (Ph.D), University of Tartu, Estonia,
Associate Professor Štepan Jurajda (Ph.D), CERGE-EI, Czech Republic

Opponents: Professor Karsten Staehr (Ph.D), Tallinn University of Technology, Estonia
Professor Mihails Hazans (Ph.D), University of Latvia, Latvia

The public defense of the dissertation is on May 14nd 2004 at 14.15 in room B306, Narva Rd. 4, Oeconomicum, the University of Tartu.

The publication of this dissertation is granted by the Faculty of Economics and Business Administration, the University of Tartu.

ISSN 1406–1309
ISBN 978–9949–11–841–0 (trükis)
ISBN 978–9949–11–842–7 (PDF)

Tartu Ülikooli Kirjastus
www.tyk.ee
Tellimus nr 137

TABLE OF CONTENTS

A LIST OF THE AUTHOR'S PUBLICATIONS AND CONFERENCE PROCEEDINGS

I. Chapters in monographs

1. **Leping, K.-O.** (2005); **"**Inimkapitali ja palga seosed Eestis ning nende dünaamika" (Human capital and wage relations and dynamics in Estonia). In "Majandusteadus ja haridus Eestis" (Economics and education in Estonia). Tartu: Tartu Ülikooli Kirjastus, 2005, pp. 15–44.

II. Articles in international journals

1. **Leping, K.-O.** (2006); "Evolution of the Public–Private Sector Wage differential during Transition in Estonia", *Post-Communist Economies*, Vol. 18, No. 4, pp. 419–436.

III. Other research articles

1. **Leping, K.-O.** (2006); "Differences in occupational mobility between public and private sector during transition in Estonia", *Procceedings of University of Tartu and Tallinn University of Techonology Doctoral School in Economics Doctoral Summer School 2006*, 23p
2. **Leping, K.-O.** (2007); "Fringe benefits as an explanation for the unexplained black-white wage gap in U.S", *Procceedings of University of Tartu and Tallinn University of Techonology Doctoral School in Economics Doctoral Summer School 2007*, 22p.

Working Papers

3. **Leping, K.-O.** (2005); **"**Public-private sector wage differential in Estonia: evidence from quantile regression," *University of Tartu (Estonia), Faculty of Economics and Business Administration Working Paper* , No.39, 43 pp.
4. **Leping, K.-O.** (2006); "Measuring the Specificity of Human Capital: a Skill-based Approach," *Tallinn University of Technology, School of Economics and Business Administration Working Paper* , No.134, 17 p.
5. **Leping, K.-O.,** Toomet, O. (2007); "Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition", *University of Tartu (Estonia), Faculty of Economics and Business Administration Working Paper*, No.53, 56 p.
6. **Leping, K.-O.** (2007); "Racial Differences in Availability of Fringe Benefits as an Explanation for the Unexplained Black-white Wage Gap for

Males in U.S.", *University of Tartu (Estonia), Faculty of Economics and Business Administration Working Paper*, No.57, 39p.

IV. Conference publications

1. **Leping, K.-O.** (2004); "Aktiivne tööpoliitika ja selle hindamine Eestis – Eesti majanduspoliitilised perspektiivid Euroopa Liidus" (Active labour market policy and its valuation in Estonia), in *Economic Policy Perspectives of Estonian in the European Union. Reports-papers of the XII Scientific and Educational Conference* (Tartu-Värska 1–3 July 2004), Tallinn, Berlin: Mattimar OÜ, Berliner Wirtschafts Verlag, pp. 231–236.
2. **Leping, K.-O.,** Eamets, R. (2005)**; "**Töötajate koolitamine erasektoris Järvamaa ettevõtete näitel." (Training of employees in the private sector: The case of Järva county), in *Reports-papers of the XIII Scientific and Educational Conference* (Tartu-Värska 30 June –2 July 2005), Tallinn, Berlin : Mattimar OÜ, Berliner Wirtschafts Verlag, pp. 388–397.
3. **Leping, K.-O.** (2006); "Public sector support to adult job training in Estonia," in *Reports-papers of the XIV Scientific and Educational Conference* (Tartu-Värska 29June.–1 July 2006), Tallinn, Berlin: Mattimar OÜ, Berliner Wirtschafts Verlag, pp.478–496

V. Conference presentations

1. **Leping, K.-O.** "Aktiivne tööpoliitika ja selle hindamine Eestis – Eesti majanduspoliitilised perspektiivid Euroopa Liidus" (Active labour market policy and its valuation in Estonia), XII Scientific and Educational Conference "Economic Policy Perspectives of Estonian in the European Union", Estonia, Tartu-Värska, 1–3 July 2004.
2. **Leping, K.-O. "**Public-private sector wage differential in Estonia: evidence from quantile regression,", 3rd Helsinki – Tartu Symposium in Economics, Finland, Helsinki, 13–14 May 2005.
3. **Leping, K.-O.** "Töötajate koolitamine erasektoris Järvamaa ettevõtete näitel." (Training of employees in the private sector: The case of Järva county), XIII Scientific and Educational Conference*,* Estonia, Tartu-Värska 30 June– 2 July 2005.
4. **Leping, K.-O. "**Public-private sector wage differential in Estonia: evidence from quantile regression," University of Tartu and Tallinn University of Techonology Doctoral School in Economics Doctoral Summer School 2005*,* Estonia, Kääriku, 1–3 August 2005.
5. **Leping, K.-O.** "Ettevõtete koolitusvajadus ning koolituse korraldamine Järvamaa ettevõtete näitel" (Demand for training and implementation of

training in firm level at Järva county), Seminar "Life-long learning: A chance for everyone", Estonia, Pärnu, 12 October 2005

6. **Leping, K.-O.** "Measuring the Specificity of Human Capital: a Skill-based Approach,", Reasearch Seminar of the," University of Tartu and Tallinn University of Techonology Doctoral School, Estonia, Tallinn, 18 November 2005.
7. **Leping, K.-O.** "Measuring the Specificity of Human Capital: a Skill-based Approach," Annual Conference of the Estonian Economic Association, Estonia, Pärnu, 20– 22 January 2006
8. **Leping, K.-O.** "Measuring the Specificity of Human Capital: a Skill-based Approach," EQUALSOC EMPLOY Reasearch group meeting, Italy, Turin, 25– 27 January 2006
9. **Leping, K.-O.** "Inimkapitali ja palga seosed regionaalsel tasandil"(Relationship between human capital and wage at the regional level), XVIII Conference of the The Estonian Statistical Society, Estonia, Paide, 16 May 2006.
10. **Leping, K.-O.** "Täiskasvanuhariduse rahastamine Euroopa riikides" (Financing adult education in the European countries), IV Adult Education Pre-forum, Estonia, Tartu, 14 June 2006.
11. **Leping, K.-O.** "Public sector support to adult job training in Estonia", *XIV Scientific and Educational Conference*, Estonia, Tartu-Värska, 29 June–1 July 2006.
12. **Leping, K.-O.** "Differences in occupational mobility between public and private sector during transition in Estonia", University of Tartu and Tallinn University of Techonology Doctoral School in Economics Doctoral Summer School, Estonia, Nelijärve, 30 July– 2 August 2006
13. **Leping, K.-O.** "Unexplained Wage Gap and the Role of Ethnical Groups: Estonia During the Political and Economic Transition" Annual Conference of the Estonian Economic Association, Estonia, Pärnu, 12–13 January 2007.
14. **Leping, K.-O.** "Racial Differences in Availability of Fringe Benefits as an Explanation for the Unexplained Black-white Wage Gap for Males in U.S.", University of Tartu and Tallinn University of Techonology Doctoral School in Economics Doctoral Summer School, Estonia, Kääriku, 30 July– 2 August 2007
15. **Leping, K.-O.** "Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition", 22nd Annual Congress of the European Economic Association, Hungary, Budapest, 27–31 August 2007.
16. **Leping, K.-O.** "Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition", Annual Conference of The European Association of Labour Economists, Norway, Oslo, 20–22 September 2007.
17. **Leping, K.-O.** "Non-Estonian Entrepreneurship in Estonia: Language, Culture, and Ethnicity", Annual Conference of the Estonian Economic Association, Estonia, Pärnu, 22– 23 January 2008.

INTRODUCTION

Structure

This thesis consists of the theoretical and empirical background for the research and four chapters. Each chapter corresponds to a single study, which has its own research task and results. The studies, which make up the chapters, are referred to in text below using the following Roman numbers, and they are as follows.

I. Measuring the Specificity of Human Capital: a Skill-based Approach
II. Evolution of the Public-Private Sector Wage Differential during Transition in Estonia
III. Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition
IV. Racial differences in availability of fringe benefits as an explanation for the unexplained black-white wage gap for males in the US

The importance of the topic

This dissertation studies the heterogeneity of human capital and its valuation on the labour market. Human capital is the most important determinant of labour productivity. In the case of perfect competition, which is often assumed or viewed as a benchmark case in the literature, the marginal product of labour, which is determined by human capital, equals the employee's wage. If that is the case, then differences in the stock of human capital among employees will reflect the differences in their wages. This kind of approach has been widely used to explain wage differences between individuals. This kind of analysis requires that human capital is measured correctly. But, human capital is heterogeneous by nature and measuring it is not an easy task. Most of the existing literature does not turn much attention to the correct measurement of human capital, but uses relatively simple proxies for that purpose. Therefore, the problem that human capital is measured incompletely or incorrectly is present practically for every existing analysis of wage differentials. So, the quality of the research in that area would benefit from the development of better measures of human capital and especially its heterogeneity.

Besides differences in human capital, several other factors exist that affect wages. Therefore, it is possible that human capital among employees with equal productivity is valued heterogeneously on the labour market. This would lead to the presence of wage gaps in the labour market, such as gender, ethnic, union and public-private sector wage gaps. Furthermore, as employees are not only compensated for their labour with wages, but also with fringe benefits, the heterogeneity in the valuation of human capital will lead to similar gaps in the availability of fringe benefits.

This study does not aim to cover all aspects of the complex topic of the heterogeneity of human capital and its valuation on the labour market, but instead it focuses on the following areas:

- human capital specificity
- public-private sector wage gap
- ethnic wage gap
- ethnic fringe benefit gap

This dissertation fills several gaps in the existing literature in these four areas.

In the area of human capital specificity, the classical distinction between general and specific human capital presented by Becker (1962,1964) has prevailed as a dominant approach for at least three decades. Becker himself noticed that in practice human capital in most cases is neither completely general nor specific to a single firm as assumed in the original theory. Still, the overwhelming majority of the following research has not challenged the theory of firm-specific human capital. Only during the last 10 years have some new theoretical viewpoints of the human capital specificity been proposed; for example, the idea that human capital is industry-specific (Neal 1995, Parent 2000), occupation-specific (Kamburov and Manovskii, 2002) or task-specific (Gathmann and Schönberg, 2006; Poletaev and Robinson, 2006). Lazear (2003) has developed a skill-weights approach to human capital.

As these new theoretical considerations of human capital view human capital as not completely firm-specific or general, this leads to questions about how specific human capital is and how to measure the specificity of human capital. In earlier studies, it has been common to use the years of formal schooling or job market experience as a measure of general human capital, and length of tenure as a measure of specific human capital. These kinds of measures are suitable if the individual's human capital can be split into completely general and specific components, but as the new theories do not assume the presence of such an option, there is a need for new and more flexible measures of human capital. Some authors have proposed alternative methods of measuring human capital specificity through the length of vocational adjustment (Frank 2003) or observed skill characteristics (Ingram and Neumann 1999). Still, these measures are not directly linked to the most up-to-date theoretical concepts of human capital specificity, such as task-specific human capital or the skill-weighted approach. Therefore, there is work to be done in developing new and better ways of measuring human capital specificity.

The ability to precisely measure the human capital of workers is a key issue for the correct identification of wage gaps between specific groups of workers, such as males and females, members of different ethnic groups etc. An important related research question is to what extent the observed wage differences between groups of workers reflect differences in human capital (both general and specific). This question has been asked for example for gender, ethnic, union-non-union and public-private sector wage differences.

In the case of the public-private sector wage gap extensive empirical work has been completed for the US and Western European countries, but research based on the data from Central and Easter European countries has been rather limited. There are some studies for these countries; for example, for Serbia (Reilly 2003) and Poland (Adamchik and Bedi 2000), but this research is based on datasets that cover only a single year. These articles, therefore, do not provide much information about the evolution of wage differentials during the transition period, nor do they give a sufficient answer to the question of how transition affects public–private sector wage differentials. As employment in the public and private sectors and economic conditions can change rapidly during transition, it is likely that a public-private sector wage gap exists. Therefore, it will be beneficial to investigate the evolution of the public-private sector wage differential over the whole transition period. Estonia provides a good opportunity for that kind of research because the Estonian Labour Force Survey provides suitable data covering the whole transition period.

Turning to the analysis of ethnic wage gaps, there is great deal of research about the US and Western European countries, but not much research has been done on transition economies. Yet these countries offer interesting opportunities for research. They have been subject to shocks that have changed the social and economic position of ethnic minorities and majorities, as well as the structure of the economy. To a certain extent, the rapidly changing roles of ethnic groups serve as a natural experiment here, allowing us to shed new light on the relationship between status and wages in different ethnic groups.

Estonia makes a good case for studying the effect of transition on the ethnic wage gap. Firstly because, as opposed to many other countries that have several small ethnic minority groups, Estonia has a single Russian-speaking minority. Secondly, this minority group is of a relatively large size – 30% of the total population. Thirdly, the Estonian Labour Force Survey enables us to analyse the ethnic wage gap in Estonia during the whole transition period, while most of other studies conducted on the example of Central and Eastern European countries (e.g. Giddings (2002) for Bulgaria and Orazem and Vodopivec (2000) for Estonia and Slovenia) are based on short time periods.

Analysing the ethnic gap in fringe benefits and its effect on the ethnic wage gap is so far to a large extent an unexplored area. The vast majority of the present research about the labour market performance of different ethnic groups only looks at wages and neglects the presence of fringe benefits. According to the compensating wage theory (Eberts and Stone 1985), employees may be compensated for lower wages by a higher access to fringe benefits. Therefore, the ethnic fringe benefit gap could explain the ethnic wage gap. Despite this possibility, this issue has not been noticed by researches of ethnic wage gaps, while some authors have investigated the effect of fringe benefits on the gender wage gap (Solberg and Laughlin 1995) and the union wage gap (Budd 2004). The analysis of ethnic fringe benefits gaps has generally been limited to the

availability of health insurance in the US, but the ethnic gap for other fringe benefits has not yet been explained.

The US provides a useful case for studying ethnic fringe benefits gaps, as there are good datasets on the availability of different fringe benefits, such as the National Longitudinal Survey of Youth. Additionally, the US black-white wage gap is probably the most extensively investigated ethnic wage gap, but how ethnic differences in fringe benefits could affect the corresponding wage gap has not been explained.

The aim and research tasks

The aim of the dissertation is to study the heterogeneity of human capital and its valuation on the labour market. For most of the empirical analysis, Estonia is used as an example, except for one study, which is based on US data. Although most of the analysis is conducted on Estonian data, the aim of this research is to contribute to the literature on this topic generally.

The research tasks of the four studies that make up the dissertation are as follows:

The first research task is to develop a skill-based measure of the specificity of human capital. That measure will be applied to Estonian data and its validity will be tested (Study I).

The second research task is to estimate the public–private sector wage differential in Estonia during the entire transition period from early transition to EU accession. Additionally, the effects of the transition process, and business and political cycles on the public-private sector wage differential are also to be analysed (Study II).

The third research task is to analyse the unexplained wage gap between Estonian and ethnic minority groups in the Estonian labour market during the transition period from 1989 to 2005 (Study III).

The fourth research task is to analyse the black-wage wage and fringe benefits gaps and to estimate the compensation gaps in order to explore whether ethnic differences in the availability of fringe benefits could provide an explanation for the existence of the unexplained black-white wage gap in the US (Study IV).

Data and methods used in the research

Study I uses data collected from an internet-based job vacancy database, which is situated at the website www.hyppelaud.ee. This website is the largest on-line job search site in Estonia. Here employers can advertise vacancies and job seekers can apply for these vacancies online. Study I utilises information about 1268 job advertisements, valid in the period from 10 August 2005 to 20 August

2005. For each vacancy there is information about the occupation, job location, industry, required educational level and previous work experience, length of hours, salary, required skills and provision of on-the-job training.

Studies II and III use data from the Estonian Labour Force Survey (ELFS). The ELFS was first conducted in 1995. The first wave includes a retrospective part where labour market history is observed as far back as in 1989. The next survey was conducted in 1997 and thereafter the survey was conducted as an annual cross-section until 2000. Since that year, the survey was shifted to a rotating panel sampling scheme, conducted quarterly. The different waves mostly include similar information, although details may vary. The number of annually sampled individuals varies from between approximately 5000 (1997 wave) and 16000 (from 2000 onwards), resulting in around 3000 males annually with a positive income. The ELFS sample includes permanent residents of the country aged between 15 and 74. The 1995 sample of ELFS was based on the 1989 nationwide census database. Hence, it does not include people, who arrived, or left the country between 1989 and 1994. For later years, the sample is based on the data from the Population Register. The ELFS makes it possible to investigate wages and their determinants at the micro level over the whole transition period in Estonia. Study II uses ELFS data for the period from 1989 to 2004 and study III uses data from 1989 to 2005.

Study IV uses data from the National Longitudinal Survey of Youth 1979 (NLSY79). This is a US panel data set of 12,686 individuals born between 1957 and 1964. Until 1993, the respondents were interviewed annually, in the later periods bi-annually. The NLSY79 provides information about wages and fringe benefits available to individuals as well as various characteristics such as education, socio-economic background and characteristics of his/her job and employer. In Study IV, data from the 2004 round of NLSY79 is used.

In study I, measures of human capital specificity are calculated using data about the required skills in the job advertisement. The average values of these specificity measures are calculated for different skills, occupations and industries. To test the validity of the human capital specificity measure, ordinary least squares (OLS) regressions are used.

In Study II quantile regressions are applied to analyse the public-private sector wage gap. This method enables us to estimate the wage effect of being employed in the public sector for portions of the wage distribution. An OLS regression is used to analyse the institutional determinants of the public-private sector wage gap.

Studies III and IV use the Oaxaca decomposition method to analyse ethnic gaps in wages and fringe benefits. This method enables us to divide the wage and fringe benefits gaps into two different components – explained and unexplained. The first component shows the part of the gap caused by differences in the characteristics of two ethnic groups. The second component shows the part of the gap caused by differences in the valuation of characteristics of the two ethnic groups.

Acknowledgements

I have received support from many people and institutions in preparing my dissertation. First of all I would like to thank my supervisors Raul Eamets and Štepan Jurajda.

The articles have benefited from useful comments made by several people. Study I has benefited from comments by an anonymous referee, Raul Eamets and Urve Venesaar. Study II has benefited from comments by an anonymous referee and Raul Eamets. Study III has benefited from comments by Raul Eamets, Ott-Siim Toomet, Jaan Masso, Štepan Jurajda, Jan Svejnar, Anthony Heath and Aslan Zorlu. Study IV has benefited from comments by Raul Eamets, Tõnu Roolaht, Epp Kallaste, Sten Anspal, Štepan Jurajda and Lawrence Smith. I am also thankful to a great number of people, who made comments on these papers at various seminars and conferences.

I would like to thank the Faculty of Economics and Business Administration and Pärnu College at the University of Tartu for financial support. I am also very grateful to Estonian Science Foundation Grant No. 6479,"The Valuation of Human Capital in the Estonian Labour Market: Issues of Over-education and Skill Mismatch (2005–2008)", for its support.

The research in the dissertation would not have been possible without good data. I would like to thank Indrek Seppo, Varje Tugim and Tõnu Ruut for preparing the data.

Finally, I would like to thank my parents, friends and colleagues for their support and encouragement during my doctoral studies.

The author is responsible for all possible mistakes and errors in the dissertation.

1. THE THEORETICAL AND EMPIRICAL BACKROUND FOR THE RESEARCH

1.1. Heterogeneity of human capital

1.1.1. The concept and heterogeneity of human capital

The concept of human capital is more than three centuries old. References to it are found in economics writings dating back to 1691 when Adam Petty made attempts to estimate the monetary value of human beings. His estimations of human capital were based on the differences between the total national income and the national capital income (Kiker, 1966).

Among the early economists, Adam Smith was probably the one who made the most significant contribution to the topic. He noticed the importance of education on economic development and as he saw capital as a determinant of a nation's economic success, he included human capital. He defined four different types of capital: 1) useful machines, instruments of the trade; 2) buildings as the means of procuring revenue; 3) improvements of land and 4) human capital. According to his conception human capital consisted of skills, dexterity and judgment (Smith, 1776).

Several other early economists including Jean Batiste Say, Nassau William Senior, Friedrich List, Johann Heinrich von Thünen, Leon Walras and Irwin Fischer conducted research on the topic of human capital. Human capital was accounted for in investigations of a variety of economic problems, including describing the economic power of different countries, estimating the cost of warfare, the design of just tax systems and estimating the value of human life for legal purposes. Early research on human capital was not very systematic and the concept of human capital was not fully explored by these economists. Not all the authors fully recognised the implementation of the concept of human capital. For example, Marshall regarded the concept of human capital unrealistic, as according to his viewpoint capital had to be marketable, but human beings are not (Kiker, 1966).

In modern economics, the concept of human capital was introduced in the early 1960s with the writings of Becker (1962, 1964), Schultz (1961, 1962) and Mincer (1958, 1962, 1974). Since the re-birth of the concept of human capital there has been an explosion in the amount of human capital related scientific work. Estimations of the returns on education and explaining wage determination and income inequality are probably the most common applications of the human capital related theories, but besides these this concept is applied to an array of very different topics. For example, economic growth has been described according to investments in human capital (Arrow, 1962), human capital spillovers (Romer, 1986) in endogenous growth models and measures of

human capital have been used to describe human development and quality of life (Lind, 1992).

Human capital has been defined in different ways. The earlier concepts of human capital were rather narrow and limited human capital only to education. Shultz (1960) stated: "I propose to treat education as an investment in man. Since education becomes a part of the person receiving it, I shall refer to it as human capital." More recent definitions view human capital more broadly. For example, McConnell, Brue, and Macpherson (1999: 614) state that human capital is "the accumulation of prior investments in education, on-the-job training, health, and other factors that increase productivity". Hamermesh and Rees (1988: 63) define it as "All acquired characteristics of workers that make them more productive". Some recent definitions are even broader as they do not limit the returns from it solely to productivity. The OECD definition views human capital as "the knowledge, skills and competencies embodied in individuals that facilitate the creation of personal, social and economic well-being (OECD 2001:18). Laroche et al. (1998: 89) have gone even further in widening the definition of human capital as they have included innate abilities. They define human capital as the "aggregation of the innate abilities and the knowledge and skills that individuals acquire and develop throughout their lifetime".

Regardless of the definition of human capital, it could be first concluded that all these definitions consider some kind of human characteristics to be a type of capital. In modern economic theory, capital is one of the production factors and it could be defined as produced commodities that are used in the production of other goods and services. This kind of capital could also be referred to as physical capital. Although human capital theory is to a great extent based on similarities between human and physical capital, there exist some limitations to this similarity. First, human and physical capital differ with respect to property rights. Skills and knowledge are embodied in human beings. Therefore, in the absence of slavery, when human beings are non-tradable, there exists no market where human capital could be traded. Secondly, there exist several differences in the process of accumulating physical and human capital. The accumulation of human capital includes a social aspect that is much less present in the accumulation of physical capital. Investments in human capital in the form of schooling or training usually include social interaction of some type (Lucas, 1988). In most cases, the accumulation of human capital is also more labour-intensive in comparison to the accumulation of physical capital. Thirdly, as opposed to physical capital, not all investments in human capital are made exclusively by the owners of human capital. During the early life, it is parents that mainly make human capital investments. Fourthly, the fact that human capital is not tradable requires that its mobility could only result through the movement of its owner, whereas physical capital could change location through a change in its ownership (Laroche et al. 1998). Fifthly, the channels of depreciation for each of the two types of capital are different to some extent.

Although both types of capital depreciate due to technological progress, which happens when new and improved ideas and technology become available, human capital depreciates when it is idle. Human capital also depreciates completely with the death of its owner, which is not the case for physical capital.

Human capital is related to intellectual and social capital. At the individual level, the productive characteristics of an individual make up the stock of human capital. At the organisational level, not only the human capital of employees, but also structural capital, which consists of process descriptions, databases, manuals, networks and so on, is a component of the organisation's productive knowledge (Stewart, 1999). If all employees left the organisation then human capital would disappear, but the structural capital, which is independent of the existence of the employees, would remain. The sum of the human and structural capital is referred to as intellectual capital. Thus, at the organisational level, human capital is a component of intellectual capital.

Although there exits a broad variety of definitions of social capital, in many cases social capital refers to connections between individuals, social networks and norms. Social capital exists in connection with human capital through its effect on investments in human capital. Learning activities are usually more efficient when they are done in groups.

Human capital is heterogeneous in various ways. First, its heterogeneity arises from the variety in the components of human capital. As human capital covers very different activities (formal schooling, on-the job training, pre-school education, health, migration etc.), then it is clear that all of these have a different effect on the individual's performance on the labour market. The number of components that human capital includes depends on how human capital is defined. But even if it is defined in a narrow sense, in almost all cases it includes skills and knowledge accumulated through formal education. Actually, one of the starting points in the development of modern human capital theory was the estimation of the effects of formal education on wages (Mincer, 1958; Becker, 1962). But as it was recognized that employee wages rise with age, and so it was clear that formal education could not be the only component of human capital (Mincer, 1962). Skills and knowledge are acquired through work experience. This happens through on-the-job training, either in the form of participation in training programs or through learning-by doing. Besides different skills and knowledge acquired, the health of individuals is also often considered to be a part of human capital. The productivity of labour depends on the individual's health, as healthier workers produce more for a number of reasons – increased strength, attentiveness, stamina, creativity and so forth. Health was first treated as human capital by Mushkin (1962). Grossman (1972) has studied this concept more widely and created a model that explains demand for health as human capital. As with participation in education, healthcare could also be seen as investment in human capital. Some authors also include migration in the concept of human capital. This idea was introduced by Sjaastad

(1962), who generated a framework for analysing the costs and returns from migration. Childcare could be also considered to be a component of human capital as it could be seen as the transfer of human capital from the parents to the children. There is much evidence that parents have a strong influence on the human capital of their children (Oreopoulos et al. 2003, Black et al. 2005).

Secondly, there exists a great deal of variety in the broad components of human capital listed in the previous paragraph. For example, if we consider formal education, then there exists a variety of different educational levels. Education includes both primary schooling and PhD programs. Even at the same educational level there exist different fields of study and of different programmes as for example there exist PhD programs both in political science and biology. In practice, the heterogeneity in fields of study results in different economic returns from different fields of study (Koch, 1972). Similarly, on-the-job training includes very different training programmes and healthcare includes a variety of medical treatments.

Thirdly, the heterogeneity of human capital can be the result of differences in the quality of human capital. Human capital does not only have its quantitative, but also qualitative aspects. If we consider education, then even in the case of similar fields of study and formal qualifications, there could exist qualitative differences. For example, a bachelor degree in economics could be obtained from a variety of universities and colleges. Despite the formal requirements that apply to BA programs, the content of the curricula and teaching quality could vary to some extent. The seminal work addressing the issue of school quality in the sense of the quality of human capital was conducted by Welch (1966). Schooling quality is usually measured by the school inputs. The most frequently used school inputs include student/teacher ratios, teachers' salaries, teaching costs per student and the qualification of teachers (e.g. Card and Cruger, 1992). In some other cases, aptitude and achievement test scores are used for that purpose (Brown and Corcoran, 1997).

Finally, the heterogeneity of human capital could result from the heterogeneity of opportunities for utilising the increased productivity acquired from the investment. Not all skills and knowledge are productive in all firms and occupations. This kind of source of heterogeneity of human capital is called the specificity of human capital. The issue of the specificity of human capital is discussed in detail in the following chapter.

1.1.2. The specificity of human capital

The concepts of general and specific human capital were introduced by Becker (1962, 1964). According to his work, completely general human capital increases the individual's labour productivity by exactly the same amount in all firms. General human capital consists of skills that could be exploited everywhere. Most of the basic skills are general; for example, literacy affects

productivity in almost every job. Besides general skills, there exist second type of skills that do not increase productivity in all firms and these skills are referred to as specific human capital. In the case of a completely specific human capital, this affects productivity only in a single firm. That kind of human capital is also referred to as firm-specific human capital. For example, the knowledge and skills to operate a certain kind of machine, which is only used in one firm, is completely firm-specific human capital.

The concepts of general and specific human capital are used to analyse a variety of economic problems. Probably the most important of them is financing the investment costs of human capital. The main implication of Becker's standard theory is that under the conditions of perfect competition on the labour market, firms do not have any incentives to finance investment in their employees' general human capital, but it could be profitable for them to finance investment in specific human capital. The intuition behind this result is the following. In the existence of perfect competition on the labour market, the equilibrium condition is that the employee's wage rate is equal to the value of the employee's marginal product. Investment in general human capital will increase the employee's marginal product for all firms at an equal rate. Investment in specific human capital will increase the employee's marginal product only for a single firm. That will lead to a situation where if a firm invests in an employee's firm-specific skills then his marginal product in that particular firm will be higher than in other firms. It is then possible to pay wages lower than the employee's marginal product without the risk of the employee quitting the job as long as the wages are higher than the market wage outside that firm. So it will be possible for a firm to earn rents on an employee's specific human capital. As there is no such opportunity for general human capital, and as investment in human capital is costly, then employers have no incentive to invest in their employees' general human capital. Upon these theoretical considerations Hashimoto (1981) has developed a theoretical model for sharing the costs of investments in specific human capital between firms and employees.

According to Becker (1962), if firms offered their employees training programs that developed general skills, then it could only occur where the employee bears the cost personally, and this could result in the employee being paid a wage below his or her marginal product in order to cover the training costs. But in contradiction to Becker's theory, it has been empirically observed that participation in general training programs does not lead to a decline in wages for the participant in many cases (Parsons 1989, Holzer 1990). This has led to the development of further explanations for why it could be profitable for firms to invest in general human capital.

This kind of literature questions the presence of prefect competition on the labour market, and explains that some kinds of market frictions exist, which make it profitable for firms to invest in employees' general human capital. Acemoglu and Pischke (1999) argue that transaction costs and imperfect

competition on the labour market can lead to a compressed wage structure, where more skilled workers are paid less than their marginal product, which enables firms to earn rents on labour. Katz and Ziderman (1990) have explained the possibility for firms to earn rents via the presence of informational imperfections on the labour market. They suggest that information asymmetry may arise, as the skills of employees are not fully visible. The initial firm that employs the worker has better information about the skills of the worker than the other firms. Therefore, it is possible that after investing in the employee's general human capital, other firms may not fully recognize that the employee's marginal product has increased. Under such circumstances employees may not have any incentive to quit their jobs after receiving general training as it is possible that training raised the productivity, but not the marketability and wages of the employees.

Externalities could be an additional explanation for firm-financed general human capital. It may happen that investments in human capital have spillover effects inside firms. In that case the general human capital of some workers could increase the productivity of other workers. The most well known example of this phenomenon is network externality. This may occur, for example, if some workers are taught to use information and communication technology, which is an investment in general human capital as these skills are productive in many firms. After the completion of a training program, the worker's increased knowledge in handling such technology could improve the overall speed and quality of communication in the company and so the productivity of other employees may also increase (Bishop 1997). Burdett and Smith (1996) considered the cost to employers of finding new workers and to employees of finding a new job. These costs create a matching externality and could lead to a situation where wages could be lower than the marginal product, which would again provide an incentive for employers to finance investment in general human capital.

General training can also be complementary to other types of investments, like specific training and investments in physical capital. If investments in general training increases the rate of return on investments in physical capital, then it will enable firms to earn profits to cover the costs of general training (Galor and Moav 2004). Similarly, Casas-Arce (2004) has shown that if investments in general and specific human capital are complementary in the sense that one activity raises the returns from the other, then it provides incentives for firms to invest in general human capital.

Financing investments in general human capital can also be profitable for firms in the case of liquidity constraints for employees. Unlike physical capital, human capital cannot be used as collateral for a loan when financing human capital investments. Furthermore, the employers have better information than the bank about the potential that employees have of achieving higher levels of productivity after the training programme. If that kind of information asymmetry is present, then employers could act as a credit institute on the

employee's behalf. In that case firms will not decrease wages during the specific training, but will postpone wage increases after completion of the training in order to earn rents to cover the cost of training plus interest on the loan (Ericson, 2005).

In reality many training programs include the development of both general and specific skills. Although it was already noted by Becker (1962) that in most cases training is neither completely general nor specific, during the following decades in the majority of the theoretical models only completely specific or general training is considered. One of the exceptions to that case is a paper by Acemoglu and Pischke (1999), who have shown that if specific human capital is complementary to general human capital in the sense that investments in them are embodied in the same training program, then the employees' marginal product increases more than his wage. This will give the employer another incentive to finance general training.

Besides the previously discussed idea that financing human capital investments explains the fact that wages increase with tenure, there is also a second well-known concept of firm-specific human capital. Several empirical papers have found support for a positive relationship between wages and tenure (Abraham and Farber 1987, Topel 1991, Lynch 1992). As specific human capital increases with tenure, then the effect of tenure on wages is related to the effect of specific human capital on labour productivity. In a similar way, wage decreases for displaced workers could be explained by firm-specific human capital. In new jobs, the productivity and hence the wage of the worker will be lower because the specific human capital will not be productive any more.

Third, specific human capital is related to labour turnover. As specific training increases the difference between the employees wage in the present firm and potential wage in other firms, it decreases the employees' incentives to quit jobs and thus reduces labour turnover. Parsons (1972) was one of the first researchers to find support for these propositions. Jovanovic (1979) has developed a well-known model of labour turnover, where he has linked the concept of human capital specificity to job search theory.

Upon the previously described fact that human capital is not usually specific only to a single firm, several other types of concepts of specific human capital have developed besides firm-specific human capital. Some authors argue that human capital is not specific to firms but industries. Neal (1995) was the first one to state that in many firms industry specific skills could be the most important parts of the employees' human capital. He used data about wage changes for displaced workers and finds that displaced workers that find new jobs in their pre-displacement industry will have higher rates of return on their experience and tenure than displaced workers that find a new job in a new industry. He argues that this result shows that workers that do not switch industry receive compensation for the skills, which are not general of specific to a single firm, but to a set of firms within one industry. Parent (2000) found additional support for the importance of industry-specific human capital – he

found that if industry specific experience is accounted for in wage equations, then wages do not depend on general tenure. This result means that in the case of wage and productivity it is the industry-specific and not firm-specific human capital that matters. Additionally, industry specific human capital is argued to be an important determinant of inter-industry wage mobility (Weinberg 2001, Tang and Tseng 2004).

Kamburov and Manovskii (2002) have developed the concept of occupation-specific human capital. According to their view it is not likely that human capital is specific to the industry the employees work in rather than the type of work they do (their occupation). The reason for human capital to be occupation-specific could be the fact that very different occupations exist within a single industry and at the same time there can be quite similar occupations across different industries. In contrast to Neal (1995) and Parent (2000) they find that it is the occupational experience and not industry specific experience that affects wages.

Gathmann and Schönberg (2006) argue that human capital is task-specific (alternatively they refer to it as skill-specific). According to their view, output in a certain occupation is produced by performing different tasks. The tasks (or skills) are general by nature as they are productive in different jobs. Occupations differ in terms of the tasks they require and in the relative importance of each task for production. Human capital, which is accumulated by working in a certain occupation, is specific to the extent that occupations place different values on combinations of skills. Poletaev and Robinson (2006) conducted tests similar to Neal (1995) and found support for the theoretical consideration that human capital is skill-specific. Lazear (2003) adopted a skill-weights approach to human capital. This is similar to the concept of task-specific human capital as in his model skills are general, but they affect productivity differently in different jobs. For each job there exists a set of skills that affect productivity. The same skills are productive in other jobs too, but at a different rate. The marginal product and hence the wage in a certain job depends on the skill-weights of a particular job. So, according to this theoretical approach wages depend on different skills like the weighted sums of marginal products of different skills. Upon his theory, Lazear has made a number of predictions about wage losses from job change, tenure effects and the provision of firm-paid training. Backers-Kellner and Mure (2004) have conducted several empirical tests that add support to the skill-weights theory.

Several authors have considered human capital to be location-specific to some extent. In some cases the term region-specific human capital is used. Location-specificity of human capital has been widely used in the literature of migration. The possibility that some skills may be specific to a geographic location was already acknowledged by Sjaastad (1962), Becker (1964) and DaVanzo (1983). There exist several explanations why human capital can be location-specific. For example, agricultural production technologies and know-how are dependent on the local climate, soils and so on (Rosenzweig and

Wolfpin 1983). Chiswick (1978) views language skills as location-specific human capital and sees the lack of these skills as the reason for the poor labour market performance among immigrants.

Cingano (2003) has considered human capital to be specific to industrial districts. According to his approach, human capital is specific to a set of firms that operate in relatively homogenous activities. These kinds of sets of firms are identified through their geographic location in districts that specialise in certain economic activities. His results indicate that industrial district specific experience does not have significant wage effects. As his approach combines the concepts of industry and location specific human capital then on the one hand, these results are contradictory to the previous findings about the importance of industry-specific human capital, but on the other hand these findings indicate the irrelevance of location-specific skills.

Culture-specific human capital consists of skills that are productive in a certain cultural environment. They may include knowledge about cultural traditions, social norms etc. Culture-specific and location-specific human capital are to a great extent overlapping components of human capital as cultural environments are usually linked to geographic locations. But as communities with a similar cultural background may exist in different geographical locations, then culture-specific human capital can be productive in several locations. As with location-specific human capital, culture-specific human capital has been applied to migration analysis (Chiswick 1983).

1.2. Valuation of human capital in the labour market

1.2.1. Returns on human capital

The majority of human capital definitions require human capital to be productive. Therefore, the productivity of an employee depends on his/her human capital stock. In the case of perfect competition on the labour market, wages equal the marginal product of labour and according to that wages depend on the human capital stock. But returns on human capital are not limited to wages and productivity. They are not even limited to the owner of the human capital himself as investments in human capital can cause externalities. Some of these externalities (network, matching) were discussed in the previous chapter. Therefore, private and social returns on human capital could be distinguished. Private returns are the benefits that the owner of human capital gets from it. Social returns are the benefits that other parties gain from human capital. As not all the benefits from human capital are received on the labour market, then the dimension of market and non-market returns is distinguished. Therefore, returns on human capital can be classified in a four-cell matrix (table 1.2.1.1.). This kind of matrix is usually applied to benefits from education, but as the other components of human capital have similar benefits to a large extent, it is applied

here to the entire human capital. From this matrix it could be seen that returns on human capital are very heterogeneous.

Table 1.2.1.1. Classification of returns on human capital

Type of returns	Private	Social
Market	Wages Fringe benefits Working conditions Employment	Productivity Taxes Less reliance on government financial support
Non-market	Consumption value of education and training Consumption value of better health Consumption value of better children quality	Reduced crime Reduced spread of infectious diseases Social cohesion Voter participation

Source: Psacharopoulos (2006), modified by the author

Higher wages are probably the most important private benefit of human capital. Education, on-the job training, health and other components of human capital will result in higher wages. The effect of education on earnings is probably the most discussed of all these benefits of education. It is worth noticing that estimating the wage effects of different educational programs was the starting point of the development of the modern human capital theory in the 1960s (Mincer 1958, Schlutz 1961). Mincer (1962) was the first one to conduct a similar analysis for on-the-job training. Over the following decades there a huge amount of empirical estimations of the effects of education and experience on wages have been conducted. For example, Psacharopoulos (1994) and Psacharopoulos and Partinos (2004) have carried out comprehensive cross-country evaluations of the returns on education. The effects of health on wages have been estimated for example by Grossman and Benham (1974), Lee (1982) and Haveman et al. (1994). While for education, experience and health, positive wage effects are detected when the effects of migration on wages are not so clear. Since the seminal empirical work by Nakosteen and Zimmer (1980) there is no clear evidence about the positive wage effects, with the results dependent on the categories of migrants analysed. Several studies have also found positive effects of childcare on wages. Childcare is not likely to affect wages directly, but better childcare and preschool education increase the child's chances of achieving a higher level of education, which leads to higher earnings (Magnuson et al. 2004).

As wages do not make up the whole compensation for labour, what the employees receive, thus human capital can be valued in the terms of fringe benefits and better working conditions. Duncan (1976) has shown that education and experience have similar effects on fringe benefits like on wages. Furthermore, his results indicate that higher education and experience lead also to better working conditions.

Besides wages, human capital investments increase the employment probabilities of individuals. In the case of some human capital investments, such as training programs for the unemployed, the biggest aim of the investment is to increase the employment potential instead of the wage level. The fact that unemployment rates are lower for individuals with higher formal education is true practically for every country (Mincer 1991). The positive relationship with employment probability has found support both for potential experience proxied by age minus years of schooling (Bloch and Smith 1977) and actual working experience (Jones and Long 1979). The probability of employment can also be dependent on health. Poor mental or physical health could decrease productivity and could lead to job loss. Similarly, these factors could reduce the search efficiency and re-employment probabilities for unemployed. The effects of health on unemployment have not been studied to a great extent, instead there exists a wide range of literature investigating this effect from the opposite direction – how unemployment affects health (for example Kessler et al. 1987, Lahelma 1989).

Private non-market benefits are associated with the consumption value of human capital. It is reasonable to assume that all the components of human capital are positively related to the individual's utility in most cases. Education may increase utility both during the investment, for example utility increases from attending classes and acquiring new skills and knowledge and after an investment, as education may improve the individual's abilities to consume some types of goods (Lazear 1977). Better health will also increase utility as the results of empirical studies indicate that individuals with better health have higher self-reported level of happiness (Easterlin 2003). Human capital can lead to better health in two different ways. In a direct way as healthcare is considered to be an investment in human capital then it will improve health. The second possibility is that higher levels of education are usually associated with healthier lifestyles or enable the individual to have healthier working conditions (Ross and Wu 1995).

Social market returns include increases in productivity, the generation of tax revenue and the reduction of the cost on social expenditures for the public sector. The productivity increases from human capital accumulation are considered the determinants of long-term economic growth in the literature on endogenous growth as mentioned earlier. As reviewed by Sianesi and van Reenen (2003) most of the corresponding macro level studies agree that an increase in the level of human capital measured by the average duration of schooling, leads to higher growth rates and levels of GDP per capita. As higher GDP per capita will lead to higher tax revenues then it means that human capital generates extra money for the public sector, which could be used to produce more and better public goods. Previously it was concluded that higher levels of human capital will lead to higher wages and lower unemployment, therefore increases in the stock of human capital, will lower the governments expenditures on social security payments and unemployment benefits.

Social non-market returns include reduced crime, reduced spread of infectious diseases, increased social cohesion and voter participation. Human capital investment decreases crime as it increases the earning potential from legal activities and the opportunity cost of serving sentences in prison (Moretti 2004). Education can also change the values of individuals as educated people are usually more risk averse, which also decreases the probability of engaging in crime (Becker and Mulligan 1997). The spread of infectious diseases can be tackled by spending more on healthcare and by altering the behaviour of individuals. As higher educated individuals care more about their health, then education decreases the spread of such diseases. According to Meja and Posada (2005) human capital investments may improve the functioning of a democratic society as more educated citizens are more interested in political issues, which is necessary for democratic processes. Educated citizens participate more actively in political processes and they make more rational choices at election time.

1.2.2. Heterogeneity in valuation of human capital

In the previous chapter it was shown that human capital has a wide range of market and non-market returns. Therefore, individuals and society benefit from human capital investments in various ways. Although the heterogeneity in valuation of human capital is likely to be present in the case of all these returns, in this chapter only two types of private market returns are analysed. These are wages and fringe benefits, which are probably the most important private returns on human capital. Furthermore, these returns are directly related to valuation of human capital on the labour market, as they are the direct benefits that employees will receive in compensation for their labour.

Different employees receive different wages and fringe benefits from the labour market. In the case of perfect competition on the labour market there are generally two types of explanations for why some employees receive higher wages and fringe benefits than others. First, in the case of equilibrium, wages are equal to the marginal product of labour. Therefore, wage differences reflect differences in productivity. Second, according to the hedonic theory of wages presented by Rosen (1974) wages will reflect the working conditions on the job. Employees, who have worse working conditions will receive more compensation for that. In Rosen's original theory this compensation occurred in the form of higher wages, but it is also possible that fringe benefits are offered as compensation for bad or risky working conditions (van Ommeren et al. 2002). Similarly, the division of labour compensation between wages and fringe benefits can be different across firms and employees, as according to Eberts and Stone (1985), employees may be compensated for lower wages by a higher level of fringe benefits or vice versa. So, it could be concluded that under perfect competition, wage differences between two employees may be caused

by differences in productivity, fringe benefits and/or working conditions. In the same way, differences in fringe benefits between two employees may be caused by differences in productivity, wages and/or working conditions. As productivity is affected by human capital, then in perfectly competitive labour markets and under similar working conditions human capital should be valued at the same rate for all employees in terms of labour compensation. Therefore, under perfect competition, there may exist heterogeneity in valuation of human capital in the sense that employees with equal productivity will receive higher levels of some components of labour compensation than others. But there will not exist heterogeneity in valuation of human capital in the sense that equally productive employees will get different levels of overall labour compensation.

If imperfect competition exists on the labour market, then it is possible that the human capital of different employees is valued at different rates. This means that equally productive employees may receive unequal compensation for their labour. The main sources of imperfect competition, which allow that kind of heterogeneity in human capital valuation, are differences in the bargaining power between employers and employees and the presence of discrimination on the labour market.

Under the conditions of perfect competition there is an unlimited number of employers and employees on the labour market, but in reality this in not the case for many labour markets. In some labour markets there are only a few or just one employer. This will result in high bargaining power for the employers and it will result in the lower wage level in comparison to a more competitive labour market. The situation could be the other way around if there are only a few employees or if the employees are covered by trade unions and they act collectively in wage bargaining. In such a case, the employees will have high bargaining power and this will result in higher wage levels compared to a more competitive labour market.

Heterogeneity in valuation of human capital can also be caused by discrimination in the labour market. Labour market discrimination can be defined as a situation in which equally productive employees are treated unequally in the labour market in a way that is related to an observable characteristic such as gender or ethnicity (Altonji and Blank 1999). In terms of valuation of human capital, unequal treatment means offering unequal compensation for labour. In most empirical studies this means offering unequal wages to equally productive employees. Two types of labour market discrimination – taste and statistical discrimination are distinguished in the literature. Taste discrimination can occur in the form of employer, employee or consumer discrimination. According to Becker (1971), employer discrimination is a situation in which some employers are prejudiced against some employees that belong to a certain group (for example, an ethnic minority). In such a situation, prejudiced employers will prefer to employ members of some particular groups to members of another group. This will lead to a situation in which equally productive employees from different groups receive different wages. Employee

discrimination means that there are some prejudiced employees, who do not like to work together with members of another group. In the case of consumer discrimination prejudiced consumers will obtain less utility from buying a similar good from members of particular groups. Therefore, they will do so only if the price of the good is lower. As with employer discrimination, employee discrimination will lead to a situation where the employees that belong to the discriminated group, receive lower wages.

Statistical discrimination may also occur when employers do not have perfect information about the productivity of employees. In such a case, employers may use some observable characteristics, such as race or gender as proxies for productivity if they are correlated with productivity (Phelps, 1972). Therefore, employers may prefer to hire members of certain groups, and this leads to wage differences between different groups as taste discrimination.

Besides discrimination on the labour market, pre-market discrimination could also exist. This will occur if some individuals are discriminated against in schooling or other forms of human capital acquisition. Pre-market discrimination will result in differences of human capital between members of different groups, but not in differences in valuation of human capital (Aigner and Cain, 1977). So pre-market discrimination is not relevant in valuation of human capital in the labour market, and this issue is not considered in the following analysis

In reality, remarkable differences exist in the wage rates of observably identical employees. Identical employees may also have different access to fringe benefits. It also happens to be the case that certain groups of employees tend to have different wage rates than other groups. Investigations into the size and causes of wage and to a lesser extent fringe benefits, differences between different groups of individuals has been an extensively researched area in labour economics during the last four decades. The four most important kinds of wage and fringe benefits differences, which are often called wage and fringe benefit gaps, are:

1. Gender wage and fringe benefit gap
2. Ethnic wage and fringe benefit gap
3. Union wage and fringe benefit gap
4. Public-private sector wage and fringe benefit gap

In the next subsections, we will take a closer look at each of these gaps, focusing on both the theoretical and empirical implications emerging from them.

1.2.2.1. Gender wage and fringe benefit gap

Women everywhere have traditionally earned lower wages in comparison to men, and although these differences have decreased over recent decades, still substantial gender wage gaps exist. In 2004, the median gender wage gap averaged 18% across 21 OECD countries. This gap ranges from 6% in New Zealand to 40% in Korea.

To some extent gender wage gaps could be explained by differences in human capital between men and women. In the case of formal education, for younger people in developed countries there no longer exists a significant difference in the attained educational level, but older women tend to have a relatively lower education level. For the US, this has been documented by Blau (1998). The quality of education for men and women is usually equal because in developed countries, and in the overwhelming majority of cases, men and women attend the same schools. Some authors argue that aptitude and achievement test scores will reflect the quality of education. There exist some systematic differences on the basis of gender in these kinds of test results. Brown and Corcoran (1997) show that among high school graduates in the US, males score better on mathematics achievement tests, while females have better results for reading and vocabulary tests. But as women tend to score better on one group of tests and men on the other types of tests, then on the average it is likely that there does not exist large gender differences in the quality of schooling.

Differences in job market experience are much more important determinants of gender wage gaps than differences in formal education. Men have more labour market experience than women in terms of the total duration of employment. In addition to less time spent on the labour market, women are also more likely to be employed in part-time jobs. The importance of job market experience as a determinant of the gender wage gap is highlighted by Blau and Kahn (1997), who have shown that increases in women's employment has narrowed the gender wage gap in the US.

Women also have lower tenure and therefore they have lower levels of firm-specific human capital. Women have a higher job turnover than men. There also exist gender differences in terms of quitting jobs (Sicherman 1996). Women tend to leave more for non-market reasons, such as pregnancy, changes of residence and health. As they are more likely to quit jobs, then this could lead to the fact that women are offered less on-the-job training. According to Gronau (1988), women are hired for jobs that offer lower employer financed investment in human capital. Therefore, the gender wage gap is age dependent, women get less employer paid training over their career and gender differences in accumulated human capital and wages increase during the working career (Barron, Black and Loewenstein, 1993).

Besides differences in human capital, job characteristics are often presented as an explanation for the gender wage gap. Men and women tend to be

employed in different occupations. Women are employed in occupations with lower wage levels. Several empirical studies have found evidence that the share of women in a certain occupation has a negative impact on the average wage for that occupation (Blau and Beller, 1988; Lewis, 1996). The question is how these differences of occupations reflect differences in working conditions. Hersch (1991) investigates the effect of working conditions on the gender wage gap and finds that men's wage advantage is partly caused by the fact that they work in more hazardous jobs.

Gender differences in working conditions could be caused by different preferences. For example, women tend to have a higher risk-aversion than men. Several studies, for example, Sunden and Surette (1998) and Lehman and Warning (2001), have shown that women tend to take less risks in their savings and investment behaviour. Furthermore, these differences in risk aversion can lead to different preferences in terms of the form of pay. According to Chauvin and Ash (1994), women are more employed in jobs with a relatively high level of base wage in comparison to the share of contingent pay. As there exists a positive relationship between the share of contingent pay and the size of the wage then this relationship causes women's wages to be lower.

The previously listed characteristics usually do not fully explain gender wage gaps. For example, Altonji and Blank (1999) show that only about 25% of the gender wage gap in the US is caused by the gender differences in human capital, personal and job characteristics. Therefore, it could be argued that the unexplained part of the gender wage gap may reflect the discrimination of women in the labour market in the form of receiving lower wages for similar work on a similar job. But it is also possible that human capital is not correctly or fully accounted for in the analysis of the gender wage gap. Alternatively, job characteristics such as occupation and industry are not measured precisely enough in many studies, and this may bias the results. Marini (1989) has pointed out that unexplained gender wage gaps become smaller when more detailed occupational control variables are used. Therefore, it may be the case that gender wage differences are largely caused by the fact that women are employed in industries and occupations with lower wages. However, it is difficult to assess if that kind of occupational and industrial segregation is caused by gender differences in productivity, discrimination against women in the hiring process or differences in preferences for job characteristics between men and women. In order to solve that puzzle some authors have tried to compare the gender differences in productivity and wages in order to test for the presence of discrimination. These studies have given mixed results in different countries. For example, Hellerstein et al. (1999) have found for the US that wage differences are greater than productivity differences, but Crepon et al. (2002) have found that in France the wage and productivity differences between men and women are equal.

A few studies have been conducted about the gender gap in fringe benefits. Kotlikoff and Wise (1987) have estimated the gender wage gap in the case of

pension plans. Their results show that women receive lower pension funds in comparison to men. Pesando et al. (1991) have investigated the same issue, but found the opposite result. Solberg and Laughlin (1995) have investigated the effect of fringe benefits on the gender wage gap. They use data about a wide range of fringe benefits and include them together with wages as part of the total compensation. Their results show that in the US the gender wage gap is larger than the corresponding gap in fringe benefits. This result suggests that women are compensated for lower wages with higher level of fringe benefits.

1.2.2.2. Ethnic wage and fringe benefit gap

Substantial ethnic wage gaps exist in most countries that are not ethnically entirely homogenous. In the vast majority cases ethnic majorities have higher wages, and there are only very few exceptions to that rule; for example, whites as an ethnic minority have higher wages in South Africa (Allanson et al., 2002; Leibbrandt et al., 2005). Ethnic wage gaps are most extensively studied in the US and Western-European countries. In the US the main topics are black-white and Hispanic-white wage gaps and in European countries there are different ethnic minorities in different countries. According to US Current Population Survey in 2004, wages for black males were 25.5% lower than wages for white males. Hispanic males receive 36.8% lower wages than white males. For females the corresponding wage gaps are 10.9% and 10.0%. In the UK, according to Blackaby et al (1998), ethnic minorities had on the average 17% lower wages than natives in the 1990s, while for some minorities the wage gap was up to 31%. Kee (1995) documents that different ethnic minority groups have 12–43% lower wages than the ethnic majority in the Netherlands.

Ethnic wage gaps are to a relatively large extent explained by differences in human capital. First, ethnic minorities usually have a lower level of formal education. For example, in the US in 1996 according to the Current Population Survey, 28.2% of white males, 10.9% of black males and 8.6% of Hispanic males have acquired a college level education or higher. For females these shares are respectively 24.9%, 13.8% and 7.5% (Altonji and Blank 1999). Several studies have tried to estimate what the ethnic wage gap would be if the different ethnic categories had similar levels of formal education. For example, according to O'Neill (1990), the black-white wage gap in the US for males will decrease from 17 percentage points to 12 percentage points if both ethnic groups had a similar level of education measured by the years of schooling.

Besides the quantity of education, the quality of education can also be a determinant of ethnic wage gaps. Ethnic minorities in many cases attend schools of relatively poor quality. Card and Cruger (1992) have shown that black-white differences in the quality of education measured according to schooling inputs are important determinants of the black-white wage gap in the US. Johnson and Neal (1996) have shown that the black-white wage gap could be explained by

the racial differences in the Armed Forces Qualification Test (AFQT) scores, which could be interpreted as a proxy for ability or skills or quality of schooling. According to Maxwell (1994), the differences in quality of education are a more important determinant of the black-white wage gap than differences in the quantity of education.

In many cases ethnic minorities consist of immigrants and in these cases besides the differences in formal education, the lack of location specific human capital could be a reason for the lower wages for migrants. As over time immigrants acquire location-specific human capital then their earnings depend on the time spent in the new country. Those kinds of earnings patterns are described by the theories of assimilation (Chiswick 1978). For many countries, there exists evidence that for immigrants an education attained abroad has lower rates of return than the education attained in the new country. For example, McManus et al. (1983) have found these kinds of results for the US, Chiswick and Miller (1985) for Australia and Kee (1995) for the Netherlands. Several other studies have documented the fact that language skills are important determinants of the earnings of immigrants. For example, Daneshavry et al. (1992) and Carliner (1996) have found English language wage premiums for immigrants in the US. According to Bratsberg and Terrel (2002), lower rates of return on education for immigrants could be caused by differences in the schooling quality between their homeland and the destination country.

Differences in labour market experience are also important for the existence of the ethnic wage gap. Ethnic minorities tend to have less job market experience. In many cases, especially in European countries, they have less chance of finding jobs and therefore they accumulate less job market experience over their life-cycle (Blackaby et al 1998). Antecol and Bedard (2004) show on the basis of US data that ethnic differences in actual labour market experience explain about half of the black-white and Hispanic-white wage gaps in the US. Furthermore, it was noticed already by Flanagan (1974) that ethnic minorities are less likely to be offered on-the-job training by their employers. So, even if ethnic minorities had an equal level of labour market experience they will accumulate less human capital as they receive less on-the-job training.

Differences in working conditions are not likely to be a determinant of ethnic wage gaps. Ethnic minorities tend to have worse working conditions in comparison to ethnic majority. For example, Richardson et al. (2004) studied fatal occupational injury rates in the US and they found that these rates are higher for blacks and Hispanics than for whites.

The ethnic wage gap could also be caused by industrial or occupational segregation on the labour market. Ethnic minorities tend to be employed in low paid occupations, which of course is to a large extent caused by the fact that they have a lower level of human capital. As ethnic minorities are more likely to be employed in certain industries, and if there is a lack of mobility of labour between different industries, then macroeconomic shocks result in the lower earnings of ethnic minorities. Bound and Freeman (1992) have studied the

changes in the black-white wage gap over several decades and they argue that the decline of the manufacturing sector has increased the ethnic wage gap. The wages of ethnic minorities may also be hurt more by immigration, as immigrants are likely to increase the labour supply for those industries where the largest proportion of the ethnic minorities are employed (Borjas et al. 1996).

As for gender wage gaps, it is difficult to judge if ethnic wage differences are caused by discrimination. In comparison to gender wage gaps, ethnic wage gaps are generally better explained by differences in the observable characteristics between different ethnicities. As with the gender wage gap, there have been some attempts to estimate the racial productivity differences directly and investigate how these differences affect the ethnic wage gap. One of the few attempts has been made by Hellerstein et al. (1999), who found that the black-white wage gap in the US reflects productivity differences and there is no evidence of discrimination on the labour market.

The ethic differences in fringe benefits are largely an unexplored area. There exist only a few studies dealing with that issue for the US, and those only consider health insurance in the majority of cases. These kinds of studies have been conducted by Monheit and Vistnes (2000) and Levy (2006) and they find that blacks and Hispanics have lower access to employer paid health insurance. So these results indicate that availability of health insurance is not a likely determinant of the ethnic wage gaps, but more research needs to be done in that area, as fringe benefits are not limited to health insurance.

1.2.2.3. The union wage and fringe benefit gap

The union wage and fringe benefit gap reflect the difference in wages and fringe benefits between unionised and non-unionised workers. Different studies have viewed the unionisation of employees differently. Some studies have made a distinction on the basis of union membership, while other studies have taken the coverage of collective bargaining agreements as the measure of unionisation. According to Lewis (1986), the difference in the results of empirical studies depending on the definition of the unionisation is virtually absent. The first empirical estimations of a union wage gap were conducted by Lewis (1963). His results indicated the positive effect of unionisation on wages, but as he did not account for the difference in the characteristics of employees between unionised and non-unionised sectors, these results do not tell us much about the causes of the wage gap.

Human capital investment is probably not such an important determinant of the union wage gap in comparison to gender and ethnic wage gaps. Union wage effects are dependent on the employee's skill level as generally low-skilled employees benefit more from union coverage (Card 1996). It could be argued that low-skilled workers have a comparative advantage when employed in the unionised sector or that unions compress the wage structure so that low-skilled

employees receive a wage premium in comparison to their potential non-union wage (Freeman 1980). Therefore, employees in the unionised sector have a lower average level of education, but as the union wage premium is negatively related to education, then the union wage gap is mostly caused by the differences in how education is valued rather than differences in educational attainment.

Unionised employees usually have longer tenure as unionisation reduces job mobility. The results of Budd and Na (2000) show that tenure differences do not drive the union membership premium. This result means that differences in working experience explain some part of the union wage gap.

The union wage gap can also be explained by differences in on-the-job training. Theoretically, unionisation may increase firms' incentives to pay for general training as unionisation reduces labour turnover (Farber 1980). At the same time, as proposed by Mincer (1983), unions may decrease training as unions press for seniority rules to be used in promotions and wage increases. Those kinds of rules may decrease the importance of general training for wage increases and promotions. Among empirical studies most of the studies (e.g. Lynch, 1982) have found positive union effect on training, but in some cases (e.g. Green, 1993) this result holds true only for some types of firms or industries.

There has been very little research conducted about the role of differences in working conditions in determination of the union wage gap. Some evidence exists that unionised employees have more compensation against risks than non-unionised employees (Viscusi and Aldy, 2003). This kind of result shows that the union wage gap cannot be explained by compensating wage differentials.

Probably the most important reason for the existence of the union wage gap is the fact that union coverage raises employee bargaining power. Due to higher bargaining power, the employees in the unionised sector will receive higher wages. Unions also have effects on non-union wages. First, there could exist "threat effects" as non-unionised employers can increase wages in order to deter union organizing. Second, wage increases in the unionised sector due to union power may decrease employment in the unionised sector. Therefore, some workers in the unionised sector may loose their jobs and may search for a new job in the non-unionised sector. It will increase labour demand and decrease wages in the non-unionised sector. This effect is called the "spillover effect" (Kahn 1980).

Freeman (1981) has studied union fringe benefit gaps. He has studied several fringe benefits and has found that the provision of fringe benefits is higher for unionised employees, and that kind of difference is particularly large in the case of pensions and insurance.

1.2.2.4. Public-private sector wage and fringe benefit gap

The public and private sector wage gap is an important political issue in most developed countries as the wage increases for many categories of public sector employees are dependent on political decisions. Besides that, public sector wage policy has an impact on the wages in the private sector. In developed countries wages in the public sector tend to be somewhat higher. According to Borjas (2002), average wages in the public sector for males are 10% and for females 20% higher than in the private sector in the US. Melly (2005) reports an 11.2% public sector wage advantage in Germany. The situation is the opposite for many developing countries, including the transition countries from Central and Eastern Europe during the 1990s; for example, Serbia (Reilly, 2003) and Poland (Adamchik and Bedi, 2000). One of the first authors to investigate public-private sector wage differences was Smith (1976), who documented the positive public-private sector wage difference for the US, and he found that much of the gap could be explained by differences in employer and employee characteristics.

Human capital differences account for some part of the public sector wage advantage. According to Moore and Raisian (1991), more than 50% of the wage gap is explained by differences in human capital. Public sector employees generally have a higher level of human capital. First, the level of formal education for public sector employees is higher; secondly, public sector employees have longer tenure; and thirdly, according to Arulampalam et al. (2004), public sector employees receive more on-the-job training than private sector employees in the majority of developed countries.

Differences in human capital do not fully explain the public-private sector wage gap. This could mean that human capital is valued differently in public and private sectors. If there exists an unexplained wage advantage for the public sector then it could be possible that besides the higher level of human capital among public sector employees, returns on human capital are higher in the public sector. But the estimations of the rate of return on education by Psacharopoulos (1985) do not confirm this hypothesis. According to his results, the average rate of return on education across various different countries in the private sector is 13% and in the public sector is 10%. According to Gunderson (1979), employment in the public sector also gives lower returns on tenure and training. It is likely that these kinds of differences in the return on human capital are at least partly caused by lower wage dispersion in the public sector in comparison to the private sector. According to these results the public sector wage advantage is likely to be relatively higher for employees with a low level of human capital. Several empirical studies, for example Lassibille (1998), give support to this proposition as they have found that the public-private sector wage gap is higher for employees with a low level of education.

As wage dispersion in the public sector is smaller than in the public sector, then it causes the public-private sector wage differential to vary over the wage

distribution. This phenomenon was first studied by Poterba and Ruben (1994), who found that the wage gap is higher for the lowest deciles of wage distribution in the US. Since then, the same result has been confirmed in many studies for different countries – for example, for the UK by Disney and Gosling (1998).

There exist several other explanations to the existence of a public-private sector wage gap, apart the different attainment of human capital. According to Gregory (1999), union densities in the public sector are higher for many countries. Trade unions in the public sector also have stronger bargaining power due to the relatively inelastic demand for some public sector services; for example, police and healthcare.

Differences in the relative bargaining power of employers and employees between public and private sectors may be the other way round for some cases, as public sector employers could have monopsony status in some cases. According to Mueller (1998), it is likely that monopsony is more often present for the public than private sector. Therefore, the existence of the monopopsony will cause the wages in the public sector to be relatively lower. In practice, the presence of the monopsony is probably not a very important determinant of the wage gap for developed countries, as wages in the public sector tend to be higher.

The differences in the wage setting processes between the public and private sector could also be one reason for the existence of the public-private sector wage gap. The wages in the private sector are determined by the profit-maximising behaviour of firms. Private sector organisations may have different aims, and therefore different wage setting practices. In many cases the wages in the public sector are affected by the vote-maximizing behaviour of politicians or by the budget-maximising behaviour of bureaucrats (Borjas 1980). On the one hand, there exists a floor for public sector wages because employers in the public sector have to compete with the employers in the private sector for their workforce; but on the other hand, as the public sector organisations do not usually maximize their profits, there does not exist a wage ceiling similar to the private sector for public sector wages. However, public sector organisations are still under the scrutiny of the taxpayers and this does not allow public sector wages to grow too much beyond wage levels in the private sector (Mueller, 1998).

It is not likely that the public-private sector wage gap is explained by the worse working conditions in the public sector. Usually, public sector employees have better job protection. Not many public sector jobs contain a hazardous working environment. Differences in fringe benefits are not likely to compensate the wage gap either as public sector employees in the majority of cases receive more fringe benefits available than private sector workers (Gregory, 1999).

2. STUDIES

2.1. Measuring the specificity of human capital: a skill-based approach

2.1.1. Introduction

Dividing human capital into general and specific human capital has been a common issue in the research of on-the-job training since the development of the human capital theory by Becker (1962). Usually, human capital is considered to be firm-specific, but some authors have also used the concepts of skill-specific, occupation-specific and industry-specific human capital. A recent development in this field is the skill-weights approach, which emphasizes the point that the skills are not firm-specific, but the combinations of the skills required on different jobs are firm-specific (Lazear, 2003).

Although the distinction between general and specific human capital has been widely used in theoretical literature, not enough attention has been turned to the question of how to measure the specificity of human capital. In the earlier studies, it has been common to use the years of formal schooling or the level of formal education as a measure for general human capital and the length of tenure as the measure for specific human capital. More recently there have been some attempts to measure the specificity of human capital by using alternative approaches. For example, Frank (2003) has measured it indirectly using the length of the vocational adjustment of new employees. Ingram and Neumann (1999) have proposed a measure based on the observed skill characteristics of the job, but the aim of their measure is to distinguish between different levels of human capital through the skills of workers (low-skilled and high-skilled) instead of general and specific human capital. These measures do not fully correspond to the most up-to-date theoretical concepts of human capital specificity, such as task-specific human capital or the skill-weight approach.

Therefore, the aim of this chapter is to develop a skill-based measure of the specificity of human capital. In this chapter, this measure is based on the potential that a person has of obtaining the use of a particular skill and this will depend on the number of jobs where this skill is required. The smaller the number of jobs where the skill is required, the higher the specificity of that particular skill. To calculate the levels of specificity for different skills empirically, data from the skill requirements of vacant jobs will be used. For this purpose data from one Estonian Internet-based job advertisement database will be used. To test the validity of this measure, it will be used as an estimator of the probability that on-the-job training is offered to employees. If this measure is correct, then according to human capital theory, in the case of the jobs that require more specific skills, there is a higher probability that training will be offered.

The chapter is organised as follows. First, according to human capital theory and especially the skill-weights approach, a measure for human capital specificity will be proposed. Then a description of the data used in the empirical analysis will be provided. After that, an analysis of the specificity of different skills and the specificity of required human capital across different occupations and industries will be carried out. The validity of the previously proposed human capital specificity measure will then be tested. Finally, conclusions on the results will be drawn.

2.1.2. A measure for human capital specificity

The starting point for developing the human capital specificity measure in this paper is the skill-weights approach by Lazear (2003). In his paper it was assumed that wages depend on the value of the weights that the firm poses about the employee's skills. In the standard model, it was assumed that employees have only two skills − A and B, and each firm *i* poses weights λ_i and $1-\lambda_i$ to these skills. So a worker with the skill set (A, B) has potential earnings in firm i

$$y_i = \lambda_i A + \left(1-\lambda_i\right)B$$

In reality, the number of skills required on different jobs is usually higher than two. There are also many different jobs within firms. Although the standard theory has considered human capital to be firm-specific and the skill-weights approach is also based on the firm-specificity of skills, it would be more realistic here to assume skills to be specific to jobs. This kind of approach also corresponds with the theoretical viewpoints of occupation- and task-specific human capital. According to these considerations, this model can be extended to cover situations where there is a total number of skills *m* and for each job *j* there exists a weight λ_{jk} for a particular skill *k*, so the potential wage, which in the case of perfect competition and **the** absence of other frictions on the labour market is equal to the marginal productivity of **the** worker's labour, on job *j* will be

$$y_j = \sum_{k=1}^{m} \lambda_{jk} A_k \ ,$$

where A_k is the level of the skill *k* owned by the worker. While the skill-weights on different jobs can be different, it will be difficult to estimate them empirically. At the same time, it is quite obvious that when the skills are

defined quite narrowly, which means that the total number of skills in the economy is high, then only a small number of them affects the employees productivity and wage significantly for one particular job. For example, the skill of preparing meals is highly critical for cooks, but it has no significant effect on the productivity of dentists. So it can be assumed that for each job there are a number of skills that affect the employee's productivity significantly, and these skills can be called critical skills. It can be assumed that the firm poses a zero-weight on all other skills that do not affect productivity significantly. As it is difficult to estimate the skill-weights empirically, then it is assumed here that all jobs have equal weights for all critical skills. So, if the number of critical skills on job j is m_j, then each of these skills is valued by a weight $\frac{1}{m_j}$. The potential wage will then be:

$$y_j = \sum_{k=1}^{m_i} \frac{1}{m_j} A_k \,.$$

So, if a worker has a level A_k of skill k then he can get the return $\frac{1}{m_j}$ on job j from it if this skill is critical to this job, and he will get the return 0 from it if this skill is not critical for that job.

As the sets of critical skills are different for different jobs, employees' wages for different jobs are different too. For employees, it is optimal to be employed in a job that pays him the highest wage, and as the wage depends on the critical skills, then it is optimal to be employed in a job that requires the set of skills that match the employees' skills best.

The employees' skills can be developed by training, which can be financed by both the employer and employee. It is natural to assume that employers are only interested in developing an employee's critical skills, as investing in other skills will be clearly a waste of resources as these skills do not affect productivity. But the employees' options for making use of their skills in other firms also affects the firm's decisions to invest in these skills. This means that if the opportunities for employees to use their skills in other companies are many, then the risk of a separation is also high, and therefore, the firm's incentives to invest in a worker's human capital are low. The opportunities for employees to use a skill depend on the number of jobs where that skill is critical. If a particular skill is critical only for one job and hence only in one firm, then it is completely firm-specific and in that case employees cannot benefit from that skill in other companies and therefore employers have an incentive to invest in these skills. The opposite case occurs when a particular skill is critical for all jobs. In this case that skill is completely general and workers can benefit from it everywhere and employers have no incentive to invest in it (in the case of perfect competition). Therefore, the number of jobs where a skill is critical can

be used to determine a measure for skill specificity. To make this measure comparable for different labour markets where the total number of jobs can be different, the proportion of the jobs where the skill is critical is used, so the measure for skill specificity is

$$s_k = \frac{n}{c_k},$$

where s_k is the specificity of skill *k* and c_k is the number of jobs where skill *k* is critical and *n* is the total number of jobs.

The inverse specification of the skill specificity measure results in the fact that if the number of jobs where a particular skill is critical increases, then skill specificity decreases at the declining rate. The intuition behind this is that if there are few opportunities for an employee to make use of a skill then the appearance of new firms that require that skill will remarkably increase the employee's potential of finding a new job where he could foster that skill. Therefore, that skill becomes more general. But if a particular skill is critical for a large number of jobs, then the entrance of new firms that require that skill, will not noticeably increase the employee's options for changing job and therefore it will not decrease the skill specificity to a great extent.

As there is usually more than one critical skill for each job, the incentives for firms to pay for training do not depend only on the specificity of just one particular critical skill, but on the specificity of all critical skills. In Lazear's model, one of the results is that the more idiosyncratic the skill-weights of the firm are, the larger the share of the training the firm will pay for. As firms are more likely to pay for investments in specific human capital, then it can be concluded from the previous statement that more idiosyncratic skill-weights correspond to the requirement of more specific human capital in that firm. So it can be said that firms' decisions about financing employee training are based on job specificity, which depends on the specificity of its critical skills and also on the number of critical skills. It is quite obvious that the higher the specificity of critical skills, the higher job specificity will be. But it is also assumed here that the higher the number of specific skills, the higher the job specificity will be. The intuition for this is that jobs with a greater number of critical skills are likely to be more different from other jobs as the number of possible combinations of skills rises when the number of skills that can be combined rises. According to these two factors, which affect job specificity, the following measure for job specificity is proposed:

$$s_j = \sum_{k=1}^{m_i} s_k .$$

So job specificity is the sum of the skill specificities for all critical skills in that job. This kind of the specification satisfies the two previously proposed conditions that the jobs specificity increases in the specificity of critical skills and the number of critical skills. This measure for job specificity can be interpreted as a measure for human capital specificity for two reasons. First, it expresses the specificity of critical skills, because in the case of more specific critical skills job specificity is higher and if the critical skills are more specific then the required human capital for that job is more specific. Secondly, as firms are assumed to only offer training in critical skills, then over the period of employment the worker's skills will become more similar to the job's critical skills and so the required and actual human capital of a worker will become more and more similar. So it can be said that job specificity measures the worker's human capital specificity and over time this measure becomes more precise.

2.1.3. Data

The data used in this article comes from an internet-based job vacancies database, which is situated on the website www.hyppelaud.ee. This website is of the biggest on-line job search sites in Estonia. On this site employees can advertise their vacancies and job seekers can apply for these vacancies through the website. Most of the services provided by this website are free. In this article information is used about 1268 job advertisements, which were active in the period from August 10th 2005 to August 20th 2005. In order to avoid possible seasonality problems, it would be ideal to use data from a whole year, but it was not possible to use that kind of data as this website does not provide information about past vacancies. Using data from the whole year would be preferable, as there exist seasonal fluctuations in employment, especially in industries related to tourism. For example, during the summer months, employment in hotels and restaurants is about 20% higher than in other periods. Therefore, it is possible that similar seasonality is present in the posting of job advertisements. If the industrial structure of job advertisements fluctuates seasonally and if there are industrial differences in skill requirements, then it could bias the results. But as the data was collected at the end of the summer period then probably these advertisements reflect the labour demand for the non-summer period, which is more stable. So it could be argued that the seasonality is probably not a very serious problem. The sample includes vacancies posted both by private and public sector institutions, but advertisements for vacancies abroad were dropped.

For each vacancy there is information about the occupation, location of the job, industry, required educational level and previous work experience, length of hours, salary, required skills and provision of on-the-job training. When previous work experience is required, two types of experience can be

distinguished: general and occupation-specific. For some vacancies, the applicants are only required to have had some previous work experience in any job, but other vacancies require experience in the same occupation. As skills are often acquired via on-the-job training and learning by doing, then it can be assumed that when the applicants are required to have work experience, they are indirectly required to have the skills relevant to that experience. The problem here is that it is not possible to detect which skills the work experience actually represent, and therefore this information cannot be used to estimate the specificity of different skills. Still, it is possible to use this information to test the validity of the job specificity measure, as it is possible to use the requirement of previous work experience to estimate the provision of on-the-job training.

The required skills on which the database provides information and which are used in the following analysis belong to three broad categories: computer skills, language skills and driving skills. Although it is clear that these skills represent only a small percentage of the skills from among all critical skills for different jobs and in different firms, the data still makes it possible to evaluate the specificity of these skills and the fact that the data does not provide information about all skills, does not affect the process of estimating the specificity of the skills that belong to these three categories. For computer skills, in some cases the advertisements contain detailed information about different types of software that the applicant should be able to use, but in other cases it is only indicated that the ability to use computers is required. As these requirements are very heterogeneous, only one type of computer skill is distinguished here. Six different language skills are distinguished. These are skills for Estonian, Russian, English, German, French and Finnish. Although some advertisements provide information about the required level and type (oral, written) of language proficiency, the advertisements only indicate whether a job requires some type of command of a particular language or not. Five different types of driving skills are distinguished and the classification of these skills is based on the driving licence categories. According to the Estonian Traffic Law, an A licence is a permit for riding motorcycles, a B licence is a permit fro driving automobiles with a kerb weight no more than 3500 kg and no more than 8 passenger seats, a C licence is a permit for driving automobiles with a kerb weight more than 3500 kg, but with no more than 8 passenger seats, a D licence is a permit for driving automobiles with more than 8 passenger seats and an E licence is a permit for driving automobiles with a trailer that has a kerb weight more than 750 kg (Liiklusseadus 2001).

2.1.4. Results

In order to calculate the specificity of those previously mentioned skills, it is assumed that all the required skills mentioned in the job advertisements are critical skills and all those skills that are not mentioned are not critical skills for that job. It could be quite natural for the firms to mention only those skills that significantly affect productivity, but in practice there may be some reasons why firms announce non-critical skills as required and, on the other hand, in some cases not all critical skills may be listed as required skills. For example, if the firms want to reduce the number of potential applicants for the job, they may announce some other skills, which in reality do not significantly affect productivity. Reducing the number of applicants could reduce the costs of filling the vacancy, but it can also decrease the chances of hiring good workers as it is possible that the best suitable worker for that job does not apply because he or she does not have the required skill which in fact does not affect his or her productivity. There is also a possibility that not all critical skills are indicated as being required. One reason for that is that if firms reduce the number of required skills, they can increase the number of applicants. However, increasing the number of applicants in such a way need not increase the number of those applicants who possess all the critical skills, but it also attracts such workers who do not possess all critical skills and whose productivity should be lower if the productivity is determined only by the critical skills. But if there are some other factors, such as the loyalty of workers, which affect productivity, then it may be rational for firms not to announce all critical skills as being required. Another reason for this is the fact that there are some informational problems and firms do not exactly know which skills are critical for that particular job, which could be the case for starting firms or new and uncommon occupations. While those kinds of problems exist and these issues need to be investigated in the future, it is not likely that these factors have a very large influence on the results of the analysis. In some cases the number of required skills can be higher than the number of critical skills, and in some cases the situation can be the converse, but on the whole, the number of required and critical skills should be equal and probably in most cases required and critical skills should be identical.

The specificities of different skills calculated using the previously described methodology are presented in Table 2.1.4.1. Information from all the 1268 job advertisements in the dataset is used in these calculations.

The more highly estimated skill specificities correspond to more specific skills. In the case of a completely general skill, skill specificity would be equal to 1. The results indicate that Estonian and Russian language skills are the most general, whereas English skills are somewhat more specific. Computer skills have a medium specificity. Driving skills are highly specific, except for the B category. Other foreign language skills such as Finnish, German and French also have high specificity. According to human capital theory, firms should be more likely to pay for training in skills with high specificity. Unfortunately the

data does not include information about the provision and types of training so it is not possible to check this proposition.

Table 2.1.4.1. Estimated skill specificities

Skill	Number of vacancies, where critical	Specificity
Computer	276	4.59
Estonian	937	1.35
Russian	625	2.03
English	384	3.3
German	27	46.96
French	6	211.33
Finnish	141	8.99
A category	4	317
B category	230	5.51
C category	35	36.23
D category	3	422.67
E category	12	105.67

Next, these skill specificities are used to calculate the job specificities for each vacancy. For vacancies where no required skills were announced, the value of job specificity is assumed to be equal to 0. According to the estimated job specificities, the average job specificity for different sectors and occupations are calculated.

In Table 2.1.4.2 the calculated average job specificities for different occupational categories are presented. These occupational categories are based on the ISCO88 classification. It can be seen that vacancies that belong to the category, legislators, senior officials and managers, have the highest job-specificity. In general, occupations, which require higher qualifications require more specific skills and low-skill occupations, like craft and related workers or elementary occupations, require less specific skills. There are some exceptions to that pattern; for example, vacancies for plant and machine operators and assemblers have high job-specificity. This is caused by the fact that truck and bus drivers belong to that category and these occupations need highly specific driving skills (licence categories C, D and E). Job-specificity for skilled agricultural and fishery workers is also relatively high, but this is probably due to the fact that there are very few vacancies that belong to these occupational categories in the dataset.

Table 2.1.4.2. Average job specificities for different occupational categories

Occupational category	Job specificity
Legislators, senior officials and managers	3.79
Professionals	1.89
Technicians and associate professionals	3.23
Clerks	2.99
Service workers, shop and market sales workers	1.99
Skilled agricultural and fishery workers	2.8
Craft and related workers	0.97
Plant and machine operators and assemblers	3.34
Elementary occupations	0.94

Table 2.1.4.3 presents the average job specificities for different industries. Here we see that differences in job specificities are remarkable. It is worth mentioning that differences across industries are greater than across occupational categories. This can be caused by the fact that the number of industries is greater than the number of occupational categories and in many cases very different occupations belong to the same occupational categories. For example, both truck drivers and wood-processing-plant operators belong to the same category as plant and machine operators and assemblers. Agriculture, hunting and forestry, and financial intermediation are the industries with the vacancies that require the most specific human capital. Education and manufacturing are the industries where the job specificities are the lowest, meaning that the required human capital is most general there. In general, job specificities in the primary and tertiary sector are remarkably high compared to the secondary sector.

Table 2.1.4.3. Average job specificities for different industries

Industry	Job specificity
Agriculture, hunting and forestry	4.49
Manufacturing	1.21
Construction	1.93
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	2.70
Hotels and restaurants	2.33
Transport, storage and communication	3.95
Financial intermediation	4.48
Real estate, renting and business activities	2.18
Public administration and defence; compulsory social security	1.44
Education	0.76
Health and social work	3.98
Other community, social and personal service activities	2.56

2.1.5. Testing the validity of the job-specificity measure

To test the validity of the job specificity measure, this measure is used as the estimator of the probability of company financed training. If firms are likely to pay for training in critical skills as previously proposed in this chapter, then firms' decisions about financing training will depend on job specificity. This means that the higher the job specificity of a vacancy, the higher the probability of offering training. Higher job specificity in a vacancy indicates that the required human capital is more specific in that job, and as the firm is assumed only to offer training in critical skills, then that kind of training is more specific. As it is natural to assume that firms are more likely to offer specific training, then it could be concluded that the probability of firm-paid training will increase with the job specificity of a vacancy.

Unfortunately, the data from the job advertisements does not contain information about whether the companies actually offer training for the employee hired for that job. Neither does the information in the advertisements say anything about who will pay for the training. But it is quite natural to assume that if the firm announces in the job advertisement that the employee will receive training, the firm will pay for it. Although it might be possible that after hiring a worker who has been promised training, the worker may not be offered company financed training, this case is not likely as training is offered in the database only in the case of 41 vacancies out of 1268. The problem is likely to be the other way round as it is quite clear that firms actually pay for training more frequently than they announce in their advertisements. If this is true, then only a fraction of the firms that offer training announce it in their advertisements, and it can therefore be assumed that firms only announce training if they are absolutely sure they can offer it; in other cases they do not announce it because there is some risk they cannot offer the training.

Besides job specificity, there may be several other factors that influence the probability of being offered on-the-job training. These factors can be divided into human capital, industry-specific and occupation-specific and firm-specific factors. Previous job experience can also be one of them as it is part of human capital. The dataset includes information about required work experience, which can be divided into general and occupation-specific experience. Formal education is another component of human capital, which will probably have an effect on the potential for receiving training. Usually, workers with a higher educational level receive more training from employers. Three educational levels are distinguished in the model for the probability of being offered training. The educational levels are based on the ISCED97 classification. So, educational level 1 here consists of the ISCED97 levels 0–2, level 2 of ISCED97 levels 3–4, and education level 3 of ISCED97 levels 5–6. Industry and occupation specific factors can also have an effect on offering training because besides differences in the job-specificities in different industries and occupations, which were previously investigated, there can also exist industry or occupation specific effects of offering on-the-job training. The empirical

research of Estonian data has indicated that training is offered more frequently in the secondary and tertiary sectors than in the primary sector (Leping and Eamets, 2005). The location of the job is the only firm-specific variable in the dataset, but in order to control for a possible firm-size effect on the offering of training, the firm size should also be accounted for, but unfortunately the dataset does not enable us to do so.

The probability of offering training is estimated for each vacancy using a logit-model. The dependent variable is the announcement of training, which is assumed to have the value 1 if the advertisement indicates that the company will provide training for the employee, and the value 0 in other cases. The explanatory variables used in the regression models are listed in Table 2.1.5.1.

Table 2.1.5.1. Explanatory variables used in the regression models

Variable	Description
JOBSPEC	job specificity of the vacancy
EXPERIENCE	dummy variable for required previous job experience
SPECEXP	dummy variable for required previous occupation-specific experience
EDUC3	dummy variable for required level 3 education
EDUC2	dummy variable for required level 2 education
MANAGER	dummy variable for legislators, senior officials and managers
PROFESSIONAL	dummy variable for professionals
TECHNICIAN	dummy variable for technicians and associate professionals
CLERK	dummy variable for clerks
SERVICEWORKER	dummy variable for service workers, and shop and market sales employees
SKILLAGRI	dummy variable for skilled agricultural and fishery workers
CRAFT	dummy variable for craft and related workers
OPREATOR	dummy variable for plant and machine operators and assemblers
CONSTRUCTION	dummy variable for construction
TRADEHOT	dummy variable for wholesale and retail trade, repair of motor vehicles, hotels and restaurants
TRANSPORT	dummy variable for transport, storage and communication
FINANCE	dummy variable for financial services, real estate, rental and business activities
PUBLIC	dummy variable for public administration and defence, compulsory social security, education, health and social work
TALLINN	dummy variable for the location of employment (TALLINN=1 if the vacancy is located in the capital, TALLINN=0 otherwise)

Those explanatory variables are job specificity, two dummy variables for required previous job experience, two educational dummies where level 1 education is selected as a basis, eight occupational dummies (elementary occupations are selected as a basis), five industry dummies (agriculture, forestry, fishing, mining and quarrying, manufacturing and electricity, gas and water supply industries are selected as a basis) and one location dummy.

The aim of the regression analysis is to estimate the effect of job specificity on the announcement of training. According to the theoretical considerations, the announcement of training should increase the job specificity. Therefore, the empirical support for a positive relationship between job specificity and the announcement of training will confirm the validity of the job specificity measure. In order to test for the stability of the results, six different regression models are estimated. Model 1 only includes job specificity as an explanatory variable. In model 2, required experience is added and in model 3, required education is added. The first three models include only human capital variables as explanatory variables. Models 4 and 5 do not contain human capital variables, but they include occupation-specific and industry specific variables. Model 6 includes all human capital, industry-specific and occupation-specific and firm-specific variables.

The estimation results are presented in Table 2.1.5.2. As the number of vacancies where training is announced is small, the majority of the parameter estimates of the model are not statistically significant. Only job location, technician occupation, required previous job experience and job specificity have statistically significant effects on the announcement of training. The estimates of job specificity parameters are positive for all the model specifications. Although they are only weakly statistically significant for two of the models and insignificant for four models, the values of this parameter are stable across all models. Therefore, it could be argued that the statistical insignificance of the estimates for this parameter is likely to be caused by the low number of job advertisements where training is announced. As the estimates of the job specificity parameters are positive and stable regardless of the specification of the regression model, then it could be concluded that a positive relationship exists between job specificity and the announcement of training.

If the results of the different regression models are compared according to the goodness of fit statistic, it could be said that industry-specific, occupation-specific and firm-specific are more important determinates of the announcement of training than human capital variables. Still, the required human capital explains the announcement of training to some extent. Among the required human capital variables, job specificity is one of the determinants of the announcement of training. Higher job specificity results in a higher probability that training is announced in the job advertisement. This result is in line with previously stated theoretical considerations and confirms the validity of the job specificity measure proposed in this article.

Table 2.1.5.2. Estimation results

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Coef	se	Coef	se	Coef	se	Coef	se	Coef	se	Coef	se
JOBSPEC	0.089*	*0.054*	0.078	*0.054*	0.078	*0.057*	0.071	*0.067*	0.097*	*0.057*	0.060	*0.068*
EXPERIENCE			0.692	*0.444*	0.729*	*0.442*					0.737	*0.457*
SPECEXP			0.141	*0.413*	0.085	*0.415*					0.075	*0.428*
EDUC3					–0.231	*0.528*					–0.488	*0.588*
EDUC2					0.480	*0.376*					0.335	*0.398*
MANAGER							–0.122	*0.812*			–0.076	*0.833*
PROFESSIONAL							–0.097	*0.748*			0.204	*0.794*
TECHNICIAN							1.100*	*0.610*			1.161	*0.627*
CLERK							–0.332	*1.150*			–0.235	*1.152*
SERVICEWORKER							0.355	*0.666*			0.190	*0.680*
CRAFT							–0.148	*0.671*			–0.305	*0.682*
OPREATOR							–0.712	*1.156*			–0.068	*1.157*
CONSTRUCTION							–0.028	*0.580*	–0.017	*0.574*	0.012	*0.587*
TRADEHOT							–0.241	*0.543*	0.051	*0.483*	–0.304	*0.544*
TRANSPORT							–0.746	*1.094*	–0.869	*1.089*	–0.751	*1.097*
FINANCE							–0.333	*0.475*	–0.096	*0.457*	–0.374	*0.475*
PUBLIC							–1.122	*0.722*	–0.984	*0.679*	–0.972	*0.727*
TALLINN							–0.857***	*0.331*	–0.817**	*0.329*	–0.848**	*0.333*
CONSTANT	–3,610***	*0,215*	–3,697***	*0,236*	–3,900***	*0,336*	–2,981***	*0.610*	–2.984***	*0.376*	–3.146***	*0.637*
Sample size	1268		1268		1268		1266		1268		1266	
Pseudo R^2	0.007		0.012		0.022		0.061		0.032		0.072	

Note: Variable SKILLAGRI is dropped as it predicts failure perfectly, *** – statistically significant at 99%, ** – statistically significant at 95% * – statistically significant at 90%
Source: author's calculations

2.1.6. Conclusions

The aim of this chapter was to construct a skill-based measure for human capital specificity. For that reason, the number of jobs where a particular skill affects productivity was used to define skill specificity, which describes the specificity of skills and as human capital consists of skills − also the specificity of human capital. All the skills that affect productivity on a particular job are counted as critical skills for that job. According to the critical skills, a measure for job specificity was developed. Job specificity can be interpreted as a measure of human capital and if the critical skills are more specific, then the required human capital on that job is more specific. As firms should offer only training in critical skills, then over the time of employment a worker's skills will become more similar to the job's critical skills and so the required and actual human capital of a worker will become more similar.

To provide a practical example of the skill specificity measure, skill specificities and job specificities for different skills and jobs were calculated using data from job advertisements. The results indicate that Estonian and Russian language skills are the most general and some types of driving skills the most specific. In general, more specific human capital is required in occupations that require higher qualifications, such as legislators, senior officials and managers. There also exist remarkable differences in the specificity of the required human capital between different industries, as the job specificities in the primary and tertiary sector are remarkably higher than in the secondary sector. The industrial differences in the specificity of required human capital are larger than the corresponding occupational differences. To test the validity of the job specificity measure, this measure is used to estimate the announcement of training in job advertisements. Six different specifications of a logit regression model were estimated. The estimation results indicate that regardless of the model specification there exists a positive relationship between job specificity and announced training. This result confirms the validity of the job specificity measure proposed in this article.

Unfortunately, the quality and size of the dataset is not very good, and therefore, the estimation results are statistically insignificant in many cases. However, the results are still stable for different model specifications, and therefore, it could be argued that the statistical insignificance of the estimates is caused by the small sample size. So it remains for future work to test the validity of the human capital specificity measure by using better data. One possibility is to repeat similar calculations on a larger dataset, and this could be constructed, for example, by extending the period, preferably over the whole year, which will also eliminate the seasonality problem. The second possibility is to acquire data about actual firm-financed training as well as more detailed and more complete information about skills. That kind of data could be collected via a questionnaire survey among employers. Alternatively, it could be possible to use data from the vocational standards or job descriptions that deal

with critical skills in different jobs and merge this with data about firm-financed training.

2.2. The evolution of the public–private sector wage differential during transition in Estonia

2.2.1. Introduction

Public sector pay has always attracted policy attention in any country, and Estonia is no exception. There are many reasons why public sector wage levels are an essential and acute issue. In modern economies, the public sector wage bill is an important item in public sector budgetary costs, and it is one of the determinants of the balance of the public sector budget. Public sector wage levels can also affect wages in the private sector and have an influence on the inflation rate. Wages that are too high in the public sector compared to the private sector can cause inflation and budgetary deficits, wages that are too low will decrease motivation among employees in the public sector and in that case it will be difficult for the public sector to hire skilled and loyal employees, and this will in turn damage the performance of public sector organisations.

The transition process may have a significant influence on the public-private sector wage differential. The transition process includes huge restructuring processes, which usually involve mass-privatisation of public enterprises and reforms in public administration. These kinds of processes may cause differences in the growth rates of public and private sector wage rates.

Although a remarkable number of articles have been written, where public-private sector wage gaps have been estimated empirically based on both US and European data, there has been little research in this field for transition countries. Public-private sector wage differentials in transition countries have been estimated by Adamchik and Bedi (2000), Reilly (2003), Jurajda (2003) and Leping (2005), but they have estimated them only on the basis of a single year of data; although, Jurajda (2003) has investigated this issue on data from 1998, 2000 and 2002. These articles do not provide much information about the evolution of wage differentials during the transition period nor provide a sufficient answer for the question of how transition affects public-private sector wage differentials. The aim of this chapter is to estimate the public–private sector wage differential in Estonia during the entire transition period from early transition to EU accession. The data used for this comes from Estonian Labour Force Surveys from 1989 to 2004. A quantile regression will be used to estimate the public-private sector wage differential. This approach allows us not only to estimate how working in the public or private sector affects employees wages on average, but it also allows us to investigate the effect of working in a particular sector depending on the potential wage of the employee.

The chapter is organised as follows. First, an overview of the theoretical background to this problem will be provided. After that, there will be an overview of previous empirical research in this field. Then, possible factors influencing the public-private sector wage differential are analysed in the Estonian context, and the trends in public and private sector employment and wages during the transition period will be described. Next, the data used in this chapter will be described, and this is followed by a description of the specification of the regression models estimated in this chapter. Finally, the results of the quantile regression analysis will be presented and conclusions will be drawn.

2.2.2. Literature overview

The public sector in this chapter is defined by ownership. The public sector consists of all kinds of organisations that are owned by the central government or local authorities. It also includes enterprises, where the central government or local authorities own more than 50% of stock capital.

In the previous chapter it was stated that public sector employees generally have higher wages than private sector employees. To some extent public-private sector wage differences can be explained by differences in human capital, but there exist many non-productivity related explanations too – such as, differences in the bargaining power between employees and employers, wage setting processes and working conditions.

Differences between public and private sector wages can be dependent on economic cycles. If there are differences in the cyclical responsiveness of the earnings of public and private sector employees, then it may cause short-term changes in the public-private sector wage differential. Earnings of private sector employees generally vary pro-cyclically. Thus, if the pay structure is less flexible in the public sector and cannot react after an economic boom or a crisis, the public-private sector wage differential will vary counter-cyclically (Melly 2005). Borjas (1984) presents another theory for why the public-private earnings differential may vary over time. In his model, electoral wage cycles are generated as a result of optimising behaviour on the part of voters, bureaucrats and the government. His empirical analysis for the US indicates that federal wage rates rise significantly more in election years.

The public-private sector wage gap can be affected by the transition process. Jurajda (2003) has illustrated transition in the labour market via three aspects: reallocating workers and jobs from old post-communist firms to newly established private enterprises, providing incentives for human capital investment decisions, and coming to terms with new anti-discrimination labour market legislation motivated by looming EU accession. All these aspects influence employment and wage levels in both public and private sectors. In a planned economy, employment in the private sector is very low compared to the

public sector. Transition brings changes to that situation as most of the state-owned enterprises will be privatised and at the same time new private companies will emerge. Both these processes cause extensive labour re-allocation, a decrease in public sector employment and an increase in private sector employment. In most former planned economies, these kinds of processes caused a rise in unemployment and so both employment and output can be described using a U-shaped curve across the transition period, where employment and output decline during early transition as the decrease in public sector employment is greater than the increase in private sector employment, but in the second stage of transition, when the re-allocation of labour comes to an end, employment and output start to increase (Boeri and Terrell 2002). In planned economies, wage differences are modest compared to wage differences in market economies, and wages usually do not correspond to human capital. Several authors, for example, Munich et al. (2005) and Jones and Simon (2005), have found no or only modest returns on human capital in planned economies. When the transition starts, returns on human capital will increase and the wage structure will become more and more similar to the wage structure of capitalist countries. EU accession is also likely to have an impact on employment and wages, as it requires the implementation of several labour markets regulations.

The transition process from a planned economy to a market economy can influence the public-private sector wage gap in several ways. If private sector firms during transition are, ceteris paribus, more efficient and less restricted by administrative wage setting than state-owned enterprises and other public sector organisations, then it could be expected that wage levels in the private sector will be higher (Adamchik et al. 2003). Furthermore, if wage inequality in the private sector is higher, then the public-private sector wage differential will be more negative among employees with a higher income. On the other hand, as most private sector employment growth comes from small enterprises and the average size of the private companies is smaller than in the public sector, then there could be less union bargaining power in the private sector and less scope for efficiency wage mechanisms, which could lead to lower private sector wages. Boeri and Terrell (2002) argue that transition would lead to new job matches that fit better with the heterogeneous skills and preferences of workers. As most of the new jobs are located in the private sector then it could be expected that private sector jobs match employees' skills and preferences better than public sector jobs, which could lead to higher wages in the private sector. But if it takes time to allocate workers efficiently in the private sector then it could be that during early transition, when matches in the private sector are not so good, the wage differential between the two sectors is smaller, but it will increase over time as labour allocation efficiency improves in the private sector. At the same time, the public sector is also going through a process of reorganisation and matching quality in the public sector should increase too, which increases public sector wage levels. So the wage differential depends on the speed of improvements in the matching of efficiency in the two sectors.

There has been little research on public-private sector wage differentials in transition countries. In the case of Central and East European countries there is one paper by Adamchik and Bedi (2000) where this problem is analyzed on the basis of Polish data. They used data from the Polish Labour Force Survey, which was conducted in 1996. So the data comes from a period when Poland was in the middle of its transition from a planned economy to a market economy. Their study shows that wages in the private sector are higher and the gap is especially large for male workers with a university education. They also point out that for males, the extent of the wage gap for those with a university education and the negative selection effects suggest that the public sector may be facing difficulties in retaining and recruiting highly educated and high calibre individuals. Additionally, they state that even if there are no recruitment problems, widening wage gaps might promote moonlighting. Reilly (2003) has written a paper about the public-private sector wage differential in Serbia, and his analysis is based on data from 1995 to 2000. Results from this paper are somewhat controversial and questionable as the estimates suggest that the hourly wage premium for a private sector job at the 50th percentile of the conditional wage distribution was just over 20% in 1995, insignificantly different from zero in 1996, 1997 and 1999, and nearly 24% in 1998. Leping (2005) estimated public-private sector wage differentials in Estonia in 2003, and found that the public-private wage differential is zero for the lower quantiles and it is negative for the higher quantiles. Jurajda (2003) investigated the evolution of wage levels in new and old sectors during the transition period in the Czech republic. His definition of new and old sectors does not exactly correspond to private and public sectors as he defines the new sector as private firms started during the transition period and the old sector both state owned firms as well as privatised old public sector companies. He finds that during early transition wage levels in the private sector are higher than in the public sector, but during the transition process this difference disappears. He argues that this kind of result can be caused by the self-selection process, as those workers that would have benefited most from leaving public sector jobs for private sector jobs, were probably the first to change sector. If a wage premium arises from the rent received from first-mover advantage, then this advantage shrinks over time as private employment increases. He also investigates new-old sector wage gaps between different industries and finds that there is little industry heterogeneity in new-old wage differentials.

According to the previous literature, it is quite difficult to formulate a hypothesis about the public-private sector wage differentials in Estonia, as little research has been completed on this issue in countries with the same state of economic development as Estonia. The evidence from the highly developed western countries shows that on average there can be a positive wage gap between public and private sectors, but in some cases, such as Poterba and Rueben (1994), there are no differences on average. Public sector wages compared to private sector wages tend to be higher for low-waged workers and

lower for high-waged workers. Women and workers with lower education usually benefit more from working in the public sector. In some cases, the public-private wage gap can be negative too, for example, for highly educated men. On the other hand, in the transition countries the situation is the opposite, as wages tend to be higher in the private sector in all categories. But these transition countries were investigated in the mid 1990s and the situation could be significantly different from conditions in present-day Estonia.

2.2.3. Factors influencing the public-private wage differential in Estonia

In the following section several factors that should have an impact on the public-private sector wage differential, as pointed out in the previous chapter, are investigated. Among these factors the dynamics of the bargaining power of trade unions both in the public and private sector and the evolution of non-wage labour compensation in both sectors will be investigated.

The effect of trade unions on employment and wage levels in Estonia is likely to be low, as trade unions and collective bargaining do not play a significant role either in the public or private sector in Estonia. In 2000, only 16% of the employed were members of trade unions and collective bargaining covered only 14% of wage contracts. Trade union membership is higher in the public sector since 20% of public sector employees and 8% of private sector employees were union members in 2000. Trade union membership has decreased over the transition period, although precise data does not exist about trade union membership over the entire transition period (Kallaste, 2004). Collective bargaining is used more in the sectors of healthcare and education, which belong mostly to the public sector, and also in transport, energetics and mining, which belong both to the public and private sector (Rõõm, 2003). As the public sector tends to be more unionized, then the low unionization of the Estonian labour market should lower the public-private sector wage differential.

Some public sector employees have better access to fringe benefits and job protection. Public sector employees have lengthier paid vacations and in very few cases better pension schemes, but not all public sector employees are eligible for these kinds of benefits. Fringe benefits are most generous for civil servants, whose employment is regulated by The Public Service Act (Avaliku teenistuse seadus). That legislation was enforced in 1995 so it could be expected that from that year on wage growth in the public sector could be somewhat lower than in the private sector, as civil servants could receive more fringe benefits than private sector employees. Civil servants in the sense of this law are employees of the following institutions: ministries, the State Chancellery, the Office of The President, the Chancellery of the Riigikogu, the Office of the Chancellor of Justice, the State Audit Office, The Supreme Court of Estonia, public offices and county governments.

Civil servants are entitled to 35 calendar days of base vacation in comparison to 28 calendar days of base vacation for other employees. Furthermore, one additional vacation day is given for the third and every additional year of service, but no more than a total of 10 days of additional vacation is given. Once every five years, public servants have the right to study-leave for professional development, with pay, for a period of up to 3 months. Civil servants are entitled to forego repayment of the state educational loan, after graduating from an educational institution, in that every year of service is counted as repayment of one-fifth of the loan (Õppelaenu… 2004). Those studying at a state university, with at least one parent who is or was working in the public service for at least 15 years, have the right to the reimbursement of tuition fees from state budget funds. The same right is accorded to a person whose parent or spouse, while employed in the civil service becomes disabled or dies as the result of a work injury, an occupational disease or an attack made against an official in the course of duty (Õppetoetuste… 2003). Civil servants are entitled to job training financed from the general government budget, and the expenditures on training range from 2 to 4% of the wage bill of civil servants. Public servants have the right to additional state old-age pensions with the accrual of years of service. For 10–15 years the pension is increased by 10 per cent, 16–20 years of service guarantee 20 per cent additional pension, 21–25 years, 25 per cent, 26–30 years, 40 per cent and over 30 years the pension is increased by 50 per cent (Avaliku…1995). There is also better employment for civil servants in comparison to other employees as they have lengthier required notification periods for the termination of an employment contract and higher compensation in the case of a dismissal (table 2.2.3.1).

Table 2.2.3.1. Minimal compensation and notification periods in the case of dismissal

Tenure	Compensation		Notification period	
	Public service	Other	Public service	Other
less than 3 years	2 months' salary	2 months' salary	2 months	1 month
3–5 years	3 months' salary	2 months' salary	2 months	1 month
5–10 years	6 months' salary	3 months' salary	3 months	1 month
more than 10 years	12 months' salary	4 months' salary	4 months	1 month

Source: Avaliku teenistuse seadus, Eesti Vabariigi töölepingu seadus

Besides civil servants there are some other categories of public sector employees, who receive special fringe benefits. Pedagogues, such as teachers in public secondary, vocational, comprehensive or elementary schools and kindergartens, teaching staff at public universities and teachers in public extracurricular schools are entitle to be offered 160 hours of training each five years. These training costs are covered from the central governmental budget and the size of the training costs is 3% of the pedagogues' wage costs (Õpetajate…. 2000).

Mobility between different sectors has also been relatively high in Estonia; the labour hiring and separation rates have been around 16–18% in the period from 1998–2000, but at the same time the geographic mobility of the Estonian labour force has been low. (Rõõm 2002) High inter-sectoral labour mobility could lower the monopsony power of public sector employers, which should increase wages in the public sector, but on the other hand, the low geographic mobility of labour will decrease public sector wages, especially in peripheral regions.

If private sector wages are more sensitive to cyclical fluctuations then the public-private sector may depend on economic cycles. During the early 1990s, real GDP growth in Estonia was negative, but since that time it has been positive. GDP growth peeked in 1997, but dropped in 1999 as a result of the Russian crisis. From 2000 to 2004 growth has been high and stable. If the public-private sector wage differential were counter-cyclical then it would be expected to be higher during the early transition and Russian crisis.

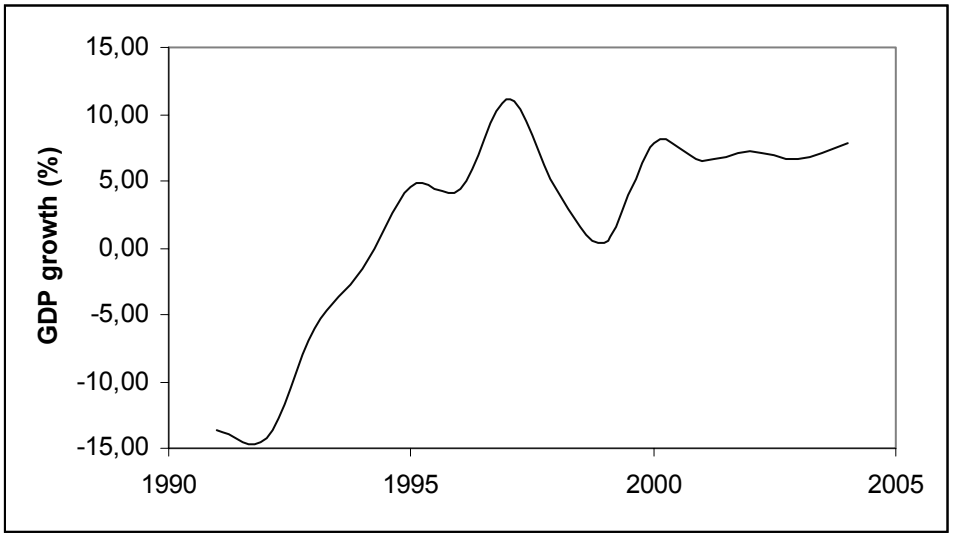

Figure 2.2.3.1. Real GDP growth 1991–2004

Source: Statistical Office of Estonia

Political cycles are determined by elections, and in case of Estonia there are two different types of elections: parliamentary (Riigikogu) elections and local authorities elections. There were also public presidential elections in 1992, but in latter years an election body consisting of representatives of parliament and local authorities has elected the president. But as the president in Estonia has a mainly representative task and does not have much power to influence public sector wages, then presidential elections are neglected in this article. It can be considered that parliamentary elections have a larger impact on public sector wages than local authorities' elections, since central governmental employment has been higher than municipal employment during the entire transition period.

There were parliamentary elections in 1992, 1995, 1999 and 2003 and local authorities elections in 1993, 1996, 1999, 2002 and 2005. If public sector wages are higher in the election year then it could be expected that the public-private sector wage differential will be more positive in these years

2.2.4. Trends in public and private sector employment and wages

As mentioned earlier, the transition from a planned economy to a market economy will result in a decline in public sector employment and an increase in private sector employment, and Estonia is no exception in that case.

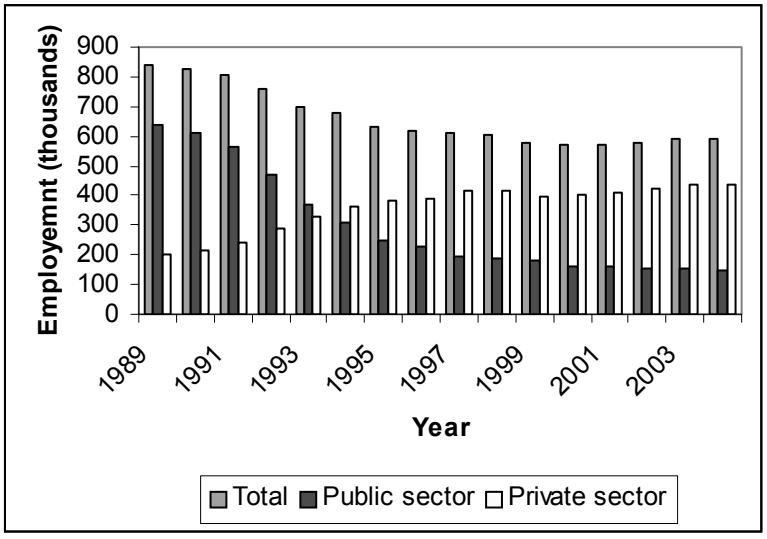

Figure 2.2.4.2. Employment in Estonia 1989–2004

Source: Statistical Office of Estonia

As can be seen from figure 2.2.4.2 there has been a remarkable drop in public sector employment, which has been larger than the rise in public sector employment, and therefore, total employment has declined during transition. The sharpest decline in public sector employment was in 1993, when it decreased by 23%. Although public employment stabilized at the end of the period, it has declined in every single year except 2001. Throughout the entire transition period, public sector employment has dropped by 76.5%. The stabilization of public employment can be explained by the fact that the privatization process had ended by the start of the 21st century. During early transition, employment growth in the private sector was rapid as yearly growth rates exceeded 10%. There were slight decreases in private employment in 1998

and especially in 1999, when the Russian crisis caused a recession. During recent years, private employment has slightly increased. Private sector employment in 2004 was 2.16 times higher than in 1989, so it has more than doubled in 15 years. Total employment declined between 1989 and 2000, but started to rise from then on, but still it is 30% lower than in 1989. That kind of decline in employment is partly caused by the 14% decline in population during that period, but the employment rate has also decreased from 76.4% in 1989 to 59.7% in 2004. The drop in the employment rate could be caused by the decrease in labour force participation, especially among women.

The transition period is also characterized by rapid wage growth in Estonia, the nominal growth rates were especially high during the early transition period, but they were affected by a high inflation rate (figure 2.2.4.3).

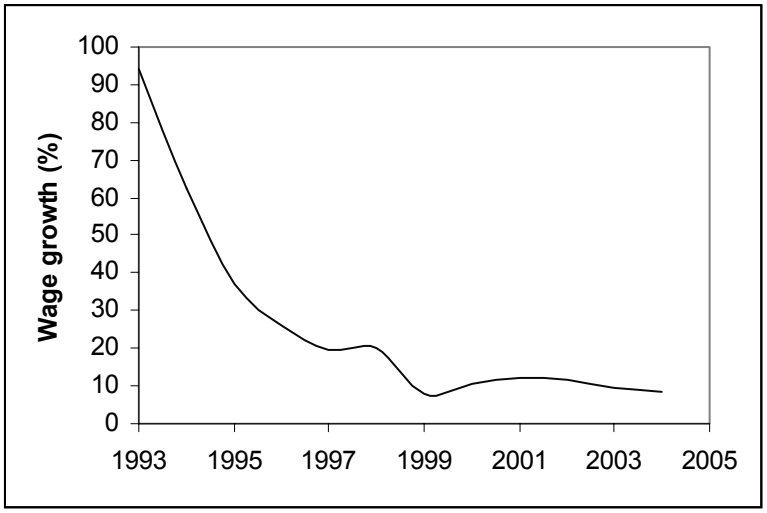

Figure 2.2.4.3. Nominal wage growth in Estonia 1993–2004

Source: Statistical Office of Estonia

The dynamics of public and private sector wages has been generally quite similar, as both have increased remarkably during the transition period, but there have existed some differences in the level of wage rates according to each sector. It can be seen from figure 2.2.4.4 that at the end of the Soviet period and during early transition, wages in the private sector were higher than in the public sector. That kind of difference was largest in 1989, when the average wage in the private sector was more than double of the average wage in the public sector. By that time several new small private enterprises had recently been founded and wage levels in these firms were much higher than in the public sector. Since then, wage differences during two sectors have decreased and this kind of wage dynamics fits the theoretical U-shaped curve of productivity during transition. The kink in the wage curves at 1997 is caused by

the changes in ELFS data collection from gross wages to net wages. It has to be also kept in mind that illegal employment and tax evasion have been problems during the transition period, especially during early transition. As these problems have occurred in the private sector then actual labour income in the private sector is underestimated by both official wage statistics provided by Statistical Office of Estonia and probably also by reported wages in the ELFS. Therefore, the wage differential calculated in this article is probably biased. The hypothesis that the public-private sector wage differential is countercyclical also finds some support, as can be seen in 1999 as a result of the Russian crisis, public sector wages were higher than private sector wages. From 2002 afterwards, Estonia has experience high GDP growth rates, and private sector wages have been higher than public sector wages.

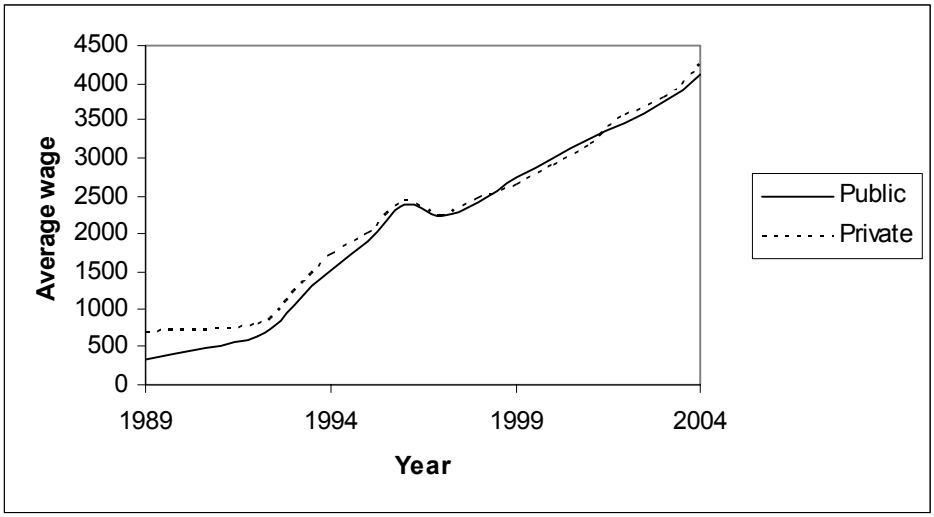

Figure 2.2.4.4. Average wages in the public and private sector in Estonia 1989–2004

Source: Estonian Labour Force Surveys

Differences in average wage rates indicate that there exists an unconditional wage differential between these two sectors. An unconditional public-private sector wage differential can be caused by variation in the differences in the levels of human capital, abilities and other personal characteristics between the employees in the public and private sector. As several studies conducted in other countries (e.g. Poterba and Rueben, 1994; Disney and Gosling, 1998; and Mueller, 1998) have shown, since working in the public or private sector has a different effect on an employee's wage depending on the level of education and other personal characteristics of the employee, then it will be necessary in order to find out the "true" effect of sector choice on the wage rate, to estimate the conditional public-private sector wage differential. This will be done in the next sections of this article by using quantile regression equations.

2.2.5. Data

The data used in this article comes from the Estonian Labour Force Surveys (ELFS), which cover wage data from 1989 to 2005. The first Estonian Labour Force Survey (ELFS) was conducted in spring 1995 and it consists of a retrospective and current survey. The retrospective part of the ELFS 95 reconstructs major labour market flows from 1989 to 1995 and wage data about 1989 and 1992–1994. The current part of the survey includes wage data about 1995. The wage data about 1989 is probably the most unreliable as it was obtained through a questionnaire survey six years after the actual time of the wage payments. Wages from 1989 are given in roubles, whereas wages from 1992 to 2005 are given in Estonian kroons. Similar surveys were conducted in 1997 (with the retrospective section covering 1995–1996, full years), in 1998 (retrospective covering 1997) and in 1999 (retrospective covering 1998). Since 2000 the design of ELFS has changed and it has been conducted as a quarterly continuous survey.

The age limits of the sample are set at 15–74 years, but the retrospective part of ELFS 97 covers individuals aged from 15 to 69 years. ELFS is a household survey, which includes only the residents of Estonia. This means that foreign workers are not included in the sample, but this is not likely to be a problem, as the number of foreign employees has been modest Estonia during the entire transition period and furthermore very few of the foreigners in Estonia work in the public sector.

Until 1996, the ELFS contains reported data about gross wages; from 1997 net wages are reported. As the Estonian income tax system is fairly simple and proportional, gross wages could be calculated on that data. As the wage data is based one a household questionnaire survey, the wages reported here may differ from the official wage statistics based on the data from the employers, as employees may report data about unofficial or illegal employment, which does not occur in the official wage statistics. The ELFS contains data about monthly wages, but as average weekly working hours are also reported there, then it is possible to calculate the hourly wages.

The sample sizes of the ELFS vary over time. In 1995 it was 9 608 persons, 1997 5 051 persons, 1998 13 090 persons, 1999 12 703 persons. Also, the sample frames have changed over the years; the sample frame for the ELFS in 1995 was the database of the 1989 population census, for other ELFS surveys the 1997–1999 population register has been used. For ELFS 2000 the more recent survey database of the 2000 population census has been used as a sample frame. There are also differences in the sample design as stratified simple random sampling was used in the ELFS 95, cluster samples in subsequent ELFS.

2.2.6. Model

Due to the differences in the wage dispersion between the public and private sector, the public-private sector wage gap is usually not constant across the wage distribution. Therefore, since Poterba and Rueben (1994), it has been a standard approach to apply a quantile regression to the analysis of public-private sector wage gaps. This method permits estimating the conditional public-private sector wage gap at any point along the wage distribution. The purpose of the ordinary least squares estimation is to answer the question "How does the conditional mean of a random variable *Y* depend on some explanatory variables *X*?" usually under some assumptions about the functional form of, for example, linearity. Quantile regression enables us to pose such a question at any point in the conditional distribution of a random variable *Y*. This technique allows the conditional public private-sector wage gap to vary across the wage distribution.

In this chapter, the quantile regression method is used to estimate the public-private sector wage gap. As the number of monthly working hours differs across individuals and monthly wages depending on the number of monthly working hours, then it would be more useful to model hourly wages instead of monthly wages. Unfortunately, the dataset does not include information about the monthly working hours of employees in the case of an entire year. Therefore, in order to make the estimation results on the data from different years comparable, a natural logarithm of monthly wages is used as a dependent variable in the quantile regression. Fortunately, the data allows us to control for part-time employees, which allows us to at least partly account for differences in working hours.

In order to estimate the conditional public-private sector wage gap, the effect of other factors has also to be accounted for. The quantile regression equation estimated in this chapter is as follows:

$$Q_{Y_i}\left(\tau|X\right) = X_i\beta_\tau + PUBLIC_i\chi_\tau$$

where Y_i is the log-hourly wage for worker i, X_i is a set of explanatory variables for worker i, $PUBLIC_i$ is a dummy variable for working in the public sector ($PUBLIC_i = 1$ if the worker i is employed in the public sector and $PUBLIC_i = 0$ if the worker i is employed in the private sector). The public sector here consists of all kinds of organizations that are owned by the central government or local authorities. β_τ and χ_τ are the parameters of the model in the case of estimating the τ-th quantile. It has to be kept in mind that using a dummy variable for identifying public and private sector employees imposes the restriction that the returns on observed characteristics are the same for the two sectors and that public-private differences only depend on a shift factor.

The set of explanatory variables used in the regression equations is described in table 2.2.6.1.

Table 2.2.6.1. List of explanatory variables in the regression model

Variable	Description
AGE	age of the worker by the time of the survey (years)
AGE^2	aged squared (calculated from the previous variable)
TENURE	time worked on the current job (years)
MANAGER	dummy variable for legislators, senior officials and managers
PROFESSIONAL	dummy variable for professionals
TECHNICAN	dummy variable for technicians and associate professionals
CLERK	dummy variable for clerks
SERVICEWORKER	dummy variable for service workers and shop and market sales workers
SKILLAGRI	dummy variable for skilled agricultural and fishery workers
CRAFT	dummy variable for craft and related workers
OPREATOR	dummy variable for plant and machine operators and assemblers
TALLINN	dummy variable for the place of employment (TALLINN=1 if the job is situated in the capital, TALLINN=0 otherwise
PARTTIME	dummy variable for part-time job (PARTTIME=1 if the average number of weekly work hours<35, PARTTIME=0 otherwise)
EDUC3	dummy variable for level 3 education
EDUC2	dummy variable for level 2 education
MARRIED	dummy variable for married workers
NONEST	dummy variable for non-Estonians by nationality
WOMAN	dummy variable for women

The first of these variables includes workers age and tenure. Next there are dummy variables for different occupational categories. The occupational categories used in the regression equation come from ISCO88 classification. Nine different occupational categories are distinguished here, and those are legislators, senior officials and managers, professionals, technicians and associate professionals, clerks, service workers and shop and market sales workers, skilled agricultural and fishery workers, craft and related trades workers, plant and machine operators and assemblers and elementary occupations. Elementary occupations are selected as a base, and eight dummy variables controlling for different occupational categories are entered in the regression equation. As there tend to exist remarkable regional differences in the wage levels in Estonia, a dummy variable controlling for the location of the job in the capital of Estonia is included. As there exist differences in the working hours then a dummy variable to control for part-time employment is included. To take account of the effect of education on wages, three different educational levels are distinguished

in this model. The educational levels are based on the ISCED97 classification. Education level 1 consists of ISCED97 levels 0–2, education level 2 of ISCED97 levels 3–4 and education level 3 of ISCED97 levels 5–6. In the model, education level 1 is selected as a base and dummy variables for educational levels 2 and 3 are included in the regression equation. There are also dummy variables for married workers, non-Estonians and women.

In this chapter the conditional public-private sector gap is estimated at five different conditional percentiles (0.1, 0.25, 0.5, 0.75, and 0.9) of the wage distribution separately for each year. These estimations show the conditional difference between public and private sector wages at the lower and upper 10% of the wage distribution, lower and upper 25% of the wage distribution and the median. The parameters of the regression equations are estimated on the sample of all employed workers, who have reported their wages in the ELFS survey.

2.2.7. Results

The results of the quantile regression estimations are presented in appendices 2.2.1 – 2.2.14. The estimates for the conditional public-private sector wage differential at different points of the wage distribution during the transition period are graphed on figure 2.2.7.1.

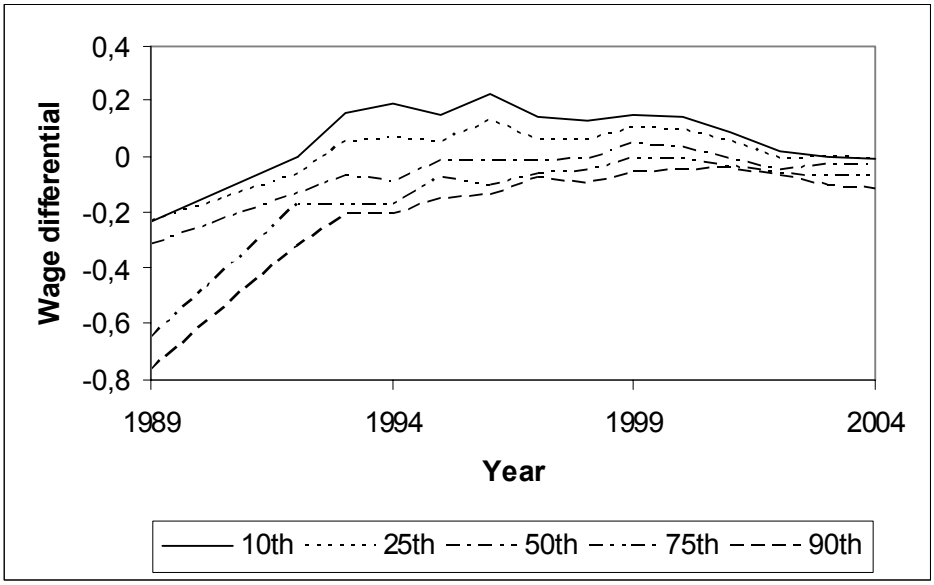

Figure 2.2.7.1. Estimated differentials between public and private sector wages in Estonia 1989–2004

In all years the conditional public-private sector wage differential appears to be more positive or less negative for lower percentiles and more negative or less positive for higher percentiles of the wage distribution. This indicates that employees with low potential wages tend to gain more or loose less from working in the public sector than workers with high potential wages. The differences between the wage differentials at different percentiles have decreased during the transition period, which may be caused by decreasing wage inequality, but it also indicates that the effect on wages of working in the public or private sector was more heterogeneous depending on the potential wage during earlier years.

During the first part of the transition period, the conditional public-private sector wage differential was negative for all percentiles. In 1989, conditional wages were dependant on the percentile from 23% to 76% lower in the public sector than in the private sector. It has to be kept on mind that in 1989 the privatisation process had not started and virtually all large firms were publicly owned. The private sector consisted of co-operatives and newly established small firms. The dataset does not include information for 1990 and 1991, so it is not possible to get to know how the wage differential has changed during these years, but in 1992 the ceteris paribus difference between public and private sector wages has decreased. For the lower end of the wage distribution there is no significant difference, while for median employees, private sector wages were 13% higher and for the 90th percentile the difference was 32%. So for the high waged workers, the public-private sector wage differential was more than twice lower in 1992 compared to 1989. The differences between the results of 1992 and 1993 are also remarkable. In 1993, the wage differential was positive for the lower part of the wage distribution (10th and 25th percentile) and negative for the median and the higher part of the wage distribution (50th, 75th and 90th percentile). The changes for the extremes of the wage distribution were greatest, while the median wage differential changed from 12% to 6% between 1992 and 1993. So during early transition, wages were initially higher in the private sector, but wage growth was more rapid in the public sector.

During the period from 1993 to 1995, which includes the major wave of privatisation when most public enterprises were sold to the private sector by 1995, the wage differential continued to decrease. This resulted in the fact that by 1995 conditional wages in both sectors were roughly equal at the median of wage distribution. From 1995 to 1998 the public-private wage differential remained fairly stable. This result indicates that the privatisation process caused public sector wages to increase at a higher rate.

In 1999, there was a remarkable rise in the conditional public-private sector wage differential, which could be the result of the Russian crisis. 1999 and 2000 were the only year during the whole period, when the public-private sector wage differential was positive. While there was a increase in the conditional public-private sector wage differential for median and upper part of the wage distribution, there were no significant changes for the lower part of the wage

distribution. That kind of the result indicates that private sector employees were more hurt by the economic downturn. It has also been taken into account that there was a significant increase in the unemployment rate during these years from 9.8% in 1998 to 13.6% in 2000.

During the period from 2001 to 2004 the conditional public-private sector wage differential has been slightly negative at the median, but for 2001 this difference was not statistically significant. The wage premium from working in the public sector for low waged employees (10th percentile) declined from 8.5% in 2001 to zero in 2004. The wage penalty from working in the public sector for high waged employees (90th percentile) increased from 4% in 2001 to 11% in 2004.

The effects of the transition process, and economic and political cycles on the public-private sector wage differential will now be empirically estimated. In order to do that, the previously estimated public-private sector wage differentials across different years will be analysed using a regression model, where the exogenous variables will explain the transition process and the economic and political cycles. As the evolution of the public-private sector wage differential is generally similar for all percentiles, then the conditional wage differential at the median will be chosen as the endogenous variable. There are several ways to describe the transition process, but according to the context of this chapter the number of public sector employees is probably a suitable variable. Alternatively, the number of private sector employees could be used as an indicator of the transition process. As can be seen from figure 2.2.4.2, public sector employment has declined over the transition period, so higher levels of public employment correspond to early transition and lower levels of public employment to late transition. Similarly, private sector employment has increased, so higher levels of private employment correspond to late transition and lower levels of private employment to early transition. In order to control for economic cycles, the GDP growth rate could have been a logical choice, but for the Estonian transition period it is very strongly negatively correlated with public employment and other possible variables of transition. Estonia experienced a sharp decline in GDP during early transition, for example in 1993 real GDP declined by 14.2% and in 1994 by 6.0%. This kind of reduction in output was not caused by the cyclical behaviour of the economy, but rather by the enormous structural changes associated with transition from a planned economy to a market economy. Probably only in the latter part of the transition period can fluctuations in GDP growth be explained by economic cycles. During the second half of the sample period, only in 1999 was the GDP growth rate significantly lower than the other years. During that year the Russian crisis reduced exports to Russia and other former Soviet countries, and this resulted in economic decline in Estonia. Therefore, the dummy variable to control for the Russian crisis is chosen to explain the economic cycles. To estimate the effect of the political cycles, two different dummy variables are used – the first parliamentary and the other for local elections. The regression equation will be

$$DIF_t = \beta_0 + \beta_1 PUBLEMP_t + \beta_2 CRISIS_t + \beta_3 PARLEL_t + \beta_4 LOCEL_t + u_t,$$

where DIF_t is the estimated conditional public-private sector wage differential (conditional difference in the natural logarithms of monthly wages) at the median of the wage distribution for year *t*, $PUBLEMP_t$ is the number of public sector employees (in thousands) for year *t*, $CRISIS_t$ is a dummy variable for the Russian crisis ($CRISIS_t = 1$ for year 1999 and $CRISIS_t = 0$ for other years), $PARLEL_t$ is a dummy variable for parliamentary elections ($PARLEL_t = 1$ for parliamentary election years and $PARLEL_t = 0$ for other years) and $LOCEL_t$ is a dummy variable for local elections ($LOCEL_t = 1$ for local election years and $LOCEL_t = 0$ for other years).

In order to test the robustness of the results of the indicator of the transition process, private sector employment is used as an explanatory variable instead of public sector employment and the following regression equation is estimated:

$$DIF_t = \beta_0 + \beta_1 PRIVEMP_t + \beta_2 CRISIS_t + \beta_3 PARLEL_t + \beta_4 LOCEL_t + u_t,$$

where, $PRIVEMP_t$ is the number of private sector employees (in thousands) for year *t*.

The parameters of these regression equations will be estimated on the basis of the sample from 1992 to 2004, the year 1989 is dropped because the economic situation during that year was completely different from other years.

Table 2.2.7.1. Estimation results for the regression equation (transition measured on the basis of public employment)

Variable	Coefficient	Standard Error	t-statistic
PUBLEMP	–0.00033	0.000091	–3.59
CRISIS	0.0720	0.041	1.74
PARLEL	–0.0074	0.022	–0.34
LOCEL	–0.0056	0.021	–0.27
CONSTANT	0.0462	0.021	2.18

N = 13 $R^2 = .7541$

Table 2.2.7.2. Estimation results for the improved regression equation (transition measured on the basis of public employment)

Variable	Coefficient	Standard Error	t-statistic
PUBLEMP	–0.00034	0.000075	–4.56
CRISIS	0.0615	0.027	2.29
CONSTANT	0.0462	0.019	2.44

N = 13 $R^2 = .6998$

Table 2.2.7.3. Estimation results for the regression equation (transition measured on the basis of private employment)

Variable	Coefficient	Standard Error	t-statistic
PRIVEMP	0.00062	0.00023	2.68
CRISIS	0.0920	0.047	1.96
PARLEL	–0.0140	0.025	–0.56
LOCEL	–0.0064	0.024	–0.26
CONSTANT	–0.2738	0.097	–2.84

N = 13 $R^2 = .6614$

Table 2.2.7.4. Estimation results for the improved regression equation (transition measured on the basis of private employment)

Variable	Coefficient	Standard Error	t-statistic
PRIVEMP	0.00067	0.00019	3.45
CRISIS	0.0763	0.032	2.43
CONSTANT	–0.2982	0.077	–3.86

N = 13 $R^2 = .6482$

The estimation results are presented in tables 2.2.7.1–2.2.7.4. The results indicate that the number of public sector employees is negatively related to the conditional public-private sector wage differential. The number of private sector employees is positively related to the conditional public-private sector wage differential. Therefore, it can be stated that the public-private sector wage differential tends to become less negative in the latter stages of transition. If the number of public sector employees decreases (and the number of private sector employees increases), which is a natural result of restructuring and privatisation processes, then public sector wages tend to rise faster than private sector wages. That kind of result fits the U-shaped curve of public sector productivity proposed by Jurajda (2003), but it contradicts the theoretical position of Boeri and Terrell (2002), who have argued that private sector wages should rise faster during the transition period as the quality of matching in the private sector will improve during the transition period. In the case of Estonia, it could have been the other way round as the matching quality in the public sector may have increased faster than in the private sector as before privatisation many public

enterprises had low labour productivity, but this issue needs further investigation, which is beyond the scope of this article. It is also relevant that the Russian crisis in 1999 had a positive effect on the public-private sector wage differential; the estimation results show that it had a remarkable effect on the wage differential and increased public sector wages relative to private sector wages by 6–9%. This result indicates that the public-private sector wage differential is counter-cyclical, but it has to be kept in mind that identifying economic cycles during the transition period is problematic and the transition period has only one recession year. Political cycles seem to have no statistically significant effect on the public-private sector. This holds both in the case of parliamentary and local elections. Therefore, election year variables were dropped in the improved regression equations, the estimation results for which are presented in tables 2.2.7.2. and 2.2.7.4.

2.2.8. Conclusions

The aim of this chapter was to estimate the public-private sector wage differentials in Estonia by applying a quantile regression method over the transition period from 1989 to 2004. The results of the regression equations show that in the case of all years the public-private sector wage differential is more positive or less negative for lower percentiles and more negative or less positive for higher percentiles of the wage distribution. This means that employees with low potential wages tend to gain more or loose less from working in the public sector than workers with high potential wages. The differences between the wage differentials at different percentiles have decreased during the transition period, so it can be concluded that the effect of working in the public or private sector has become more homogenous over the years.

During early transition, the conditional public-private sector wage differential was negative, but it decreased over time, which means that after Estonia gained independence, public sector wages increased faster than private sector wages. During the period from 1993 to 1995, which includes the major wave of privatisation, with most public enterprises having been sold to the private sector by 1995, the wage differential continued to decrease. From 1995 to 1998, the public-private wage differential was fairly stable. This result indicates that the privatisation process caused public sector wages to increase at a higher rate. In 1999, the public-sector wage differential become positive probably because of the effects of the Russian crisis. During the late transition and EU accession period from 2001 to 2004, the conditional public-private sector wage differential has been slightly negative at the median of the wage distribution.

Investigation of the effects of transition, and economic and political cycles on the wage differential show that if the transition is characterised by the volume of public employment, then it is negatively related to the public-private sector wage differential. This means that when the number of public sector

employees declined over the transition period, public sector wages increased faster than private sector wages. This kind of observation fits well with the U-shaped curve of public sector productivity proposed by Jurajda (2003). The Russian crisis in 1999 had a positive effect on the public-private sector wage differential; the estimation results show that it had a remarkable effect on the wage differential and increased public sector wages relative to private sector wages by 6%. This result indicates that the public-private sector wage differential has been counter-cyclical in Estonia. Political cycles do not have any significant effect on the public-private sector wage differential.

Appendix 2.2.1

Estimates for the parameters and standard errors of the regression model for 1989

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.039	0.0056	0.033	0.0042	0.032	0.0044	0.029	0.0057	0.032	0.0095
AGE^2	–0.00049	0.0001	–0.00041	0.00005	–0.00041	0.00005	–0.00037	0.00007	–0.00039	0.00011
TENURE	0.005	0.0013	0.004	0.0010	0.006	0.0011	0.006	0.0013	0.006	0.0023
MANAGER	0.327	0.0528	0.313	0.0406	0.300	0.0438	0.286	0.0568	0.378	0.0985
PROFESSIONAL	0.184	0.0517	0.175	0.0397	0.144	0.0429	0.108	0.0552	0.216	0.0958
TECHNICAN	0.076	0.0504	0.072	0.0388	0.047	0.0421	0.017	0.0543	0.110	0.0940
CLERK	0.086	0.0538	0.077	0.0422	0.041	0.0461	0.023	0.0592	0.058	0.1024
SERVICEWORKER	–0.039	0.0535	–0.004	0.0414	0.015	0.0449	0.006	0.0577	0.019	0.0996
SKILLAGRI	0.329	0.0702	0.389	0.0556	0.412	0.0607	0.330	0.0783	0.422	0.1334
CRAFT	0.375	0.0453	0.385	0.0343	0.335	0.0377	0.238	0.0488	0.193	0.0845
OPREATOR	0.386	0.0472	0.400	0.0360	0.340	0.0394	0.225	0.0512	0.163	0.0882
TALLINN	0.094	0.0207	0.072	0.0165	0.065	0.0180	0.067	0.0231	0.177	0.0392
PARTTIME	–0.588	0.0487	–0.318	0.0382	–0.220	0.0414	–0.243	0.0527	–0.052	0.0889
EDUC3	0.044	0.0297	0.087	0.0227	0.068	0.0243	0.039	0.0313	–0.028	0.0541
EDUC2	0.147	0.0445	0.203	0.0337	0.172	0.0358	0.092	0.0461	–0.062	0.0813
MARRIED	0.050	0.0228	0.039	0.0178	0.020	0.0192	0.000	0.0244	0.053	0.0412
NONEST	–0.070	0.0203	–0.057	0.0160	–0.054	0.0175	–0.031	0.0225	–0.043	0.0378
WOMAN	–0.243	0.0235	–0.273	0.0180	–0.279	0.0195	–0.312	0.0248	–0.451	0.0416
PUBLIC	–0.231	0.0436	–0.231	0.0350	–0.312	0.0384	–0.649	0.0492	–0.768	0.0844
CONSTANT	4.175	0.1158	4.518	0.0872	4.966	0.0947	5.809	0.1243	6.309	0.2126

N = 5,044

Appendix 2.2.2

Estimates for the parameters and standard errors of the regression model for 1992

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.015	0.0077	0.006	0.0058	0.014	0.0047	0.017	0.0046	0.021	0.0076
AGE^2	–0.00023	0.0001	–0.00011	0.00007	–0.00021	0.00006	–0.00025	0.00006	–0.00030	0.00009
TENURE	0.004	0.0020	0.004	0.0014	0.005	0.0012	0.005	0.0012	0.006	0.0020
MANAGER	0.454	0.0732	0.577	0.0532	0.573	0.0434	0.589	0.0430	0.579	0.0716
PROFESSIONAL	0.323	0.0753	0.436	0.0543	0.447	0.0445	0.400	0.0448	0.328	0.0762
TECHNICAN	0.380	0.0715	0.419	0.0510	0.429	0.0422	0.407	0.0421	0.370	0.0703
CLERK	0.255	0.0811	0.347	0.0582	0.361	0.0483	0.367	0.0484	0.343	0.0791
SERVICEWORKER	0.311	0.0724	0.267	0.0522	0.203	0.0433	0.159	0.0433	0.119	0.0731
SKILLAGRI	–0.207	0.0968	–0.108	0.0692	–0.005	0.0577	0.082	0.0575	0.218	0.0957
CRAFT	0.313	0.0650	0.356	0.0465	0.404	0.0383	0.396	0.0384	0.309	0.0644
OPREATOR	0.184	0.0688	0.321	0.0495	0.329	0.0413	0.340	0.0419	0.285	0.0702
TALLINN	0.257	0.0328	0.242	0.0233	0.256	0.0195	0.281	0.0196	0.351	0.0333
PARTTIME	–0.589	0.0611	–0.663	0.0438	–0.632	0.0366	–0.473	0.0365	–0.305	0.0614
EDUC3	0.087	0.0474	0.086	0.0343	0.059	0.0284	0.033	0.0283	0.044	0.0485
EDUC2	0.257	0.0651	0.279	0.0469	0.235	0.0385	0.217	0.0386	0.203	0.0652
MARRIED	0.018	0.0345	0.051	0.0251	0.034	0.0208	0.043	0.0206	0.020	0.0348
NONEST	–0.124	0.0329	–0.108	0.0238	–0.093	0.0196	–0.076	0.0196	–0.028	0.0337
WOMAN	–0.215	0.0359	–0.230	0.0252	–0.284	0.0208	–0.316	0.0207	–0.386	0.0342
PUBLIC	0.158	0.0385	0.057	0.0271	–0.068	0.0223	–0.169	0.0219	–0.204	0.0368
CONSTANT	5.430	0.1528	5.912	0.1132	6.215	0.0937	6.577	0.0923	6.904	0.1533

N = 4,841

Appendix 2.2.3

Estimates for the parameters and standard errors of the regression model for 1993

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.039	0.0056	0.033	0.0042	0.032	0.0044	0.029	0.0057	0.032	0.0095
AGE^2	–0.00049	0.0001	–0.00041	0.00005	–0.00041	0.00005	–0.00037	0.00007	–0.00039	0.00011
TENURE	0.005	0.0013	0.004	0.0010	0.006	0.0011	0.006	0.0013	0.006	0.0023
MANAGER	0.327	0.0528	0.313	0.0406	0.300	0.0438	0.286	0.0568	0.378	0.0985
PROFESSIONAL	0.184	0.0517	0.175	0.0397	0.144	0.0429	0.108	0.0552	0.216	0.0958
TECHNICAN	0.076	0.0504	0.072	0.0388	0.047	0.0421	0.017	0.0543	0.110	0.0940
CLERK	0.086	0.0538	0.077	0.0422	0.041	0.0461	0.023	0.0592	0.058	0.1024
SERVICEWORKER	–0.039	0.0535	–0.004	0.0414	0.015	0.0449	0.006	0.0577	0.019	0.0996
SKILLAGRI	0.329	0.0702	0.389	0.0556	0.412	0.0607	0.330	0.0783	0.422	0.1334
CRAFT	0.375	0.0453	0.385	0.0343	0.335	0.0377	0.238	0.0488	0.193	0.0845
OPREATOR	0.386	0.0472	0.400	0.0360	0.340	0.0394	0.225	0.0512	0.163	0.0882
TALLINN	0.094	0.0207	0.072	0.0165	0.065	0.0180	0.067	0.0231	0.177	0.0392
PARTTIME	–0.588	0.0487	–0.318	0.0382	–0.220	0.0414	–0.243	0.0527	–0.052	0.0889
EDUC3	0.044	0.0297	0.087	0.0227	0.068	0.0243	0.039	0.0313	–0.028	0.0541
EDUC2	0.147	0.0445	0.203	0.0337	0.172	0.0358	0.092	0.0461	–0.062	0.0813
MARRIED	0.050	0.0228	0.039	0.0178	0.020	0.0192	0.000	0.0244	0.053	0.0412
NONEST	–0.070	0.0203	–0.057	0.0160	–0.054	0.0175	–0.031	0.0225	–0.043	0.0378
WOMAN	–0.243	0.0235	–0.273	0.0180	–0.279	0.0195	–0.312	0.0248	–0.451	0.0416
PUBLIC	–0.231	0.0436	–0.231	0.0350	–0.312	0.0384	–0.649	0.0492	–0.768	0.0844
CONSTANT	4.175	0.1158	4.518	0.0872	4.966	0.0947	5.809	0.1243	6.309	0.2126

N = 4,874

Appendix 2.2.4

Estimates for the parameters and standard errors of the regression model for 1994

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.007	0.0072	0.014	0.0059	0.021	0.0045	0.026	0.0048	0.021	0.0073
AGE^2	–0.00014	0.0001	–0.00023	0.00007	–0.00031	0.00005	–0.00036	0.00006	–0.00031	0.00009
TENURE	0.003	0.0018	0.004	0.0015	0.004	0.0012	0.003	0.0013	0.006	0.0020
MANAGER	0.549	0.0660	0.649	0.0555	0.654	0.0409	0.627	0.0446	0.582	0.0698
PROFESSIONAL	0.468	0.0683	0.550	0.0578	0.474	0.0425	0.438	0.0467	0.314	0.0765
TECHNICAN	0.461	0.0631	0.493	0.0533	0.448	0.0400	0.429	0.0438	0.422	0.0674
CLERK	0.501	0.0726	0.466	0.0618	0.472	0.0467	0.400	0.0508	0.349	0.0791
SERVICEWORKER	0.356	0.0630	0.292	0.0533	0.159	0.0403	0.135	0.0443	0.096	0.0688
SKILLAGRI	–0.210	0.0853	–0.137	0.0719	–0.006	0.0549	0.165	0.0603	0.270	0.0944
CRAFT	0.443	0.0577	0.474	0.0484	0.458	0.0363	0.426	0.0401	0.309	0.0624
OPREATOR	0.343	0.0615	0.386	0.0521	0.424	0.0395	0.422	0.0442	0.337	0.0685
TALLINN	0.232	0.0285	0.237	0.0246	0.274	0.0188	0.289	0.0209	0.342	0.0330
PARTTIME	–0.848	0.0507	–0.839	0.0433	–0.776	0.0327	–0.626	0.0363	–0.474	0.0565
EDUC3	0.093	0.0443	0.095	0.0367	0.075	0.0274	0.076	0.0299	0.105	0.0466
EDUC2	0.289	0.0604	0.290	0.0507	0.323	0.0370	0.314	0.0402	0.374	0.0639
MARRIED	0.032	0.0314	0.006	0.0267	0.049	0.0200	0.060	0.0217	0.078	0.0330
NONEST	–0.081	0.0297	–0.113	0.0251	–0.122	0.0190	–0.099	0.0209	–0.078	0.0334
WOMAN	–0.179	0.0321	–0.245	0.0268	–0.268	0.0200	–0.334	0.0218	–0.380	0.0335
PUBLIC	0.192	0.0330	0.065	0.0276	–0.086	0.0208	–0.171	0.0226	–0.203	0.0352
CONSTANT	5.820	0.1391	6.139	0.1164	6.460	0.0883	6.792	0.0950	7.206	0.1422

N = 5,092

Appendix 2.2.5

Estimates for the parameters and standard errors of the regression model for 1995

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.012	0.0071	0.019	0.0045	0.016	0.0027	0.011	0.0050	0.021	0.0061
AGE^2	–0.00026	0.0001	–0.00031	0.00005	–0.00023	0.00003	–0.00017	0.00006	–0.00031	0.00007
TENURE	0.011	0.0015	0.007	0.0010	0.003	0.0006	0.003	0.0011	0.003	0.0014
MANAGER	0.528	0.0582	0.632	0.0385	0.719	0.0233	0.698	0.0442	0.545	0.0549
PROFESSIONAL	0.439	0.0625	0.510	0.0410	0.596	0.0247	0.625	0.0464	0.434	0.0571
TECHNICAN	0.349	0.0534	0.406	0.0351	0.464	0.0213	0.510	0.0403	0.397	0.0507
CLERK	0.253	0.0687	0.325	0.0456	0.431	0.0274	0.484	0.0516	0.255	0.0650
SERVICEWORKER	0.147	0.0549	0.141	0.0366	0.135	0.0221	0.178	0.0416	–0.004	0.0516
SKILLAGRI	–0.095	0.0714	0.051	0.0476	0.052	0.0287	0.211	0.0542	0.122	0.0679
CRAFT	0.302	0.0513	0.406	0.0337	0.465	0.0203	0.494	0.0389	0.349	0.0491
OPREATOR	0.154	0.0520	0.214	0.0350	0.305	0.0214	0.333	0.0412	0.169	0.0525
TALLINN	0.251	0.0262	0.264	0.0178	0.264	0.0110	0.275	0.0210	0.327	0.0264
PARTTIME	–0.740	0.0429	–0.609	0.0288	–0.526	0.0178	–0.383	0.0337	–0.224	0.0425
EDUC3	0.017	0.0289	0.065	0.0192	0.072	0.0118	0.008	0.0223	–0.073	0.0284
EDUC2	0.292	0.0456	0.328	0.0299	0.300	0.0182	0.263	0.0342	0.248	0.0419
MARRIED	0.085	0.0290	0.094	0.0191	0.069	0.0115	0.064	0.0217	0.023	0.0271
NONEST	–0.165	0.0267	–0.151	0.0179	–0.099	0.0109	–0.073	0.0206	–0.085	0.0251
WOMAN	–0.193	0.0300	–0.248	0.0194	–0.269	0.0115	–0.284	0.0214	–0.299	0.0270
PUBLIC	0.147	0.0270	0.056	0.0179	–0.012	0.0109	–0.074	0.0204	–0.148	0.0265
CONSTANT	6.229	0.1358	6.371	0.0883	6.739	0.0535	7.159	0.1006	7.568	0.1245

N = 5,392

Appendix 2.2.6

Estimates for the parameters and standard errors of the regression model for 1996

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.018	0.0099	0.023	0.0065	0.000	0.0001	0.026	0.0067	0.027	0.0094
AGE^2	–0.00032	0.0001	–0.00035	0.00008	0.00433	0.00146	–0.00037	0.00008	–0.00036	0.00011
TENURE	0.007	0.0022	0.006	0.0015	0.722	0.0552	0.005	0.0016	0.004	0.0022
MANAGER	0.445	0.0843	0.600	0.0566	0.633	0.0580	0.747	0.0612	0.594	0.0887
PROFESSIONAL	0.540	0.0920	0.578	0.0588	0.506	0.0507	0.569	0.0647	0.487	0.0949
TECHNICAN	0.291	0.0770	0.397	0.0515	0.373	0.0658	0.486	0.0568	0.443	0.0841
CLERK	0.233	0.1005	0.233	0.0669	0.160	0.0527	0.391	0.0728	0.303	0.1083
SERVICEWORKER	0.078	0.0796	0.082	0.0536	0.041	0.0670	0.122	0.0586	–0.027	0.0875
SKILLAGRI	–0.078	0.1010	0.038	0.0683	0.492	0.0485	0.179	0.0747	0.217	0.1101
CRAFT	0.375	0.0749	0.439	0.0498	0.299	0.0517	0.422	0.0545	0.334	0.0809
OPREATOR	0.191	0.0774	0.264	0.0528	0.254	0.0258	0.310	0.0584	0.221	0.0874
TALLINN	0.165	0.0377	0.275	0.0258	–0.667	0.0392	0.278	0.0290	0.329	0.0426
PARTTIME	–0.743	0.0562	–0.790	0.0392	0.043	0.0281	–0.448	0.0438	–0.327	0.0629
EDUC3	0.116	0.0403	0.095	0.0284	0.278	0.0420	–0.018	0.0314	0.008	0.0467
EDUC2	0.286	0.0657	0.289	0.0429	0.073	0.0273	0.247	0.0462	0.249	0.0666
MARRIED	0.059	0.0423	0.039	0.0282	–0.140	0.0259	0.073	0.0303	0.051	0.0442
NONEST	–0.154	0.0386	–0.197	0.0261	–0.244	0.0272	–0.108	0.0286	–0.138	0.0416
WOMAN	–0.106	0.0418	–0.184	0.0282	–0.011	0.0262	–0.287	0.0301	–0.354	0.0437
PUBLIC	0.225	0.0399	0.129	0.0267	6.936	0.1256	–0.101	0.0291	–0.135	0.0446
CONSTANT	6.282	0.1912	6.501	0.1298	6.739	0.0535	7.184	0.1345	7.552	0.1930

N = 2,600

Appendix 2.2.7

Estimates for the parameters and standard errors of the regression model for 1997

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.014	0.0034	0.012	0.0024	0.017	0.0028	0.018	0.0024	0.022	0.0032
AGE^2	–0.00022	0.0000	–0.00019	0.00003	–0.00026	0.00003	–0.00027	0.00003	–0.00032	0.00004
TENURE	0.006	0.0008	0.006	0.0006	0.004	0.0006	0.004	0.0005	0.004	0.0007
MANAGER	0.586	0.0288	0.685	0.0203	0.714	0.0233	0.688	0.0200	0.622	0.0271
PROFESSIONAL	0.560	0.0306	0.604	0.0215	0.611	0.0250	0.544	0.0220	0.520	0.0303
TECHNICAN	0.331	0.0253	0.429	0.0181	0.438	0.0213	0.399	0.0186	0.349	0.0254
CLERK	0.222	0.0330	0.342	0.0239	0.372	0.0280	0.314	0.0241	0.239	0.0325
SERVICEWORKER	0.136	0.0261	0.116	0.0188	0.090	0.0222	0.053	0.0194	0.002	0.0264
SKILLAGRI	0.106	0.0370	0.169	0.0268	0.152	0.0316	0.131	0.0273	0.079	0.0372
CRAFT	0.307	0.0239	0.384	0.0171	0.346	0.0199	0.289	0.0174	0.230	0.0237
OPREATOR	0.188	0.0245	0.270	0.0177	0.265	0.0209	0.243	0.0184	0.185	0.0253
TALLINN	0.156	0.0156	0.249	0.0113	0.293	0.0135	0.349	0.0117	0.369	0.0159
PARTTIME	–0.842	0.0218	–0.734	0.0159	–0.654	0.0188	–0.490	0.0164	–0.389	0.0228
EDUC3	0.082	0.0141	0.098	0.0101	0.089	0.0121	0.074	0.0106	0.083	0.0147
EDUC2	0.249	0.0233	0.245	0.0163	0.250	0.0190	0.260	0.0165	0.312	0.0221
MARRIED	0.035	0.0141	0.034	0.0101	0.048	0.0118	0.060	0.0102	0.079	0.0138
NONEST	–0.086	0.0142	–0.087	0.0102	–0.085	0.0121	–0.076	0.0104	–0.084	0.0143
WOMAN	–0.171	0.0144	–0.223	0.0103	–0.274	0.0120	–0.306	0.0104	–0.377	0.0142
PUBLIC	0.141	0.0141	0.058	0.0100	–0.012	0.0118	–0.059	0.0103	–0.073	0.0142
CONSTANT	6.417	0.0656	6.710	0.0471	6.978	0.0559	7.289	0.0478	7.530	0.0643

N = 14,857

Appendix 2.2.8

Estimates for the parameters and standard errors of the regression model for 1998

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.006	0.0030	0.005	0.0023	0.008	0.0022	0.016	0.0026	0.022	0.0028
AGE^2	–0.00013	0.0000	–0.00012	0.00003	–0.00016	0.00003	–0.00025	0.00003	–0.00032	0.00003
TENURE	0.004	0.0007	0.005	0.0005	0.004	0.0005	0.003	0.0006	0.004	0.0006
MANAGER	0.576	0.0262	0.674	0.0197	0.674	0.0188	0.658	0.0217	0.663	0.0232
PROFESSIONAL	0.458	0.0281	0.560	0.0210	0.505	0.0202	0.464	0.0238	0.419	0.0258
TECHNICAN	0.301	0.0228	0.396	0.0175	0.364	0.0170	0.351	0.0199	0.312	0.0211
CLERK	0.202	0.0290	0.318	0.0227	0.323	0.0222	0.297	0.0259	0.253	0.0274
SERVICEWORKER	0.120	0.0230	0.118	0.0179	0.071	0.0175	0.037	0.0205	–0.010	0.0219
SKILLAGRI	0.150	0.0351	0.181	0.0274	0.167	0.0269	0.180	0.0314	0.205	0.0332
CRAFT	0.267	0.0209	0.368	0.0163	0.318	0.0158	0.270	0.0186	0.220	0.0200
OPREATOR	0.142	0.0212	0.248	0.0168	0.223	0.0165	0.211	0.0196	0.203	0.0208
TALLINN	0.163	0.0141	0.210	0.0110	0.280	0.0109	0.321	0.0127	0.327	0.0132
PARTTIME	–0.788	0.0196	–0.657	0.0154	–0.538	0.0153	–0.409	0.0181	–0.326	0.0197
EDUC3	0.089	0.0139	0.111	0.0107	0.126	0.0105	0.108	0.0123	0.133	0.0132
EDUC2	0.260	0.0226	0.284	0.0169	0.336	0.0162	0.329	0.0187	0.370	0.0198
MARRIED	0.031	0.0126	0.047	0.0097	0.053	0.0095	0.059	0.0110	0.041	0.0117
NONEST	–0.073	0.0130	–0.087	0.0100	–0.118	0.0098	–0.112	0.0114	–0.103	0.0121
WOMAN	–0.169	0.0127	–0.237	0.0099	–0.290	0.0097	–0.315	0.0113	–0.376	0.0119
PUBLIC	0.129	0.0128	0.059	0.0098	–0.009	0.0096	–0.048	0.0113	–0.094	0.0123
CONSTANT	6.699	0.0585	6.973	0.0455	7.263	0.0444	7.442	0.0518	7.625	0.0562

N = 17,470

Appendix 2.2.9

Estimates for the parameters and standard errors of the regression model for 1999

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.007	0.0039	0.007	0.0031	0.011	0.0029	0.023	0.0027	0.028	0.0034
AGE^2	–0.00015	0.0000	–0.00015	0.00004	–0.00020	0.00003	–0.00035	0.00003	–0.00040	0.00004
TENURE	0.006	0.0009	0.006	0.0007	0.005	0.0007	0.005	0.0006	0.005	0.0008
MANAGER	0.524	0.0341	0.621	0.0264	0.654	0.0253	0.650	0.0234	0.667	0.0286
PROFESSIONAL	0.462	0.0351	0.528	0.0265	0.502	0.0254	0.497	0.0237	0.491	0.0300
TECHNICAN	0.257	0.0304	0.335	0.0237	0.375	0.0229	0.347	0.0214	0.375	0.0261
CLERK	0.199	0.0379	0.301	0.0299	0.318	0.0293	0.330	0.0274	0.279	0.0337
SERVICEWORKER	0.082	0.0296	0.078	0.0235	0.068	0.0231	0.039	0.0218	–0.008	0.0266
SKILLAGRI	–0.025	0.0455	0.078	0.0362	0.097	0.0359	0.095	0.0336	0.118	0.0411
CRAFT	0.194	0.0266	0.309	0.0216	0.285	0.0213	0.268	0.0201	0.262	0.0249
OPREATOR	0.118	0.0270	0.198	0.0220	0.227	0.0218	0.220	0.0207	0.232	0.0251
TALLINN	0.159	0.0173	0.242	0.0139	0.294	0.0138	0.310	0.0128	0.340	0.0158
PARTTIME	–0.780	0.0252	–0.638	0.0205	–0.538	0.0204	–0.414	0.0192	–0.336	0.0240
EDUC3	0.055	0.0194	0.092	0.0153	0.096	0.0150	0.106	0.0140	0.121	0.0173
EDUC2	0.200	0.0302	0.283	0.0228	0.333	0.0218	0.343	0.0200	0.355	0.0245
MARRIED	0.017	0.0159	0.020	0.0127	0.043	0.0124	0.033	0.0116	0.049	0.0143
NONEST	–0.080	0.0162	–0.091	0.0128	–0.121	0.0126	–0.128	0.0118	–0.094	0.0145
WOMAN	–0.105	0.0158	–0.216	0.0126	–0.285	0.0126	–0.343	0.0118	–0.386	0.0146
PUBLIC	0.148	0.0160	0.102	0.0126	0.047	0.0125	–0.008	0.0119	–0.056	0.0148
CONSTANT	6.788	0.0761	7.050	0.0601	7.332	0.0590	7.419	0.0548	7.590	0.0683

N = 11,659

Appendix 2.2.10

Estimates for the parameters and standard errors of the regression model for 2000

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.011	0.0046	0.010	0.0034	0.010	0.0034	0.024	0.0041	0.030	0.0054
AGE^2	–0.00018	0.0001	–0.00019	0.00004	–0.00019	0.00004	–0.00036	0.00005	–0.00043	0.00006
TENURE	0.004	0.0011	0.005	0.0008	0.005	0.0008	0.005	0.0009	0.005	0.0012
MANAGER	0.463	0.0391	0.539	0.0283	0.578	0.0286	0.593	0.0340	0.603	0.0442
PROFESSIONAL	0.459	0.0399	0.500	0.0280	0.501	0.0279	0.506	0.0334	0.490	0.0449
TECHNICAN	0.322	0.0342	0.333	0.0249	0.361	0.0254	0.348	0.0306	0.326	0.0401
CLERK	0.228	0.0444	0.233	0.0326	0.267	0.0334	0.285	0.0402	0.254	0.0529
SERVICEWORKER	0.097	0.0339	0.035	0.0251	0.074	0.0259	0.039	0.0314	–0.011	0.0413
SKILLAGRI	0.026	0.0551	0.088	0.0417	0.210	0.0433	0.100	0.0519	0.004	0.0678
CRAFT	0.214	0.0310	0.265	0.0232	0.273	0.0241	0.267	0.0293	0.212	0.0385
OPREATOR	0.213	0.0312	0.236	0.0233	0.262	0.0242	0.214	0.0295	0.157	0.0384
TALLINN	0.116	0.0208	0.225	0.0154	0.283	0.0161	0.300	0.0195	0.321	0.0253
PARTTIME	–0.914	0.0297	–0.701	0.0221	–0.585	0.0229	–0.503	0.0275	–0.437	0.0364
EDUC3	0.077	0.0223	0.136	0.0166	0.135	0.0173	0.133	0.0211	0.124	0.0280
EDUC2	0.265	0.0360	0.290	0.0254	0.355	0.0255	0.362	0.0299	0.343	0.0391
MARRIED	0.001	0.0187	0.003	0.0138	0.044	0.0142	0.031	0.0171	0.023	0.0226
NONEST	–0.066	0.0192	–0.072	0.0139	–0.103	0.0142	–0.117	0.0170	–0.134	0.0223
WOMAN	–0.109	0.0188	–0.212	0.0137	–0.270	0.0143	–0.341	0.0173	–0.358	0.0228
PUBLIC	0.145	0.0190	0.098	0.0139	0.032	0.0146	–0.007	0.0178	–0.049	0.0239
CONSTANT	6.841	0.0911	7.108	0.0669	7.433	0.0681	7.521	0.0815	7.704	0.1042

N = 5,881

Appendix 2.2.11

Estimates for the parameters and standard errors of the regression model for 2001

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.006	0.0043	0.008	0.0033	0.019	0.0025	0.017	0.0035	0.021	0.0044
AGE^2	–0.00011	0.0000	–0.00015	0.00004	–0.00027	0.00003	–0.00026	0.00004	–0.00030	0.00005
TENURE	0.008	0.0011	0.007	0.0008	0.005	0.0006	0.004	0.0008	0.003	0.0010
MANAGER	0.341	0.0361	0.504	0.0276	0.556	0.0208	0.614	0.0292	0.673	0.0358
PROFESSIONAL	0.366	0.0369	0.479	0.0281	0.540	0.0210	0.530	0.0296	0.473	0.0368
TECHNICAN	0.258	0.0320	0.307	0.0243	0.386	0.0186	0.398	0.0264	0.387	0.0329
CLERK	0.140	0.0383	0.225	0.0306	0.316	0.0236	0.312	0.0338	0.269	0.0422
SERVICEWORKER	0.011	0.0310	0.029	0.0238	0.041	0.0184	0.025	0.0262	0.000	0.0329
SKILLAGRI	0.032	0.0596	0.090	0.0474	0.174	0.0370	0.219	0.0524	0.300	0.0653
CRAFT	0.146	0.0291	0.225	0.0226	0.238	0.0175	0.237	0.0254	0.212	0.0317
OPREATOR	0.153	0.0290	0.231	0.0225	0.246	0.0174	0.248	0.0251	0.209	0.0309
TALLINN	0.164	0.0186	0.256	0.0151	0.318	0.0118	0.335	0.0170	0.350	0.0214
PARTTIME	–0.876	0.0274	–0.669	0.0212	–0.516	0.0163	–0.502	0.0230	–0.397	0.0288
EDUC3	0.140	0.0212	0.123	0.0165	0.131	0.0129	0.145	0.0185	0.145	0.0231
EDUC2	0.281	0.0325	0.278	0.0248	0.299	0.0188	0.378	0.0265	0.415	0.0332
MARRIED	0.016	0.0168	0.023	0.0132	0.036	0.0102	0.040	0.0146	0.037	0.0185
NONEST	–0.060	0.0176	–0.109	0.0136	–0.143	0.0106	–0.139	0.0151	–0.128	0.0190
WOMAN	–0.147	0.0175	–0.188	0.0138	–0.256	0.0107	–0.288	0.0151	–0.318	0.0190
PUBLIC	0.086	0.0176	0.052	0.0139	–0.006	0.0107	–0.032	0.0153	–0.042	0.0189
CONSTANT	7.083	0.0842	7.269	0.0658	7.341	0.0496	7.637	0.0703	7.834	0.0873

N = 6,700

Appendix 2.2.12

Estimates for the parameters and standard errors of the regression model for 2002

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.006	0.0033	0.016	0.0036	0.023	0.0033	0.024	0.0033	0.017	0.0042
AGE^2	–0.00012	0.0000	–0.00025	0.00004	–0.00033	0.00004	–0.00035	0.00004	–0.00027	0.00005
TENURE	0.007	0.0008	0.006	0.0009	0.005	0.0008	0.007	0.0008	0.006	0.0009
MANAGER	0.415	0.0291	0.534	0.0314	0.560	0.0279	0.583	0.0275	0.600	0.0335
PROFESSIONAL	0.419	0.0304	0.470	0.0314	0.546	0.0276	0.525	0.0273	0.506	0.0351
TECHNICAN	0.228	0.0252	0.317	0.0274	0.368	0.0248	0.381	0.0250	0.362	0.0314
CLERK	0.182	0.0301	0.263	0.0339	0.319	0.0310	0.267	0.0314	0.201	0.0391
SERVICEWORKER	0.018	0.0238	0.034	0.0261	0.043	0.0240	0.056	0.0242	–0.008	0.0308
SKILLAGRI	0.071	0.0444	0.149	0.0501	0.172	0.0462	0.127	0.0467	0.164	0.0579
CRAFT	0.165	0.0229	0.222	0.0253	0.248	0.0232	0.220	0.0236	0.190	0.0297
OPREATOR	0.076	0.0223	0.192	0.0249	0.209	0.0229	0.184	0.0231	0.197	0.0292
TALLINN	0.170	0.0150	0.263	0.0165	0.291	0.0155	0.300	0.0157	0.321	0.0198
PARTTIME	–0.768	0.0224	–0.581	0.0243	–0.468	0.0223	–0.416	0.0221	–0.383	0.0276
EDUC3	0.083	0.0168	0.082	0.0185	0.081	0.0171	0.080	0.0173	0.118	0.0216
EDUC2	0.233	0.0274	0.263	0.0284	0.280	0.0249	0.301	0.0244	0.379	0.0308
MARRIED	0.046	0.0134	0.049	0.0148	0.044	0.0137	0.029	0.0139	0.033	0.0177
NONEST	–0.102	0.0132	–0.118	0.0149	–0.144	0.0139	–0.134	0.0141	–0.149	0.0178
WOMAN	–0.102	0.0138	–0.190	0.0152	–0.271	0.0140	–0.306	0.0140	–0.344	0.0172
PUBLIC	0.024	0.0143	–0.010	0.0156	–0.046	0.0146	–0.059	0.0148	–0.071	0.0188
CONSTANT	7.237	0.0669	7.261	0.0727	7.433	0.0670	7.692	0.0669	8.053	0.0844

N = 6,250

Appendix 2.2.13

Estimates for the parameters and standard errors of the regression model for 2003

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.015	0.0045	0.015	0.0030	0.018	0.0027	0.013	0.0038	0.023	0.0043
AGE^2	–0.00024	0.0001	–0.00023	0.00003	–0.00027	0.00003	–0.00023	0.00004	–0.00033	0.00005
TENURE	0.006	0.0011	0.004	0.0007	0.004	0.0007	0.004	0.0009	0.005	0.0010
MANAGER	0.350	0.0372	0.469	0.0255	0.552	0.0232	0.591	0.0328	0.587	0.0359
PROFESSIONAL	0.395	0.0381	0.475	0.0249	0.493	0.0227	0.511	0.0328	0.486	0.0377
TECHNICAN	0.236	0.0323	0.317	0.0223	0.326	0.0207	0.360	0.0297	0.372	0.0337
CLERK	0.170	0.0397	0.253	0.0284	0.297	0.0266	0.274	0.0383	0.239	0.0429
SERVICEWORKER	0.027	0.0304	0.071	0.0209	0.061	0.0195	0.049	0.0280	0.069	0.0319
SKILLAGRI	0.058	0.0698	0.084	0.0484	0.155	0.0452	0.218	0.0645	0.180	0.0731
CRAFT	0.169	0.0294	0.242	0.0207	0.251	0.0193	0.258	0.0278	0.202	0.0317
OPREATOR	0.165	0.0290	0.232	0.0204	0.236	0.0190	0.264	0.0273	0.218	0.0311
TALLINN	0.162	0.0193	0.202	0.0135	0.250	0.0127	0.249	0.0184	0.239	0.0209
PARTTIME	–0.915	0.0286	–0.662	0.0201	–0.504	0.0184	–0.434	0.0258	–0.378	0.0288
EDUC3	0.087	0.0212	0.050	0.0147	0.048	0.0138	0.077	0.0198	0.064	0.0220
EDUC2	0.265	0.0340	0.244	0.0222	0.302	0.0201	0.356	0.0284	0.387	0.0315
MARRIED	0.018	0.0178	0.022	0.0123	0.043	0.0114	0.066	0.0162	0.048	0.0183
NONEST	–0.108	0.0175	–0.132	0.0122	–0.166	0.0115	–0.170	0.0165	–0.177	0.0188
WOMAN	–0.100	0.0184	–0.192	0.0124	–0.263	0.0116	–0.275	0.0164	–0.333	0.0184
PUBLIC	–0.002	0.0190	0.001	0.0133	–0.028	0.0124	–0.068	0.0178	–0.099	0.0199
CONSTANT	7.216	0.0881	7.454	0.0596	7.649	0.0552	7.953	0.0777	8.048	0.0871

N = 6,010

Appendix 2.2.14

Estimates for the parameters and standard errors of the regression model for 2004

Variable	10th		25th		50th		75th		90th	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
AGE	0.019	0.0043	0.015	0.0032	0.014	0.0032	0.017	0.0034	0.020	0.0050
AGE^2	–0.00029	0.0000	–0.00024	0.00004	–0.00023	0.00004	–0.00027	0.00004	–0.00031	0.00006
TENURE	0.006	0.0011	0.005	0.0008	0.004	0.0008	0.004	0.0008	0.004	0.0012
MANAGER	0.315	0.0365	0.403	0.0270	0.545	0.0271	0.584	0.0282	0.653	0.0417
PROFESSIONAL	0.344	0.0353	0.404	0.0257	0.459	0.0259	0.466	0.0274	0.492	0.0411
TECHNICAN	0.227	0.0306	0.297	0.0232	0.365	0.0235	0.348	0.0247	0.395	0.0372
CLERK	0.166	0.0411	0.200	0.0311	0.216	0.0317	0.201	0.0337	0.215	0.0506
SERVICEWORKER	0.068	0.0294	0.064	0.0223	0.054	0.0229	0.016	0.0244	0.041	0.0369
SKILLAGRI	0.023	0.0625	0.106	0.0475	0.104	0.0499	0.133	0.0528	0.117	0.0775
CRAFT	0.171	0.0287	0.186	0.0219	0.225	0.0222	0.209	0.0236	0.218	0.0356
OPREATOR	0.178	0.0286	0.217	0.0216	0.217	0.0222	0.184	0.0237	0.167	0.0354
TALLINN	0.154	0.0183	0.207	0.0141	0.240	0.0148	0.233	0.0160	0.236	0.0239
PARTTIME	–0.764	0.0270	–0.637	0.0206	–0.521	0.0212	–0.420	0.0224	–0.354	0.0331
EDUC3	0.082	0.0203	0.076	0.0155	0.085	0.0160	0.085	0.0171	0.069	0.0255
EDUC2	0.263	0.0313	0.271	0.0227	0.294	0.0228	0.353	0.0240	0.379	0.0353
MARRIED	0.035	0.0169	0.041	0.0128	0.068	0.0131	0.059	0.0139	0.070	0.0208
NONEST	–0.086	0.0169	–0.106	0.0131	–0.131	0.0136	–0.140	0.0147	–0.164	0.0222
WOMAN	–0.095	0.0173	–0.175	0.0132	–0.240	0.0135	–0.297	0.0143	–0.334	0.0211
PUBLIC	–0.005	0.0189	–0.004	0.0141	–0.028	0.0143	–0.068	0.0153	–0.114	0.0230
CONSTANT	7.256	0.0851	7.546	0.0637	7.798	0.0641	8.048	0.0679	8.230	0.0988

N = 5,768

2.3. Ethnic wage gap and political break-ups: Estonia during political and economic transition[1]

2.3.1. Introduction

Ethnic minorities in the vast majority of cases receive lower wages than ethnic majorities. This fact is to a great extent caused by ethnic differences in human capital, but for many cases human capital cannot entirely explain ethnic wage gaps. Usually, it is argued that the unexplained wage gap is caused by unobserved human capital or discrimination on the labour market.

Most of the previous studies use the data for advanced market economies. Although these countries excel in terms of data quality and research skills, the economic environment lacks major shocks, which could be used in a way like instruments. At the same time, there is a shortage of evidence from countries that have experienced major structural changes, completely altering the roles of ethnic groups. Examples include the collapse of the former Soviet Union (where the Russian-speaking population became a minority in the new national states), and the fall of apartheid in South Africa, where the whites lost their privileged status. To a certain extent, the rapidly changing roles of the ethnic groups here serve as a natural experiment, allowing us to shed new light on the association of the status and wages of the ethnic groups.

The existing evidence from former communist countries suggests that the unexplained wage gap is indeed related to problems with ethnic relations. The countries with a problematic record of ethnic relations tend to show a significant wage gap in favour of the majority (see Noorkõiv et al. (1998); Kroncke and Smith (1999); Orazem and Vodopivec (2000) for Estonia; Bhumaik et al. (2006) for Kosovo and Giddings (2002) for Bulgaria). The difference is negligible in Slovenia (Orazem and Vodopivec 2000). The story is different in Ukraine, where ethnicity has not been an issue because the Russian-speaking minority has a small wage advantage (Constant et al. 2006).

The current chapter complements this literature. We look at ethnic wage differences in Estonia, a former Soviet republic and current member of the EU. The case of Estonia is particularly interesting because it hosts a considerable Russian-speaking minority (around 30% of the population), a situation that changed completely after the collapse of the Soviet Union. Unlike most of the previous studies, we look at the development of the wage differential during the whole transition period from the late 1980s until 2005.

This chapter is organised as follows. In the next section we describe datasets and variables, and give an overview of the summary statistics. Section 2.3.3

[1] This chapter is based on Leping, K.-O., Toomet, O. (2007); "Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition", University of Tartu, Faculty of Economics and Business Administration Working Paper No.53. In this article K.-O. Leping has done all the calculations and both authors have written the text.

describes the empirical strategy and section 2.3.4 presents the wage gap using different sub samples and estimation techniques. In the section 2.3.5 we shed some light on a few possible explanations, including discrimination, differences in school quality and segregation. The last two sections are devoted to discussion and a brief conclusion.

2.3.2. Data

2.3.2.1. Dataset

We use the dataset of the Estonian Labour Forces Survey (ELFS). The ELFS was first conducted in 1995. The first wave includes a retrospective part where the labour market history as far back as in 1989 is observed. The next survey was conducted in 1997, and thereafter the survey was conducted as an annual cross-section until 2000. Since that year, the survey was shifted to a rotating panel-sampling scheme, conducted quarterly. The different waves include mostly similar information, although the detail may vary. The number of annually sampled individuals varies between around 5000 (1997 wave) and 16000 (from 2000 onwards), resulting in around 3000 males annually with a positive income.

The ELFS sample includes permanent residents in the country aged between 15 and 74. The 1995 sample of the ELFS was based on the 1989 nationwide census database. Hence, it does not include people who arrived in or left the country between 1989 and 1994. For the latter years, the sample is based on data from the Population Register.

We also conducted a few interviews in order to get some qualitative information about the situation of the ethnic groups in the Estonian labour market. This data is used below in Sections 2.3.5 and 2.3.6 while discussing the results. A short description of the interviewees is given in the Appendix 2.3.1.

2.3.2.2. Sample selection and variable descriptions

We limit our sample to males aged between 20 and 60 years in order to avoid the complications related to modelling the intra-family labour supply decisions.

The dataset allows us to control for personal characteristics and human capital variables commonly used in similar studies, such as age, education and family status. Below, we discuss the most important variables in the current context. The complete list of the variables is given in Appendix 2.3.2.

Information on ethnicity is based on a question about the respondent's ethnic nationality. This means that ethnicity is self-reported in our analysis. We distinguish only between Estonian and non-Estonian individuals as non-Estonians form a more or less homogenous ethnic group in Estonia.

We measure wages using the monthly salary on the main job. The definition of this variable has changed several times during the sample period. For 1989

and 1992–1994, “the salary in autumn” is reported. In 1989, it is given in Soviet roubles, later in Estonian kroons. During the next wave, “salary” in January 1995, October 1995, October 1996 and January 1997 was reported. Since the third wave of the ELFS, the net salary in the previous January, October and current January is reported. Since the third quarter of 2000 (the survey was conducted quarterly since 2000), the “last net salary from the main job” is reported. The switch from gross to net income lessens the income gap in absolute values, as the Estonian tax system is slightly progressive. We expect the possible bias from these structural breaks will not be of major concern as they supposedly affect the data in the same way for both Estonian and non-Estonian individuals.

The ELFS includes information on self-reported language skills. It does not report whether the respondent is able to write or speak (coded as 1), speak (code 2), or simply understands (code 3) the language. We denote the corresponding variables langEE1–langEE3 for the Estonian- and langENG for the English skills. Language information is extremely relevant while controlling for the non-Estonian individuals’ ability to work in an Estonian-speaking environment. However, we admit that self-reported information on language skills may be biased, but we still argue that such multilevel descriptive information is not too far from the truth.

We include a dummy for immigrant status, which we define as moving to Estonia at age 8 or above. Hence, we call “immigrants” those individuals who started their schooling outside of the country.

2.3.2.3. Descriptive statistics

If we look at the sample of mean wages, then it could be seen that the wage level of non-Estonians was slightly above that of Estonians during the time of the most rapid transition 1992–1994 (Figure 2.3.2.3.1). During the following years, the advantage turned increasingly in favour of ethnic Estonians. At the end of the sample period, the wage gap has started to decrease.

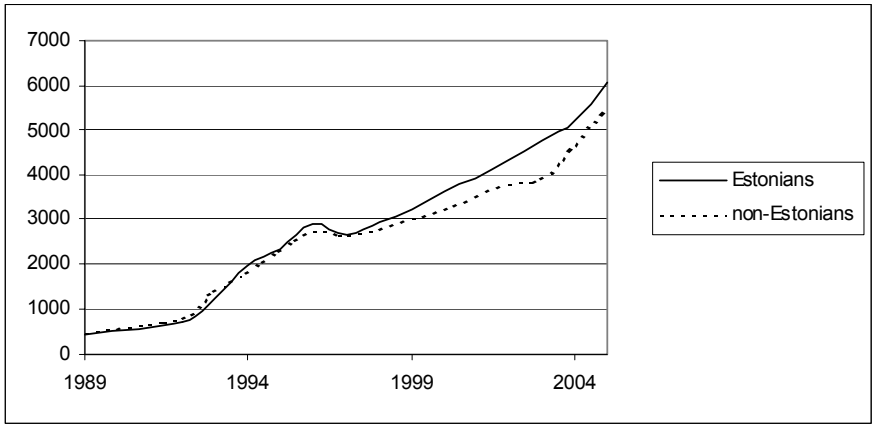

Figure 2.3.2.3.1. Mean wage across ethnic groups.

NB In 1989, wages were measured in Soviet roubles, later Estonian kroons. Gross wage until 1996, net wage since 1997.

In table 2.3.2.3.1 we present average values for the selected variables. The full table is in appendix 2.3.3.

The age distribution seems to be virtually equal for both ethnic groups, although the non-Estonian population are largely immigrants. The average educational level for non-Estonians is slightly higher as the proportion of workers with a college degree is fairly close across ethnic groups, but there are more Estonian individuals without a high school degree. Males of the majority group are clearly better at speaking English, the trend is clearly upwards for both ethnic groups. The knowledge of Estonian language is also improving among the non-Estonian population, though at a slower pace than that of English. The regional variables indicate regional segregation – there are virtually no non-Estonian people in the Southeastern part of the country while the opposite is true for the industrial North-East (Ida-Viru county). The capital, Tallinn, contains roughly 25% of Estonians in the work force and slightly above a third of that of non-Estonians. Non-Estonian males are over represented in mining, manufacturing, electricity and logistics sectors. Estonians dominate in agriculture, trade, public administration (since mid 1990s) and education. There are more professionals and managers among Estonians; non-Estonians dominate craft and related occupations.

Table 2.3.2.3.1. Means of the selected variables

Variable	1989	1994	1999	2001	2003	2005
college degree E	0.16	0.17	0.15	0.14	0.14	0.15
college degree R	0.15	0.16	0.13	0.12	0.12	0.16
Harju E	0.30	0.34	0.23	0.23	0.23	0.27
Harju R	0.49	0.51	0.36	0.38	0.36	0.43
langEE1 R	0.07	0.08	0.11	0.11	0.11	0.16
langEE2 R	0.11	0.11	0.15	0.13	0.15	0.16
langEE3 R	0.16	0.17	0.16	0.16	0.21	0.24
langEE Home R	0.10	0.09	0.13	0.10	0.10	0.09
langENG E	0.22	0.28	0.30	0.37	0.41	0.45
langENG R	0.10	0.13	0.14	0.19	0.16	0.24
immigrant R	0.57	0.49	0.38	0.36	0.32	0.27
manufacturing E	0.19	0.18	0.24	0.24	0.32	0.27
manufacturing R	0.37	0.26	0.29	0.37	0.32	0.31
publadm E	0.04	0.06	0.08	0.10	0.10	0.09
publadm R	0.04	0.04	0.03	0.04	0.04	0.04
manager E	0.14	0.18	0.14	0.14	0.12	0.13
manager R	0.12	0.11	0.09	0.06	0.06	0.08
professional E	0.10	0.08	0.08	0.08	0.10	0.08
professional R	0.07	0.06	0.04	0.04	0.05	0.05
craft E	0.28	0.24	0.25	0.25	0.24	0.25
craft R	0.42	0.39	0.39	0.40	0.40	0.37

Notes: ELFS data, males. E stands for Estonians, R for no-Estonians.

2.3.3. Model

To establish a decomposition of the average wage differential between ethnic Estonians and non-Estonians we use a similar methodology to Oaxaca (1973). We ignore selection in employment (this issue is discussed in detail in section 2.3.5). The log wage of individual *i* can be written as

$$\log w_i^g = \beta^{g'} X_i + \gamma^{g'} Z_i + \varepsilon_i$$

where *w* is the wage and *X* and *Z* are vectors of individual characteristics, where we distinguish between the explanatory variables, common for both groups (*X*) and group-specific variables (*Z*). The leading examples of *Z* include Estonian language skills as virtually all ethnic Estonians are fluent in Estonian. β and γ are corresponding parameter vectors and ε is a random error, distributed independently of X. Index *g* indicates the ethnic group. We denote the groups using *E* (Estonian), and *R* (non-Estonian).

Let the upper bar denote the sample average of the corresponding variable and the parameter estimate. The difference between group specific average wages can be decomposed as follows:

$$\overline{\log w^E} - \overline{\log w^R} = \hat{\beta}^E\left(\overline{X}^E - \overline{X}^R\right) + \left(\hat{\beta}^E - \hat{\beta}^R\right)\overline{X}^R + \gamma^E\overline{Z}^E - \gamma^R\overline{Z}^R$$
$$= \Delta_x + \Delta_\beta + \Delta_z$$

The first component, Δ_x captures the wage differences, caused by differences in common individual characteristics, such as age or education; Δ_z are differences, caused by explanatory variables not present for the other group and Δ_β are differences caused by how common skills can be valued differently. The standard errors for the components can be calculated using the delta method. In this study, we use the minority-specific explanatory variables $\overline{X}^R$ for the reference. This specification answers the question – what would the wage of non-Estonian workers be, given their current characteristics, if these were valued in the same way as Estonian workers.

2.3.4. Results

2.3.4.1. Wage gap

We decompose the ethnic wage gaps independently for each year we have wage data for, and for various sets of control variables. We use six different sets of control variables and each of them is referred to here as a model.

The unexplained wage gaps for each model (Δ_β) are presented in Table 2.3.4.1.1 and plotted in Figure 2.3.4.1.1. There exists a steady negative trend in the wage gap since the early transition times around 1992. However, the trend seems to reverse in 2003. The trend is similar for most of the period for all the models; however, the initial development during early 1990s differs. The difference between models decreases in time, but remains visible until the end of the sample period.

The non-Estonian workers earned somewhat more in average in early 1990s (Model 1). The initial advantage turned into a disadvantage 6–8 years later. Controlling for age and education (Model 2) makes the wage gap to look slightly more negative. Adding controls for immigrant status and family structure (Model 3) further decreases the unexplained wage gap. The most important explanatory variables are regional controls (model 4), making the wage gap between 5 and 10 percentage points more negative for most years. This fact is mostly related to the wage rate in the capital Tallinn, where Estonian workers enjoy a much higher wage premium than non-Estonians. However, the impor-

tance of the regional controls is fading, in 2005 these explained only 1.7 percentage points of the differential. Part of the wage gap is explained by language skills (model 5), making the unexplained part by 2–4 percentage point less negative. The last set of controls we add – industry and occupation – show the situation in a slightly paler light; however, because the difference is tiny.

We can conclude that non-Estonian workers are apparently earning less not because they are employed in worse industries and located in worse regions, but rather the other way around. However, their gain from more favourable characteristics remains less than for the ethnic majority. The only significant disadvantage in the characteristics of non-Estonian population we are able to identify from Figure 2.3.4.1.1 is their language skills.

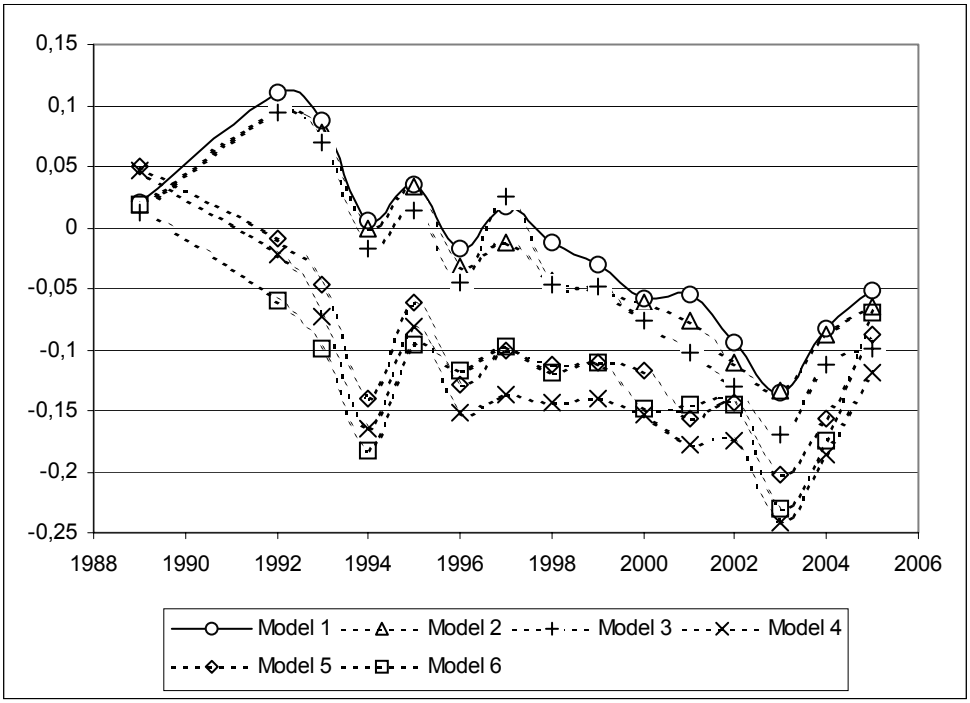

Figure 2.3.4.1.1. Unexplained wage differential in favour of non-Estonians (Δ_{β})

Table 2.3.4.1.1. Unexplained wage differential in favour of ethnic non-Estonians.

Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
1989	0.020	0.018	0.055	0.090	0.094	0.043
	0.030	*0.027*	*0.054*	*0.057*	*0.058*	*0.067*
1992	0.110*	0.106*	0.053	–0.024	–0.007	–0.073
	0.030	*0.029*	*0.055*	*0.058*	*0.058*	*0.063*
1993	0.090*	0.087*	0.037	–0.069	–0.035	–0.108
	0.030	*0.030*	*0.055*	*0.056*	*0.056*	*0.058*
1994	0.010	–0.000	–0.072	–0.189*	–0.155*	–0.199*
	0.030	*0.029*	*0.053*	*0.056*	*0.056*	*0.057*
1997	0.020	0.020	–0.073*	–0.180*	–0.140*	–0.141*
	0.020	*0.016*	*0.026*	*0.029*	*0.029*	*0.027*
2000	–0.060*	–0.055*	–0.113*	–0.204*	–0.158*	–0.197*
	0.030	*0.025*	*0.037*	*0.050*	*0.050*	*0.048*
2001	–0.060*	–0.055*	–0.110*	–0.185*	–0.156*	–0.152*
	0.020	*0.023*	*0.032*	*0.038*	*0.038*	*0.037*
2002	–0.090*	–0.099*	–0.165*	–0.207*	–0.166*	–0.171*
	0.030	*0.028*	*0.037*	*0.044*	*0.045*	*0.045*
2003	–0.130*	–0.132*	–0.213*	–0.272*	–0.225*	–0.258*
	0.020	*0.022*	*0.029*	*0.038*	*0.038*	*0.037*
2004	–0.080*	–0.075*	–0.174*	–0.242*	–0.198*	–0.206*
	0.020	*0.023*	*0.029*	*0.040*	*0.040*	*0.039*
2005	–0.051*	–0.052*	–0.150*	–0.167*	–0.126*	–0.108*
	0.024	*0.021*	*0.027*	*0.035*	*0.035*	*0.035*
Controls						
constant	X	X	X	X	X	X
age		X	X	X	X	X
education		X	X	X	X	X
family			X	X	X	X
immigrant			X	X	X	X
region				X	X	X
language					X	X
industry						X
occupation						X

Notes: * – differential statistically different from 0 at the 5% level. Different estimations include different sets of control variables. Standard errors in italics.

2.3.4.2. Coefficients

In this subsection we investigate which of the model coefficients determine the unexplained wage differentials. Here we present model 5 for selected years and selected variables (Table 2.3.4.2.1), the results for all the variables are given in appendix 2.3.4; the other models were qualitatively similar.

Table 2.3.4.2.1 Selected coefficients for Model 5

Variable	1989	1994	2001	2003	2005
college degree E	–0.026	0.408*	0.570*	0.454*	0.470*
college degree R	–0.075	0.285*	0.394*	0.240*	0.259*
Harju E	0.108*	0.476*	0.403*	0.277*	0.216*
Harju R	–0.016	0.195*	0.137*	0.035	0.038
langENG E	0.028	0.169*	0.130*	0.205*	0.171*
langENG R	0.179*	0.100	0.172*	0.089	0.137*
langEE1 R	0.030	–0.065	0.013	–0.001	0.019
langEE2 R	–0.062	–0.093	0.007	–0.063	0.056
langEE3 R	0.010	–0.029	0.064	–0.032	0.060
langEE Home R	–0.020	–0.028	0.034	–0.098*	0.052
intercept E	5.603*	6.922*	7.670*	7.972*	8.157*
intercept R	5.781*	7.003*	7.768*	7.986*	8.283*

Note: * – coefficient statistically different from 0 at the 5% level

The coefficients in most cases have an expected sign and size. The most important determinants of wages are education, marriage, part-time work, regional dummies and language skills. In 1989, most of the coefficients were small and insignificant. However, due to the rapid development in the early 1990s, returns already came close to their new stable values in 1994. It is interesting to look at the returns on language skills[2]. While knowledge of English (langENG) has been related to at least 10% of the wage advantage during almost all of the observed period, we are unable to document any similar effect for the Estonian language (langEE1–langeEE3 and langEE home). Although most of the coefficients are positive, they are of substantially smaller and only a few of them are statistically significant.

What coefficients determine the unexplained wage gap? The most consistent of these variables is Harju – having a job in the capital region. Since 1994, the difference in wage premiums for that county is statistically significant at the 1% level for every single year. While Estonian workers can expect around 30%

[2] We admit that we do not estimate returns in this word's narrow meaning. For instance, acquiring language skills may be related to unobserved ability and to the occupation (and wage).

higher salaries in that area than in the rest of the country, the wage premium for minority workers is virtually nonexistent. Another important variable is returns on university-level education or college degree, where the difference is significantly in favour of Estonian workers during the period of 1995–2001. Different returns on education for different ethnic groups have been documented earlier by, for example, Arias et al. (2004) for Brazil and Noorkôiv et al. (1998) for Estonia. Another regional dummy, Ida-Viru, has favoured Estonian workers in recent years. Therefore, it could be concluded that the higher returns on education, and the wage premium for employment in the capital are the most important determinants of the wage gap.

2.3.5 Explanations for the unexplained wage gap

In this section we consider several possible explanations for the unexplained wage gap. We look at discrimination, selection effects, incomplete language controls, quality of education, imperfect regional controls, migration and measurement errors.

First, we consider the possibility of discrimination in Estonia. The relationship between ethnic Estonians and Russians has been somewhat tense, at least in some periods. Most of the problems are related to different interpretations of the events of WW2, the Soviet period and the current status of the Russian-speaking minority in Estonia.

Unfortunately, there are very few studies related to the question of discrimination in Estonia. According to Pettai (2002), 37% of the minorities find discrimination common (only 6% of Estonian people).

As in other similar analyses, we cannot prove the presence of discrimination. The interviews we have conducted do not support the idea of discrimination in the sense of lower pay for a similar job (though this may be an issue in the case of negotiated salaries). However, in one case the respondent admitted that the management tries to avoid non-Estonian workers. The above results suggest that similar entry barriers may play a substantial role in the Estonian labour market.

Then next possible explanation is selection effects, as our estimation includes only individuals who receive positive salary. But despite the lower wage levels for non-Estonians, the non-participation rate in the minority population has been smaller than that for Estonian men, so this result does not support the idea of less favourable selection of minorities into the group of wage earners. Assuming that labour market status is related to an unobserved ability where higher ability leads to both better compensation and higher probability of employment, one should expect minority wage earners to be more favourably selected from the unobserved distribution of ability.

A common perception in the Estonian community is that by far the most important determinant of interethnic communication is knowledge of the Estonian language (Vihalemm, 2002). The current results, where the language

skills determine only a minor part of the wage gap, does not support this view. There are two possible explanations: first, self-reported language skills are severely biased, and second, the level that Estonians consider to be fluency in the language is far above what the minority finds reasonable.

The first explanation is not particularly convincing. As language skills are most probably correlated to ability, one expects skill levels to be endogenous, and hence returns on language skill (in the narrowest sense) to be rather overestimated.

It is hard to believe that an objective measure would change the picture completely. Unfortunately, there is no information about what is considered to be "sufficient" fluency. The use of the Estonian language may not automatically provide easier access to jobs; for example, Ponarin (2000) argues that using the titular language is in fact associated with a loss of respect for native speakers in Estonia.

The unexplained wage gap could be related to the content and quality of education. It is possible that the Estonian population was better prepared for the changes in the economy through different educational and occupational choices. The Estonian tier of the segregated school system was more closely oriented to the local labour market and it led, in general, to better education and occupation (often in agriculture, though). The Russian tier produced primarily blue-collar workers for the industrial segment, while their leaders were hired from elsewhere in the Soviet Union (Helemäe et al. 2000).

In order to test this hypothesis, we perform a wage decomposition for two groups – established workers (born before 1960) and young workers (born after 1975). Men, born before 1960 were 30 or more years old during the most important changes in society in the early 1990s. At that time in most cases they were already established workers with a job and some working experience. The men, born 1975 and later, were less than 17 years old during these years. Most of them had not yet started their working career and hence, they should have had better information about the requirements of the new economy when choosing their education and profession.

The results are presented in Table 2.3.5.1. Due to the low number of observations (and selection issues), we have pooled all the years (we added year dummies into the model specifications).

Table 2.3.5.1. Unexplained wage differential in favour of non-Estonians.

Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Born before 1960						
1997–2005	0.035*	–0.001	–0.016	–0.125*	–0.103*	–0.110*
	0.011	*0.009*	*0.009*	*0.013*	*0.013*	*0.013*
Born 1975 and later						
1997–2005	–0.102*	–0.113*	–0.150*	–0.158*	–0.117*	–0.097*
	0.022	*0.018*	*0.017*	*0.027*	*0.028*	*0.028*
Controls						
constant	X	X	X	X	X	X
age		X	X	X	X	X
education		X	X	X	X	X
family			X	X	X	X
immigrant			X	X	X	X
region				X	X	X
language					X	X
industry						X
occupation						X

Notes: Results for males, born before 1960, and after 1974. Standard errors in italics.

We can see that the younger generation is rather worse than better off. The younger non-Estonian workers earn around 10% less regardless of the model specification. The older minority workers have salaries comparable to those of the majority on average. However, in their case the wage premium for the capital region is rather low. This can be concluded from the fact that the unexplained differential turns suddenly negative in model 4. Surprisingly, the younger cohort does not show this disadvantageous effect for the capital. However, in their case the different returns on family characteristics and immigrant status seem to play a certain role (the unexplained differential for model 3 is much more negative than for model 2). In conclusion, our analysis of the two generations does not support the idea that the unexplained wage gap is related to the obsolete human capital of the older generation. The younger generation seems to be doing no better than the middle-aged workers.

It is possible that the worse labour market performance among ethnic minorities is related to the lower quality of Russian schools. There is some evidence that already in early 1980s the graduates of Russian schools had a lower starting position in their careers than those who graduated from Estonian schools (Helemäe et al. 2000).

Below, we present the results of the state exams for 2006 by school language in order to shed some light on school performance. State exams are a unified set of exams performed when graduating from high school, and are evaluated using a nationwide scale. This allows us to compare schools directly. Although high school-graduates in 2006 are not included in the current study, the data from

earlier years[3] suggest that school performance did not vary much during the last decade.

Most of the exam results are slightly better for Estonian schools (Table 2.3.5.2). However, for a few important subjects this is not the case. In the sciences, Russian schools do slightly better, while in maths the difference (in favour of Estonian schools) is less than 10% of the standard deviation. The bulk of the literature devoted to the relationship between high-school performance and later labour market outcomes, indicates a negligible effect from individual subjects on future earnings with maths as a possible exception (Altonji 1995; Dolton and Vignoles 2002)[4]. Whether these results are informative in this context – the effect of high school grades on later earnings – is not quite clear. However, based on the favourable outcomes for sciences and maths, we don't expect school quality to be the main reason behind the worse labour-market outcomes for non-Estonian men.

Table 2.3.5.2 The average results of state exams by school language, 2006.

Subject	language	N	average	stdd	difference
History	E	1907	68.28	17.29	–0.46
	R	232	58.61	21.24	
Biology	E	3000	63.35	17.13	–0.19
	R	708	59.49	20.38	
Physics	E	490	69.09	20.95	0.13
	R	79	71.97	22.55	
Geography	E	6263	60.94	13.25	–0.66
	R	605	51.45	14.47	
English	E	7158	66.71	15.54	–0.54
	R	2051	58.38	15.33	
Chemistry	E	1721	64.82	19.62	0.18
	R	553	68.42	19.57	
Mathematics	E	4493	52.08	23,05	–0.08
	R	1524	50.35	22.45	
Society	E	3626	59.96	14.21	–0.84
	R	481	46.45	16.17	
Average	E	39439	61.14	18.86	–0.09
	R	13607	59.20	20.78	

Notes: Bilingual schools are excluded. N – number of examinees; language – school language. Difference is the difference in mean scores as a percentage of the standard deviation. Source: National Centre of Examination and Qualification

[3] Before 2006, the results are presented according to examination language, not according to school language.

[4] Johnes (2005) finds that different subjects have important complementarities and synergy. There are substantial differences in returns on various sets of subjects.

Next, we analyse whether the wage differential may be related to imperfect controls for region. We look at the residents of the capital (Harju) county. Harju county essentially forms a single labour market where by far most of the jobs are concentrated in Tallinn and its suburbs.

The unexplained wage gap for different years and models is presented in Table 2.3.5.3. We have removed model 4, as it is equivalent to model 3 in this case. Figure 2.3.5.1 represents a graphical view of the table. At first it does not seem very different from Figure 2.3.4.1.1. Here, too, one can see a falling trend, which stabilises at around 1995, and appositive development after year 2000. However, the initial positive effect of Figure 2.3.4.1.1 is missing. Arguably, the former was related to geographic location, as a very large share of non-Estonian men work in Tallinn.

The estimates are more negative than for the full sample (Table 2.3.4.1.1). The absolute values of the estimates tend to decrease while adding additional explanatory variables. The most important variables, explaining the wage gap are the controls for language skills. The lower wages for non-Estonian men are also related to slightly worse occupations, industries and education (until mid 1990s only). However, even controlling for all these characteristics, we are still left with a very large unexplained component – around 20% of the wage.

Migration could also affect the wage gap, as the break-up of the Soviet Union was accompanied by substantial demographic changes. According to estimates, around 150 000 mainly non-Estonian people left the country during early transition, resulting in a significant fall in the total population (from 1.57 to 1.35 million). The following years have seen even further falls in the population due to low birth rates and increasing emigration to the West. However, the proportion of the ethnic groups has remained roughly stable.

Immigration to Estonia has been virtually zero since around 1990. According to census 2000, around 8300 men in the age group 20–59 were temporarily residing abroad[5]. This is around 3% of the male working population in the same age group. Hence, we do not expect temporary migration to significantly bias our results in the 1990s. However, those statistics do not include information on those who leave the country permanently. Permanent and temporary migration has increased a lot in recent years and, given that emigrants may form quite a selective sample, a certain effect on the results cannot be excluded for the latter period of the study.

[5] Statistics Estonia, online-database

Table 2.3.5.3 Unexplained wage differential in favour of non-Estonians, Harju county

Year	Model 1	Model 2	Model 3	Model 5	Model 6
1989	–0.025	–0.035	–0.038	–0.036	–0.082
	0.043	*0.045*	*0.045*	*0.047*	*0.055*
1992	–0.055	–0.054	–0.056	–0.023	–0.075
	0.045	*0.045*	*0.045*	*0.046*	*0.053*
1993	–0.130*	–0.122*	–0.120*	–0.072	–0.104*
	0.043	*0.043*	*0.043*	*0.044*	*0.051*
1994	–0.264*	–0.245*	–0.259*	–0.211*	–0.238*
	0.041	*0.043*	*0.041*	*0.043*	*0.048*
1997	–0.256*	–0.256*	–0.269*	–0.221*	–0.165*
	0.032	*0.032*	*0.031*	*0.032*	*0.035*
2000	–0.313*	–0.285*	–0.274*	–0.224*	–0.192*
	0.054	*0.053*	*0.050*	*0.053*	*0.055*
2001	–0.334*	–0.319*	–0.319*	–0.298*	–0.268*
	0.041	*0.041*	*0.039*	*0.041*	*0.045*
2002	–0.343*	–0.291*	–0.321*	–0.226*	–0.197*
	0.058	*0.052*	*0.051*	*0.055*	*0.062*
2003	–0.322*	–0.299*	–0.333*	–0.251*	–0.238*
	0.042	*0.041*	*0.039*	*0.043*	*0.047*
2004	–0.243*	–0.204*	–0.247*	–0.190*	–0.189*
	0.046	*0.045*	*0.042*	*0.045*	*0.049*
2005	–0.205*	–0.168*	–0.180*	–0.148*	–0.139*
	0.037	*0.036*	*0.035*	*0.036*	*0.038*
Controls					
constant	X	X	X	X	X
age		X	X	X	X
education		X	X	X	X
family			X	X	X
immigrant			X	X	X
language				X	X
industry					X
occupation					X

Notes: Results for males born before 1960 and after 1974. Standard errors in italics. * – statistically significant at 5% level.

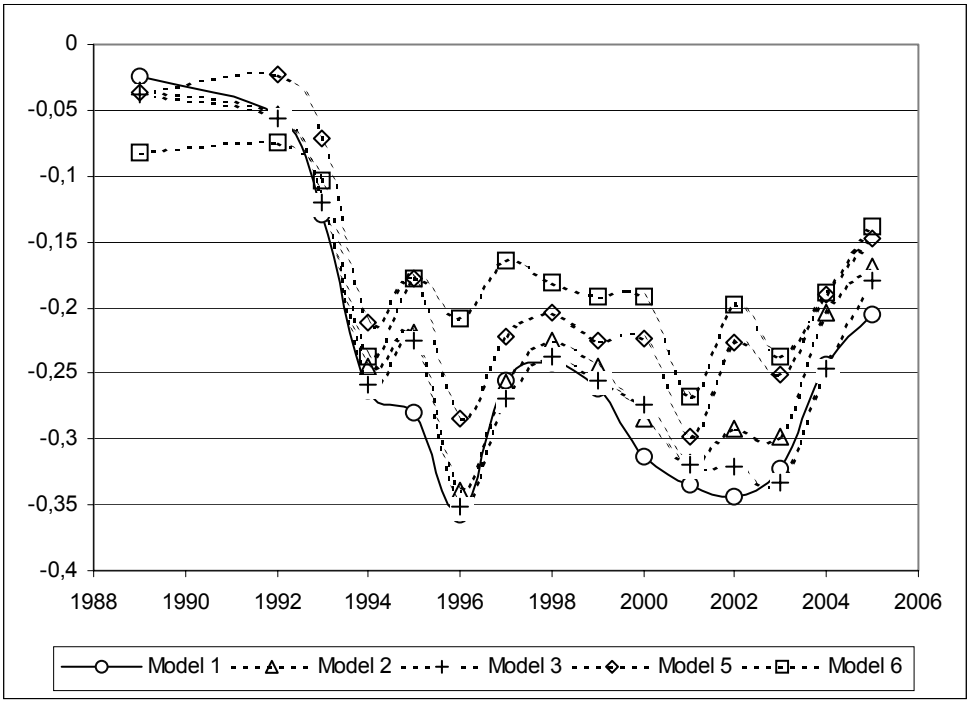

Figure 2.3.5.1 Unexplained wage differential in favour of non-Estonians, residents of Harju county

Finally, we analyse the possible effect of measurement errors. If there is a systematic misreporting bias in wages (e.g. due to more distrust among the non-Estonian workers), a spurious wage differential may arise. In order to get an idea of the extent of the problem, we report the proportion of individuals employed in both ethnic groups without a reported wage (Table 2.3.5.4). The table reveals that misreporting was probably not an issue until the mid 1990s. However, since the late 1990s, up to 37% of Estonian workers do not report their wage while the figures for the minority remains below 20% in most cases. The substantial non-reporting in agriculture will probably increase the perceived wages of Estonian workers. However, the effect should be negligible in the capital area. Underreporting in the relatively well paid financial services sector should bias the wage gap downward; however, employment in the financial sector is not great.

Table 2.3.5.4. Proportion of employed individuals with a missing wage by year (left panel) and by industry (right panel)

Year	Estonian	Minority
1989	0.029	0.028
1992	0.053	0.036
1993	0.053	0.036
1994	0.045	0.026
1995	0.044	0.031
1996	0.038	0.026
1997	0.152	0.083
1998	0.197	0.119
1999	0.240	0.137
2000	0.310	0.199
2001	0.296	0.124
2002	0.325	0.150
2003	0.371	0.189
2004	0.347	0.215
2005	0.320	0.230

Industry	
agriculture	0.295
fishing	0.234
mining	0.057
manufacturing	0.124
electricity	0.076
construction	0.192
trade	0.253
hotelrest	0.196
logistics	0.183
financial	0.259
business	0.224
publadm	0.116
education	0.085
health	0.178

2.3.6. Discussion

In the previous section we excluded a number of explanations for the unexplained ethnic wage gap. The most plausible remaining explanations are discrimination and human capital accumulation, related to schools and cultural background, and, to a certain extent, measurement errors.

Although our results are in concordance with Beckerian discrimination – lower pay for equal work – we do not believe this is a common situation in the Estonian labour market. It is also possible that entry barriers in the form of, for example, screening discrimination (Cornell and Welch 1996) or segregated social networks (Seidel et al. 2000; Calvo-Armengol and Jackson 2004) exist combined with establishment-level segregation as in Sattinger (1996). Unfortunately, we cannot test this using our datasets. However, our interviews suggested that there may be a certain unwillingness from both sides to accept a worker from a different ethnic background to an ethnically homogenous environment.

The falling unexplained wage gap during the increasingly tight labour markets in 2004 and 2005 gives some support for screening discrimination – the preference for Estonian workers where possible. This should lead to a counter-cyclical wage differential. However, our analysis does not reveal any distinct feature around the substantial economic downturn 1998–1999. Here, analysis of job market mobility is required.

Another possible mechanism behind the wage differentials is social networks and job referrals (Montgomery 1991; Kugler 2003). There is a lot of anecdotal evidence that the social networks of the ethnic groups are largely separated. Such a separation may be related to prejudices and mutual mistrust, being both the reason and result of segregation. Some indirect support for entry barriers also came from one of our interviewees: She noticed that non-Estonian workers often invite their relatives to work in the same plant. It never happens among Estonian workers. A much more thorough analysis of the ethnic networks is needed here.

What type of unmeasured human capital might be related to the wage gap? General ability does not seem a plausible explanation, although one cannot completely exclude selective migration. It would be interesting to include formal test scores, such as AFQT, to our analysis. Unfortunately, such tests are not regularly conducted in Estonia. More plausible explanations are language skills and cultural background. Although our analysis suggests the moderate role of language skills, it would be interesting to know what Estonian individuals expect as an adequate level of "fluency" in Estonian. Another relevant point here is the degree of exogeneity for language skills. As language fluency needs practice, one needs either mixed social networks or workplaces in order to achieve fluency.

The current results support the idea of a distinct relationship between the political and economic roles of the different ethnic groups. The group that leads in the political arena, also seems to achieve economic advantages – at least where ethnicity is an issue. In light of the analogous results from Kosovo (Bhumaik et al. 2006) and the Ukraine (Constant et al. 2006), the role of political leadership seems even more plausible.

2.3.7. Conclusions

In this chapter we analyse the unexplained wage gap between Estonians and minority groups in the Estonian labour market during the transition period 1989–2005. We use Estonian Labour Force Survey data and restrict the sample to males only. We decompose the mean wage differential using and Oaxaca (1973) type of technique.

We document the emergence of a substantial unexplained wage gap between Estonian and minority males. Whereas there were virtually no unexplained differentials in the early 1990s, the gap increased thereafter and reached around 10–15% of the mean wage in favour of Estonian workers. During the last years of the sample period, the gap has started to decrease. The gap is mainly related to different wage premiums for jobs in the capital region, and to different returns on education. Estonians gain more from employment in the capital region and they receive a higher premium for college education than non-Estonians. We show that the unexplained difference is even larger in the largest

regional labour market – the capital city, and there is no substantial difference between the size of the unexplained gap for young and old workers.

We analyse a number of possible explanations and exclude selection effects, language skills, schooling choice based on different expectations, regional effects, and migration, as the main reasons for the unexplained gap. The two factors that we consider most plausible for explaining the differential are entry barriers combined with low-level segregation and explanations related to segregated social networks.

Appendix 2.3.1

Interviews

We interviewed a small number of people in order to get some qualitative information about the opinions of ethnic groups on the Estonian labour market. The interviewees were

1. female, 29 years old, working in human resource management, capital region, Estonian
2. male, 26 years old, working in IT, capital region, Estonian
3. male, 28 years old, working in IT, Southern Estonia, Estonian
4. male, 26 years old, market research, capital region, Estonian
5. female, 28 years old, social worker, capital region, non-Estonian

The questions we asked concentrated on the number, role, ways of acquiring employment and performance of the workers of different ethnic groups. The more precise points of interest were related to whether there was any Beckerian discrimination present, what are relationships like between workers of different ethnic origin, whether there are many non-Estonian applicants in these firms, and whether the respondents believe the non-Estonian workers earn less in their establishment.

All the respondents believed that skills in the Estonian language matter most in terms of job access and salary. None of them confirmed any discrimination present in their establishment in terms of salaries; however, there was some indication of an unwillingness to work with people of a different ethnic background. The non-Estonian respondents stressed language-based discrimination.

List of variables

Here we list and describe all the explanatory variables used in the analysis.

Table 2.3.7.1 Explanatory variables

Variable	Description
Education and family	
less than HS	less than high school degree
high school	high school degree, some college
college degree	college degree
married	married or co-habiting
Age groups	
20–24, 25–34, 35–49, 50–60	
Region	
KaguEesti, IdaViru, Harju	
Language	
langEE1	understanding, speaking and writing skills (only for non-Estonian workers)
langEE2	understanding and speaking
langEE3	understanding
langEE Home	uses Estonian at home
langENG	understanding, speaking or writing skills (both Estonian- and non-Estonian workers)
Other individual characteristics	
immigrant	moved to Estonia at age 8 or later
partime	working less than 35 hours a week
Industry	
agriculture (reference group), fishing, mining, manufacturing, electricity, construction, trade, hotelrest, logistics, financial, business, publadm, education, health	
Occupation	
manager, professional, technican, clerk, serviceworker, skillagri, craft, operator, elementary (reference group), publsect	

Variable averages

Table 2.3.7.2 Means of explanatory variables for selected years

Variable	1989	1994	1999	2001	2003	2005
less than HS E	0.23	0.18	0.29	0.27	0.25	0.24
less than HS R	0.18	0.13	0.19	0.17	0.18	0.20
high school E	0.61	0.65	0.56	0.59	0.60	0.61
high school R	0.67	0.71	0.68	0.71	0.70	0.65
college degree E	0.16	0.17	0.15	0.14	0.14	0.15
college degree R	0.15	0.16	0.13	0.12	0.12	0.16
married E	0.78	0.75	0.75	0.73	0.70	0.72
married R	0.80	0.78	0.80	0.77	0.80	0.77
age2024 E	0.10	0.14	0.11	0.10	0.12	0.12
age2024 R	0.09	0.10	0.10	0.12	0.11	0.10
age2534 E	0.29	0.27	0.27	0.27	0.26	0.24
age2534 R	0.30	0.25	0.25	0.26	0.24	0.24
age3549 E	0.39	0.38	0.40	0.39	0.41	0.42
age3549 R	0.40	0.45	0.47	0.41	0.42	0.41
age5060 E	0.21	0.22	0.22	0.24	0.22	0.22
age5060 E	0.20	0.20	0.18	0.20	0.24	0.24
KaguEesti E	0.11	0.09	0.14	0.13	0.12	0.13
KaguEesti R	0.03	0.02	0.03	0.02	0.03	0.03
IdaViru E	0.05	0.04	0.03	0.04	0.04	0.02
IdaViru R	0.32	0.33	0.38	0.43	0.43	0.36
Harju E	0.30	0.34	0.23	0.23	0.23	0.27
Harju R	0.49	0.51	0.36	0.38	0.36	0.43
langEE1 R	0.07	0.08	0.11	0.11	0.11	0.16
langEE2 R	0.11	0.11	0.15	0.13	0.15	0.16
langEE3 R	0.16	0.17	0.16	0.16	0.21	0.24
langEE Home R	0.10	0.09	0.13	0.10	0.10	0.09
langENG E	0.22	0.28	0.30	0.37	0.41	0.45
langENG R	0.10	0.13	0.14	0.19	0.16	0.24
immigrant R	0.57	0.49	0.38	0.36	0.32	0.27
partime E	0.02	0.05	0.05	0.05	0.05	0.05
partime R	0.02	0.04	0.06	0.03	0.02	0.01
agriculture E	0.32	0.19	0.13	0.12	0.07	0.10
agriculture R	0.05	0.04	0.04	0.02	0.01	0.02
fishing E	0.04	0.02	0.01	0.01	0.00	0.01
fishing R	0.06	0.05	0.01	0.00	0.00	0.01
mining E	0.01	0.01	0.01	0.01	0.01	0.01
mining R	0.05	0.05	0.07	0.05	0.06	0.05

Variable	1989	1994	1999	2001	2003	2005
manufacturing E	0.19	0.18	0.24	0.24	0.32	0.27
manufacturing R	0.37	0.26	0.29	0.37	0.32	0.31
electricity E	0.02	0.04	0.03	0.02	0.02	0.02
electricity R	0.04	0.06	0.07	0.09	0.08	0.06
construction E	0.14	0.13	0.12	0.13	0.10	0.15
construction R	0.13	0.12	0.12	0.10	0.15	0.16
trade E	0.04	0.12	0.11	0.12	0.12	0.10
trade R	0.03	0.10	0.08	0.06	0.08	0.06
hotelrest E	0.01	0.02	0.01	0.01	0.01	0.01
hotelrest R	0.02	0.01	0.01	0.00	0.01	0.01
logistics E	0.09	0.09	0.10	0.10	0.09	0.09
logistics R	0.15	0.19	0.18	0.15	0.12	0.18
financial E	0.00	0.01	0.01	0.01	0.01	0.00
financial R	0.00	0.01	0.00	0.00	0.00	0.00
business E	0.04	0.05	0.05	0.05	0.05	0.06
business R	0.03	0.05	0.04	0.06	0.07	0.06
publadm E	0.04	0.06	0.08	0.10	0.10	0.09
publadm R	0.04	0.04	0.03	0.04	0.04	0.04
education E	0.04	0.04	0.04	0.04	0.04	0.04
education R	0.01	0.02	0.03	0.02	0.02	0.01
health E	0.03	0.04	0.04	0.03	0.03	0.03
health R	0.02	0.02	0.02	0.01	0.02	0.02
manager E	0.14	0.18	0.14	0.14	0.12	0.13
manager R	0.12	0.11	0.09	0.06	0.06	0.08
professional E	0.10	0.08	0.08	0.08	0.10	0.08
professional R	0.07	0.06	0.04	0.04	0.05	0.05
technican E	0.05	0.07	0.08	0.08	0.08	0.07
technican R	0.04	0.06	0.06	0.05	0.04	0.05
clerk E	0.01	0.01	0.02	0.02	0.03	0.03
clerk R	0.01	0.02	0.02	0.03	0.03	0.04
serviceworker E	0.02	0.05	0.05	0.05	0.07	0.05
serviceworker R	0.03	0.04	0.03	0.04	0.07	0.04
skillagri E	0.04	0.06	0.03	0.02	0.02	0.02
skillagri R	0.02	0.01	0.01	0.01	0.01	0.01
craft E	0.28	0.24	0.25	0.25	0.24	0.25
craft R	0.42	0.39	0.39	0.40	0.40	0.37
operator E	0.33	0.24	0.26	0.24	0.24	0.26
operator R	0.25	0.24	0.25	0.25	0.26	0.27
elementary E	0.04	0.05	0.09	0.12	0.12	0.11
elementary R	0.04	0.07	0.11	0.11	0.10	0.09
publsect E	0.93	0.47	0.25	0.25	0.21	0.19
publsect R	0.94	0.64	0.31	0.28	0.18	0.17

Notes: E stands for Estonians, R for non-Estonians.

Coefficients

Here we list all the coefficients for the full model (model 5) for selected years.

Table 2.3.7.3 Means of explanatory variables for selected years (model 5)

Variable	1989	1992	1996	1998	1999
E age2534	0.033	–0.120	0.038	–0.066	0.008
R age2534	0.151	0.145	0.056	0.000	0.030
E age3549	0.033	–0.112	–0.138	–0.108	–0.075
R age3549	0.056	0.101	0.281	0.028	0.077
E age5060	0.019	–0.171	–0.130	–0.173	–0.167
R age5060	0.005	0.143	0.043	–0.056	–0.001
E college degree	–0.026	0.363	0.464	0.568	0.598
R college degree	–0.075	0.218	0.108	0.365	0.333
E high school	0.048	0.135	0.098	0.178	0.199
R high school	–0.085	0.143	–0.048	0.178	0.200
E married	0.153	0.121	0.164	0.183	0.176
R married	0.119	0.110	0.258	0.198	0.130
E parttime	–0.519	–0.672	–0.679	–0.649	–0.685
R parttime	–0.302	–0.591	–0.413	–0.047	–0.190
E KaguEesti	–0.047	–0.186	–0.186	–0.089	–0.063
R KaguEesti	–0.051	–0.513	–0.213	–0.071	–0.060
E IdaViru	–0.218	0.146	0.034	0.125	0.103
R IdaViru	–0.167	–0.053	0.013	0.061	0.078
E Harju	0.108	0.448	0.484	0.333	0.374
R Harju	–0.016	0.248	0.036	0.181	0.174
E langENG	0.028	0.186	0.105	0.160	0.153
R langENG	0.179	0.127	0.238	0.165	0.144
R langEE1	0.030	–0.074	0.052	–0.017	0.034
R langEE2	–0.062	–0.034	0.042	0.094	0.154
R langEE3	0.010	–0.002	0.136	–0.014	0.105
R immigrant	–0.058	–0.122	–0.119	0.038	0.055
R langEE home	–0.020	–0.058	–0.058	0.013	0.060
E intercept	5.603	6.581	7.437	7.515	7.516
R intercept	5.781	6.562	7.350	7.338	7.350

Table 2.3.7.4 Means of explanatory variables for selected years (model 5)

Variable	1989	1992	1996	1998	1999
E age2534	0.138	0.020	0.040	0.104	0.135
R age2534	0.008	0.068	0.079	0.129	0.034
E age3549	0.063	–0.062	0.008	0.014	0.078
R age3549	0.073	0.084	0.097	0.081	0.059
E age5060	–0.052	–0.120	–0.094	–0.094	–0.066
R age5060	–0.022	0.023	0.071	0.040	–0.050
E college degree	0.545	0.582	0.454	0.418	0.470
R college degree	0.344	0.451	0.240	0.319	0.259
E high school	0.187	0.187	0.098	0.118	0.135
R high school	0.203	0.115	0.051	0.086	0.081
E married	0.124	0.210	0.163	0.231	0.161
R married	0.073	0.131	0.189	0.239	0.118
E parttime	–0.908	–0.744	–0.914	–0.754	–0.824
R parttime	–0.656	–1.022	–1.142	–0.586	–0.916
E KaguEesti	–0.009	–0.085	–0.092	–0.135	–0.116
R KaguEesti	–0.007	–0.183	–0.160	–0.035	–0.240
E IdaViru	0.106	–0.024	0.097	0.125	–0.051
R IdaViru	0.022	–0.126	–0.148	–0.118	–0.163
E Harju	0.357	0.334	0.277	0.237	0.216
R Harju	0.099	0.041	0.035	0.058	0.038
E langENG	0.183	0.162	0.205	0.175	0.171
R langENG	0.101	0.192	0.089	0.100	0.137
R langEE1	0.010	0.053	–0.001	0.053	0.019
R langEE2	–0.012	–0.074	–0.063	0.038	0.056
R langEE3	0.177	–0.044	–0.032	0.093	0.060
R immigrant	–0.001	0.037	0.011	0.064	0.064
R langEE home	0.048	–0.042	–0.098	0.037	0.052
E intercept	7.552	7.799	7.972	8.017	8.157
R intercept	7.587	7.862	7.986	7.938	8.283

2.4. Racial differences in availability of fringe benefits as an explanation for the unexplained black-white wage gap for males in US

2.4.1. Introduction

Ethnic minorities in the vast majority of cases have lower wages than ethnic majorities. The US black-white wage gap is probably the most investigated ethnic wage gap and does not represent an exception to the rule as blacks earn considerably less than whites. Even when controlling for schooling, family background and job characteristics, there still remains an unexplained gap in favour of whites. This kind of unexplained wage gap has persisted for decades and has not shown any signs of decline during the last decade (for a review, see Altonji and Blank 1999). Although the differences between blacks and whites in terms of educational attainment have narrowed, the wage differences have not decreased. There are several possible explanations for the unexplained black-white wage gap. One possible cause of such a gap is the omitted variable bias, which may result from unobserved ability or lack of information on the quality of education. Another possible explanation is discrimination in the form of taste discrimination (Becker 1971) or statistical discrimination (Phelps 1972).

The third potential explanation for the unexplained black-white wage gap could be differences in the provision of fringe benefits between blacks and whites. Employees are compensated for their effort not only with wages, but they also receive fringe benefits. According to the US Department of Labour, fringe benefits represent almost one third of total labour compensation, which means that the ethnic gap in fringe benefits will have an important effect on ethnic gaps in total labour compensation. If the ethnic fringe benefit gap is smaller than the wage gap, then the total compensation gap will be lower than the wage gap and vice versa.

Discriminating employees on the bases of the provision of fringe benefits instead of wages might be easier because offering fringe benefits is not as tractable as wages on the basis of the legal authorities. But if the labour markets are competitive then there will be no room for employers with discriminatory behaviour. If whites receive higher wages then it could be argued that in competitive labour markets blacks should receive more fringe benefits in compensation for lower wages. One of the few studies addressing this issue is Levy (2006), who analyses gaps in employer provided health insurance. She finds the black-white health insurance gap is smaller than the corresponding wage gap. So she argues that the black-white wage gap overestimates the gap in total compensation. Rhine (1987) investigated several determinants of fringe benefits, including ethnicity, but an analysis of ethnic fringe benefit gaps was not the aim of that article and so the topic receives very little attention. She investigates the determinants of pension contributions, sick leave and the total

monetary cost of fringe benefits. Her results do not indicate that ethnicity has an effect on fringe benefits.

Fringe benefits are not only limited to health insurance; although, in the US this is probably one of the most important. In order to estimate the racial gaps in total compensation, we should take other fringe benefits besides health insurance into account. The aim of this chapter is to fill that gap by analysing black-white gaps both for wages and nine different fringe benefits (medical, life and dental insurance, maternity/paternity leave, retirement plans, flexible hours, profit sharing, company provided training and childcare) and showing that the wage gap is substantially larger than the total compensation gap. Although it is clear that fringe benefits are not even limited to these nine, they probably cover the majority of fringe benefits.

Our analysis also differs from Levy (2006) by using a different dataset. Instead of the Current Population Survey, we use data from the National Longitudinal Survey of Youth 1979 (NLSY79). Although it is a smaller dataset, it also contains information about the Armed Forces Qualification Test (AFQT) scores. This variable could be used as a proxy for ability or school quality. As previous analyses of the racial wage gap (for example, Neal and Johnson (1996)) have indicated that these test scores explain a lot of the ethnic wage gap; therefore, the AFQT should also be included in the analysis of fringe benefit gaps as it could be similarly related to fringe benefits as to wages.

We use data from NLSY79 2004 survey and limit our sample to males with reported wages. We implement the Oaxaca decomposition method and estimate different specifications of decomposition models. Our results indicate that when controlling for various individual and job characteristics, there remains an unexplained wage gap in favour of whites, and for several fringe benefits there is an unexplained gap in favour of blacks. This result means that the ethnic wage gap is larger than the ethnic compensation gap. We also argue that blacks are compensated for lower wages with fringe benefits.

This chapter is organised as follows. First, there will be a short description of the decomposition methods used in this article. Next, the dataset is described. Following that, the descriptive statistics are analysed. Then wage and fringe benefit decompositions are conducted and the results are discussed. Following that, the compensation gap as a weight averaged wage and fringe benefit gap is calculated and analysed. In the last sections, a more detailed analysis of the wage and fringe benefit gap is conducted. This includes discussion of the effects of industrial and occupational segregation as well as birthplace on wage and fringe benefit gaps. Finally, the compensation gap is analysed.

2.4.2. Methodology and data

2.4.2.1. Methodology

We apply an Oaxaca (1973) decomposition method to analyse wage and fringe benefits gaps. As we use data about males aged between 40 and 47 then we ignore selection by employment. We argue that this is not likely to bias our results to a great extent, as males in this age group have typically high labour force participation rates. We do not include females in the analysis due to the complexity of female labour supply. Still, sample selection issues could have some influence on our results, as the share of respondents with positive wages is higher for whites (90%) than for blacks (82%), but these problems would have been much more serious if we had included women in our dataset.

For the Oaxaca decomposition, we assume that the dependent variable (the log wage of the binary variable for the availability of fringe benefits) for individual *i* could be written as

$$Y_i = \beta X_i + \varepsilon_i ,$$

where X is the vector of explanatory variables and ε_i is the error term. For the Oaxaca decomposition, these kinds of regressions are separately estimated for two samples, in this case whites and blacks. So we get

$$Y_i^W = \beta^W X_i^W + \varepsilon_i^W$$

$$Y_i^B = \beta^B X_i^B + \varepsilon_i^B ,$$

where W stands for whites and B for blacks. Let the upper bar denote the sample average for the corresponding variable and the hat, the parameter estimate. Then the difference of the sample average for the dependent variable could be decomposed in the following way:

$$\overline{Y}^B - \overline{Y}^W = \left[\left(\overline{X}^B - \overline{X}^W\right)\hat{\beta}^W\right] + \left[\overline{X}^B\left(\hat{\beta}^B - \hat{\beta}^W\right)\right]$$

The first term on the right hand side of the equation indicates the part of the difference in the average value of the dependent variable, which is caused by the differences in the explanatory variables between whites and blacks (explained gap). The second term indicates the part of the difference in the average value of the dependent variable caused by the differences in the values of regression coefficients between whites and blacks (unexplained gap). In this specification the unexplained gap answers the question – what would the average wage and availability of fringe benefits for blacks be, given the values

for their explanatory variables, if these were valued in the same way as for whites.

2.4.2.2. Data

We use data from the National Longitudinal Survey of Youth 1979 (NLSY79). This is a panel data set of 12,686 individuals born between 1957 and 1964. Until 1993, the respondents were interviewed annually, in the latter periods bi-annually. The size of the sample has decreased over the years of the survey; in 2004, there were 7,661 respondents interviewed.

We use a sample of males from the 2004 round of the NLSY79. Women are left out of the sample in order to avoid sample selection problems resulting from the relatively low female labour force participation in comparison to men. While that kind of problem may be present for men too, it is likely to be less important for the male sample. We include only men for whom we have wage data and who have taken the AFQT test. For ethnicity, we use the variable 'Racial/Ethnic Cohort from Screener' from the NLSY79 dataset. This variable divides the sample into three different ethnicities: non-black/non-Hispanics, blacks and Hispanics. We compare whites (non-black/non-Hispanics) and blacks. We have 1266 whites and 629 blacks in the sample with positive wages.

2.4.2.3. Descriptive statistics

The dependent variables in our decomposition analysis are wages and fringe benefits. For wages we use the logarithm of hourly wages from the main job and for fringe benefits we use binary variables, which indicate the availability of these benefits. The NLSY79 provides the hourly rate of pay, excluding any additional compensation in the form of commissions, bonuses, stock options or tips. The descriptions of the fringe benefits are listed in table 2.42.3.1. The data about fringe benefits refers to whether fringe benefits are offered to employees not taking into account whether the respondent takes up the offer of fringe benefits or not.

Table 2.4.2.3.1. Description of fringe benefits analysed

Fringe benefit	Description
Medical insurance	Medical, surgical, or hospital insurance that covers injuries or major illnesses off the job
Life insurance	Life insurance that would cover an employee's death for reasons not connected with his/her job
Dental insurance	Dental benefits
Maternity/ paternity leave	Maternity/paternity leave that will allow the employee to go back to his/her old job or one that pays the same as his/her old job
Retirement	Retirement plan other than social security
Flexible hours	Flexible hours or work schedule
Profit sharing	Profit sharing
Training or education	Training or educational opportunities including tuition reimbursement
Childcare	Company provided or subsidized childcare

Table 2.4.2.3.2. Average wages and fringe benefits for whites and blacks

Variable	Black	White	Difference
	mean	mean	
wage	16.98	24.42	–7.44
medical	0.693	0.772	–0.079
life	0.600	0.667	–0.067
dental	0.634	0.656	–0.022
maternity	0.498	0.508	–0.010
retirement	0.594	0.686	–0.092
flexible	0.468	0.461	0.007
profit	0.237	0.221	0.016
training	0.419	0.495	–0.076
childcare	0.091	0.052	0.039

The average values for the dependent variables are presented in table 2.4.2.3.2. Whites have substantially higher hourly wages in comparison to blacks, but in the case of fringe benefits the differences are not so clear. Whites have slightly higher coverage of medical and life insurance, firm-sponsored training and retirement plans, but for several fringe benefits there is virtually no difference. Company provided childcare is offered to blacks almost twice as often as to whites, although this benefit is available to only a small number of employees.

Table 2.4.2.3.3. Average values for the explanatory variables for whites and blacks

Variable	Black	White	Variable	Black	White
	mean	mean		mean	mean
age	42.59	42.48	manserv	0.113	0.039
schooling	12.81	13.70	education	0.044	0.043
afqt	23.87	55.52	health	0.059	0.043
tenure	337.54	452.91	arts	0.010	0.016
married	0.452	0.707	accommodation	0.053	0.021
kids	0.884	1.276	otherserv	0.054	0.036
maxparentschooling	11.359	12.951	publadm	0.072	0.057
immigrant	0.021	0.028	publsect	0.170	0.128
northeast	0.135	0.172	firmsize	1513.31	867.49
northcentral	0.171	0.345	selfemployed	0.104	0.142
south	0.615	0.317	union	0.178	0.161
urban	0.837	0.649	manager	0.088	0.219
mining	0.002	0.008	technician	0.038	0.083
utilities	0.003	0.005	comlegal	0.020	0.018
construction	0.117	0.151	teacher	0.016	0.023
manufacturing	0.164	0.199	entertainer	0.009	0.015
wholesale	0.041	0.040	healthworker	0.063	0.059
retail	0.072	0.090	serviceworker	0.140	0.049
transport	0.099	0.064	sales	0.044	0.082
information	0.023	0.030	clerk	0.068	0.052
finance	0.015	0.050	farmworker	0.004	0.008
realestate	0.013	0.012	productionworker	0.505	0.388
profserv	0.026	0.059			

It can be seen from table 2.4.2.3.3 that in the case of education and ability, whites have approximately one more year of formal schooling, but the differences in the AFQT results are more striking, as average scores for whites are more than twice as large as the average results for blacks. There have been quite a number of explanations for these kinds of differences. It could be argued that the low AFQT scores are the result of low school quality for blacks. Blacks are more likely to attend schools with higher student-teacher ratios, disadvantaged student ratios and student drop out ratios (Neal and Johnson, 1996). In addition, comparatively low parental education and income may be an obstacle for developing skills among young blacks. Unfavourable family background and neighbourhood could explain the racial gaps in the AFQT scores. Living in segregated neighbourhoods has certain cultural effects. Achieving good educational results could be considered as “Acting white”, by the other members of black community, which could result in high psychological costs of doing well in school (Fryer and Tortelli, 2005).

When using AFQT scores to explain the present wage and fringe benefit gaps then we have to keep in mind that these tests were taken more than 20 years ago. On the one hand, this could be a good thing as these tests were taken before the attainment of college education so they do not reflect the differences in college level education, which may be good if we suspect that blacks may be discriminated against at the college level. On the other hand, ability may change over such a long period, and in this case the test results reflect past ability rather than present ability. It could also be argued that AFQT test scores are racially biased, as there could be racial differences in their test taking ability (Rodgers III and Spriggs 1996). Still these test results are widely used in racial wage gap analyses.

Among the average values for other explanatory variables, it is worth mentioning that whites tend to be married and have more kids in their household. Blacks more often live in urban areas and in Southern states. There is some racial segregation at the industry level as whites are more likely to be employed in construction, manufacturing, finance and professional services, whereas blacks are more likely to be employed in transportation, manual services and accommodation. Blacks are employed more in the public sector and whites are more often self-employed. Besides industrial segregation, the descriptive statistics provide evidence of occupational segregation, as whites are also more likely to be managers or technicians than blacks.

2.4.3. Results

2.4.3.1. Wage and fringe benefit gap

We estimate six different models for wage and fringe benefit decomposition using the Oaxaca decomposition method. The first model estimates the raw gap in wages and fringe benefits. In model 2, schooling is inserted and in model 3, AFQT results are inserted as explanatory variables. Model 4 takes into account the effect of tenure and several family background variables (number of kids, marital status, parental education level, immigrant status). In model 5, regional variables and in model 6, several job characteristics are added.

Table 2.4.3.1.1. Specification of wage and fringe benefit decomposition models

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	X	X	X	X	X	X
Age		X	X	X	X	X
Schooling		X	X	X	X	X
AFQT			X	X	X	X
Tenure				X	X	X
Family				X	X	X
Immigrant				X	X	X
Region					X	X
Job						X

Table 2.4.3.1.2. Unexplained wage and fringe benefit gaps with standard errors from the decomposition models

	Wage	Medical	Life	Dental	Mater-nity	Reti-rement	Fle-xible	Profit	Trai-ning	Child-care
Model 1	**–0.389**	**–0.079**	**–0.067**	–0.022	–0.010	**–0.092**	0,007	0,016	**–0,076**	**0,039**
se	*0.037*	*0.018*	*0.020*	*0.020*	*0.021*	*0.019*	*0,021*	*0,017*	*0,020*	*0,010*
Model 2	**–0.338**	**–0.059**	**–0.041**	0.000	0.016	**–0.058**	0,041	0,026	–0,035	**0,049**
se	*0.037*	*0.019*	*0.020*	*0.020*	*0.021*	*0.020*	*0,021*	*0,018*	*0,020*	*0,011*
Model 3	**–0.168**	–0.003	0.020	**0.053**	**0.062**	–0.004	**0,087**	**0,05**	0,036	**0,051**
se	*0.046*	*0.023*	*0.025*	*0.025*	*0.026*	*0.024*	*0,026*	*0,022*	*0,025*	*0,013*
Model 4	–0.090	0.017	0.050	**0.083**	**0.097**	0.030	**0,083**	**0,067**	**0,056**	**0,055**
se	*0.048*	*0.024*	*0.026*	*0.026*	*0.027*	*0.025*	*0,028*	*0,023*	*0,027*	*0,014*
Model 5	**–0.120**	0.011	0.029	**0.064**	**0.095**	0.019	**0,077**	**0,086**	0,057	**0,051**
se	*0.052*	*0.026*	*0.028*	*0.028*	*0.030*	*0.027*	*0,030*	*0,025*	*0,029*	*0,015*
Model 6	**–0.083**	–0.012	0.006	0.035	**0.081**	0.000	**0,081**	**0,115**	0,035	**0,050**
se	*0.041*	*0.024*	*0.029*	*0.029*	*0.034*	*0.028*	*0,035*	*0,031*	*0,033*	*0,018*

Note: Bold text indicates statistical significance at the 95% level, standard errors in italics

As can be seen from table 2.4.3.1.2, there is a significant racial gap in wages. The raw gap is about 39 percent in favour of whites, and even if we include all the control variables then the unexplained wage gap is still 8 percent and it remains statistically significant. The AFQT score explains the biggest share of the wage gap; years of schooling and tenure also explain a substantial part. Differences in education and ability together explain more than half of the wage gap. These results are similar to previous analyses of the racial wage gap in the US; for example, Neal and Johnson (1996) also found that the AFQT explains the largest portion of the racial wage gap. Adding regional variables increases the unexplained wage gap slightly, meaning that blacks live in regions with higher average wage levels, but they do not benefit from living in these locations as much as whites. Differences in job characteristics explain a

relatively small part of the wage gap as better job characteristics for whites explain about 4 percentage points in the remaining gap.

There is a significant raw gap in favour of whites in the case of four fringe benefits (medical insurance, life insurance, retirement and firm-sponsored training) and a significant raw gap in favour of blacks for company provided childcare. As for wages, schooling and AFQT scores explain a large share of the white advantage. In model 3, which takes education and ability into account, the white advantage is not evident for any of the fringe benefits, but for five of the fringe benefits there is a significant unexplained gap in favour of blacks. The remaining wage gap from the same model is 17 percent in favour of whites. So it could be concluded that if we account for differences in education and ability then whites have higher wages, but blacks have access to more fringe benefits. For several fringe benefits, tenure and family background characteristics also play an important role. Model 4 illustrates the black advantage in fringe benefits even more because in that case there is an unexplained gap in favour of blacks for six fringe benefits. Adding regional characteristics does not affect the results to a great extent. If we control for all explanatory variables, it can be seen that for none of the fringe benefits is there a significant white advantage, but for maternity leave, flexible working hours, profit sharing and company provided childcare there is a significant black advantage. Company provided childcare is a somewhat different benefit from others as explanatory variables do not explain the gap in availability at all. Blacks have the largest advantage in profit sharing, where the unexplained gap in availability is more than 11 percentage points. In general, adding job characteristics slightly reduces the black advantage for some fringe benefits. Still there is no statistically significant remaining gap in favour of whites in any of the fringe benefits, but there exists such a gap in the case of wages.

Our results are in line with the findings of Levy (2006). She finds a 4% raw gap and a 1.7% unexplained advantage for whites in the case of medical insurance. Although she uses a different dataset, does not control for AFQT and decomposes the coverage of medical insurance instead of its availability, her results do not differ from ours remarkably.

According to these results it could be argued that blacks may be compensated for lower wages through higher access to fringe benefits. Although the raw wage and fringe benefit differences tend to be both in favour of whites, accounting for explanatory variables creates an unexplained wage gap in favour of whites, but corresponding gaps for fringe benefits are in favour of blacks in the case of several fringe benefits.

2.4.3.2. Compensation gap

So far we have viewed wages and fringe benefits as separate issues. In this section we will analyse the ethnic gap in compensation and take both wages and fringe benefits into account. Our results from the decomposition of gaps in fringe benefits would predict that the black-white gap in total compensation should be lower than the corresponding wage gap. Probably the most straightforward way to estimate the gap in compensation is to assign a monetary value to fringe benefits. One way of doing this could be to use data about employment costs as Brooks (2001) used for estimating compensation inequality. He has used average employment cost at the job level, and therefore his analysis misses the possible within-job variation in employment costs. If we want to estimate the gaps in employment costs more accurately then employee-level data about employment costs is needed, which is difficult to obtain in practise. We must also take into account that some fringe benefits, like flexible working hours, do not have clear monetary value and therefore employment cost data could not be used to analyse them. Even if a majority of fringe benefits have clearly measurable costs for employers, there are still arguments for not treating them as monetary benefits. First, employees do not usually know the monetary cost of fringe benefits and they may over or underestimate their value. Second, different employees have different preferences for money and fringe benefits and therefore they may experience the value of fringe benefits differently from their monetary value. Some employees may value flexible working hours more; others may want to earn higher monetary wages. The value of fringe benefits could also be affected by employee endowments (Kahneman et al. 1990). If we want to estimate the compensation gaps in the sense of how they reflect differences in employee utility from employment rather than gaps in employment costs, then using the monetary value of these costs could be misleading and therefore we will not do so in the following analysis.

Employees are compensated for their labour both by wages and fringe benefits. Compensation for worker *i* consisting of wage income W_i and fringe benefits F_i could be written as:

$$C_i = (1-\lambda)W_i + \lambda F_i ,$$

where λ is the share of fringe benefits in total compensation. If we assume that the share of fringe benefits λ is equal for both groups, then the average compensation for blacks and whites is

$$\overline{C}^{B} = (1-\lambda)\overline{W}^{B} + \lambda\overline{F}^{B}$$

$$\overline{C}^{W} = (1-\lambda)\overline{W}^{W} + \lambda\overline{F}^{W}$$

The racial compensation gap is

$$\overline{C}^{B} - \overline{C}^{W} = (1-\lambda)\left(\overline{W}^{B} - \overline{W}^{W}\right) + \lambda\left(\overline{F}^{B} - \overline{F}^{W}\right)$$

So the compensation gap is the average of wage and fringe benefit gaps weighted by λ.

In our analysis we have used a number of fringe benefits and it is difficult and even not favourable to assign them a monetary value as discussed previously. Still it is plausible to assume that individual utility is increasing in both wages and the number of fringe benefits available. If we do not know the value of different fringe benefits, then we assume that all the fringe benefits are equal in the sense that they affect an employee's utility. Therefore, we use the weighted average of log hourly wages and log of the total number of fringe benefits offered as the measure of compensation. If there were no fringe benefits available for a worker then the logarithm of fringe benefits was set equal to –1. We assume that wages account for two thirds of the total compensation and fringe benefits for one third, so $\lambda = \frac{1}{3}$. To estimate the racial compensation gap we use the Oaxaca decomposition and estimate six different models as previously.

Table 2.4.3.2.1. Unexplained compensation gap with standard errors from decomposition models

	Wage	Fringe	Compensation
Model 1	**–0.389**	**–0.167**	**–0.315**
se	*0.037*	*0.046*	*0.033*
Model 2	**–0.338**	**–0.097**	**–0.258**
se	*0.037*	*0.047*	*0.033*
Model 3	**–0.168**	0.072	**-0.088**
se	*0.046*	*0.058*	*0.040*
Model 4	–0.090	**0.140**	–0.013
se	*0.048*	*0.060*	*0.041*
Model 5	**–0.120**	0.117	–0.041
se	*0.052*	*0.065*	*0.045*
Model 6	**–0.083**	0.066	–0.033
se	*0.041*	*0.053*	*0.035*

Note: Bold text indicates statistical significance at the 95% level, standard errors in italics

The raw fringe benefit gap is more than one half smaller than the corresponding wage gap (17% vs 39% in favour of whites). As with the wage gap, the racial fringe benefit gap is explained mainly by schooling and the AFQT score. The results from model 3 indicate that if we control for the AFQT score then blacks will have a slight advantage in terms of access to fringe benefits. If we add tenure and family background variables then the unexplained wage gap in favour of whites decreases and the corresponding fringe benefit gap in favour of blacks increases. Regional effects on wage and fringe benefit gaps are relatively modest. If we add job characteristics to the decomposition model, then both wage and fringe benefits gaps decrease, but the direction of the effect of job characteristics is different. Adding job characteristics to the model makes blacks better off in terms of wages, but reduces their advantage in terms of fringe benefits. This means that blacks are employed in occupations and industries with relatively low wages, but high access to fringe benefits. If controlling for everything then whites have an 8% advantage in wages and blacks have a 7% advantage in fringe benefits; although, the unexplained gap in fringe benefits is statistically insignificant. These kinds of results give additional support to our previous findings that blacks are compensated with higher access to fringe benefits for lower wages.

The compensation gap is the weighted average of the wage and fringe benefit gaps. As in the case of wages and fringe benefits separately, the compensation gap is mainly explained by ethnic differences in education and ability. When controlling for all explanatory variables then the compensation gap is slightly in favour of whites, but it is statistically insignificant. Taking fringe benefits into account results in a reduction of the 8% wage gap to a 3% compensation gap. Our results confirm that accounting only for wages overestimates the black-white compensation gap.

2.4.4. Detailed analysis

2.4.4.1. Segregation

Blacks and whites tend to be employed in different industries and occupations. Could industrial and occupational segregation be the cause of gaps in wages and fringe benefits? There are several theoretical considerations why industrial segregation may cause differences in wages and fringe benefits. First, firms may have different capacities for providing wages and fringe benefits because profit margins, the intensity of competition and firm sizes vary across industries. In the case of wages, studies have documented a positive firm-size effect (Brown and Medoff 1989). Similar factors may cause positive size-effects for fringe benefits too because offering fringe benefits creates costs in the same way as paying wages. Second, there may exist positive returns to scale in offering fringe benefits (Collard et al 2005). For example, large firms may obtain

discounts from insurance companies if they buy life insurance for their employees. Still the empirical evidence on the firm-size effect on fringe benefits is controversial, as only some studies have found empirical support for that argument (Bernstein 2002), while other studies document that for a majority of fringe benefits, employer size does not matter (Variyam and Kraybill 1998). Third, union coverage and the bargaining power of unions vary across industries. A stronger union position results in higher wages and more fringe benefits as the union fights for both better wages and fringe benefits for their members. Furthermore, unions typically serve more the interests of older members, who usually have a stronger desire for certain fringe benefits such as health insurance and pension plans (Freeman 1981).

If we look at the average values of industry dummies for blacks and whites in table 2.4.2.3.3 then it could be said that industrial segregation exists to some extent. For example, whites are more likely to be employed in manufacturing, construction, finance and professional services, whereas blacks are more likely to be employed in transport, manual services and accommodation. In figures 2.4.4.1.1 and 2.4.4.1.2, we plot the relationship between the average wage and the average number of fringe benefits available at the industry level with the share of blacks in that industry.

These figures indicate that blacks are more likely to be employed in industries with relatively low levels of both wages and fringe benefits. That relationship is stronger for wages than fringe benefits. Therefore, industrial segregation is one explanation for the white advantage in wages and fringe benefits.

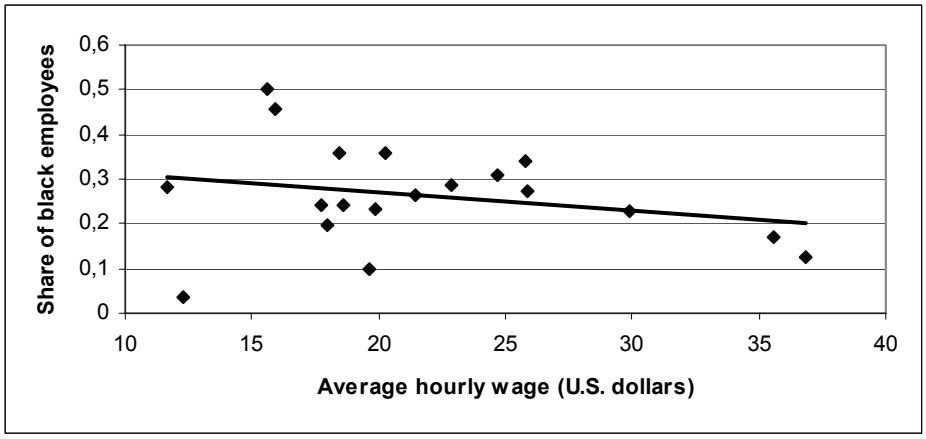

Figure 2.4.4.1.1. Relationship between average wage and the share of black employees at the industry level

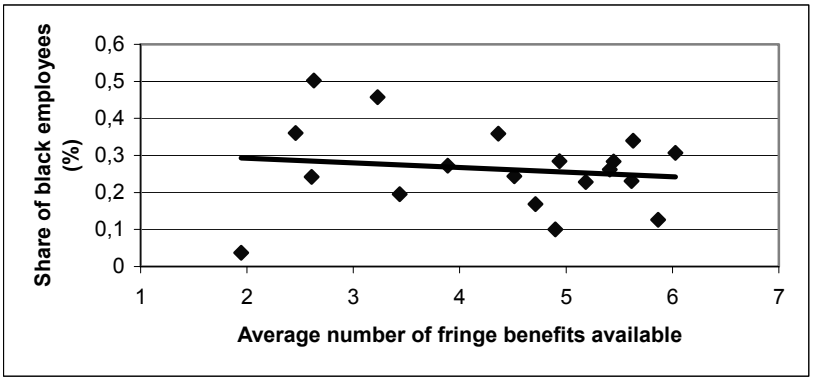

Figure 2.4.4.1.2. Relationship between average number of fringe benefits available and the share of black employees at the industry level

Occupational segregation could be a more important determinant of racial gaps in wages and fringe benefits than industrial segregation. This will be true if the availability of fringe benefits is attached to occupations rather than to single workers. Firms could offer the same package of fringe benefits to all their employees in the same occupation.

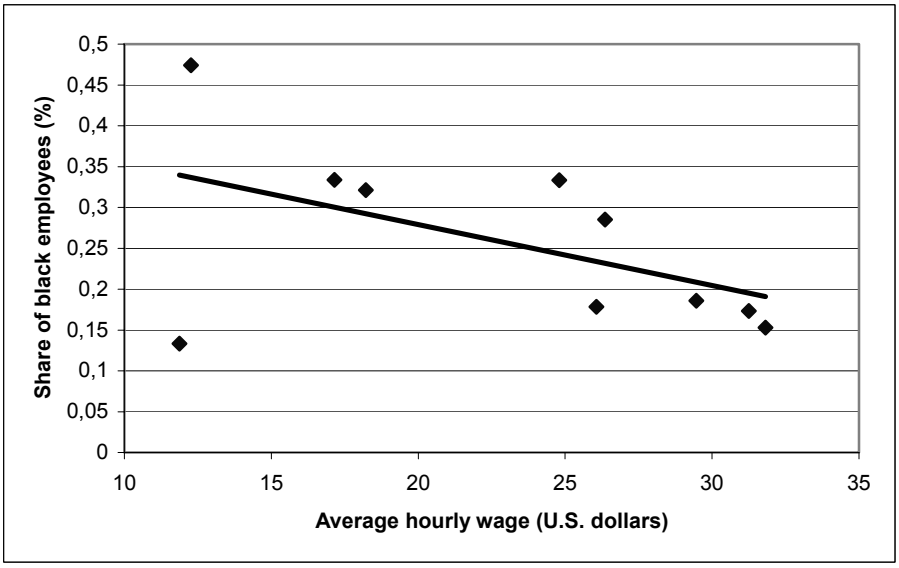

Figure 2.4.4.1.3. Relationship between average wage and the share of black employees at the occupation level

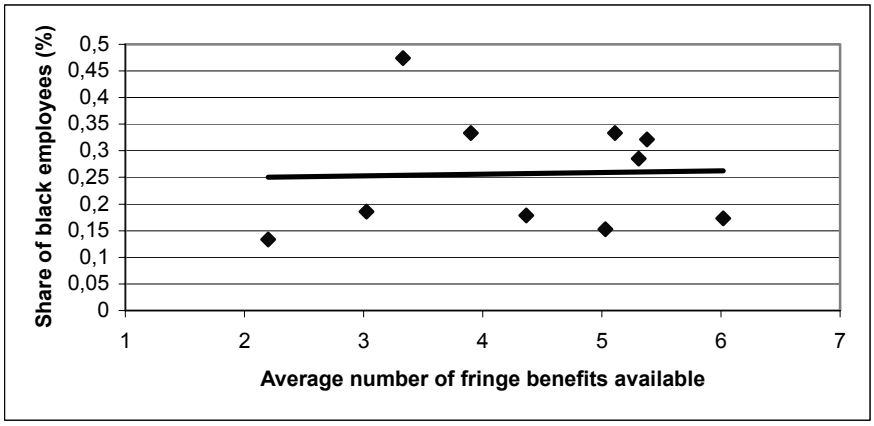

Figure 2.4.4.1.4. Relationship between average number of fringe benefits available and the share of black employees at the occupation level

Whites are much more likely to be managers, technicians or employed in sales; blacks are more likely to be service or production workers. If we look at the effects of occupational segregation on wages and fringe benefits (figures 2.4.4.1.3 and 2.4.4.1.4) then it could be concluded that occupational segregation is an important determinant of the black-white wage gap, but it does not affect the corresponding fringe benefit gap. Blacks are more likely to be employed in occupations with lower wages, but this is not true for the fringe benefits.

In conclusion, both occupational and industrial segregation explain the black-white wage gap to some extent, but for the fringe benefit gap, only industrial segregation seems to matter. Still it has to be kept in mind that due to the small sample, the number of industries and occupations used in our analysis is relatively low and therefore the level of aggregation is high.

2.4.4.2. Do blacks have preferences for fringe benefits?

In this section we investigate whether the result that blacks are compensated for lower wages by greater access to fringe benefits, could be explained by differences in preferences between blacks and whites. As wages are the most important form of labour compensation, we assume that when choosing jobs individuals make this decision on the basis of wages and not fringe benefits. Therefore, industrial and occupational segregation will not reflect black and white preferences for fringe benefits. But we assume that managerial employees have at least some power to choose their form of compensation, which is not so likely for the other occupations.

We estimate an Oaxaca decomposition model for the sub samples of managers and other employees. We argue that among all occupations, managers have the greatest power to decide about their own wages and fringe benefits. Therefore, the balance between the racial gaps in terms of wage and fringe

benefits among managers will reflect the preferences among blacks for wages and fringe benefits.

The estimation results indicate that for both sub samples there is a significant raw gap in favour of whites in wages (tables 2.4.4.2.1 and 2.4.4.2.2). In the case of fringe benefits for managers the raw gap is in favour of blacks for a number of fringe benefits, in the case of non-managers the raw gap is in favour of whites for the majority of fringe benefits. If we control for all explanatory variables then for managerial workers the wage gap reduces to zero, but there are positive unexplained fringe benefit gaps in favour of blacks. Still we have to remember that the unexplained fringe benefit gaps for managers are statistically insignificant, which is likely to be due to the small sample.

Table 2.4.4.2.1. Racial gaps in wages and fringe benefits for managerial occupations

	Wage	Medical	Life	Dental	Mater-nity	Retire-ment	Flexible	Profit	Trai-ning	Child-care
Model 1	**–0,264**	0,018	0,107	**0,124**	**0,177**	0,086	**0,168**	–0,003	0,060	**0,115**
se	*0,092*	*0,050*	*0,055*	*0,056*	*0,061*	*0,056*	*0,060*	*0,057*	*0,061*	*0,036*
Model 2	**–0,267**	0,015	**0,105**	**0,123**	**0,180**	0,084	**0,168**	–0,003	0,059	**0,114**
se	*0,076*	*0,048*	*0,049*	*0,051*	*0,058*	*0,053*	*0,057*	*0,059*	*0,060*	*0,047*
Model 3	**–0,191**	0,066	0,112	**0,159**	**0,197**	0,119	**0,241**	0,064	**0,159**	0,078
se	*0,095*	*0,058*	*0,061*	*0,063*	*0,071*	*0,064*	*0,069*	*0,071*	*0,071*	*0,053*
Model 4	–0,172	0,059	0,113	**0,140**	**0,193**	0,116	**0,220**	0,043	0,149	0,088
se	*0,102*	*0,062*	*0,065*	*0,067*	*0,075*	*0,067*	*0,075*	*0,074*	*0,075*	*0,057*
Model 5	–0,166	0,063	0,090	0,127	**0,174**	0,084	**0,269**	0,087	0,134	0,075
se	*0,113*	*0,067*	*0,071*	*0,073*	*0,083*	*0,074*	*0,082*	*0,081*	*0,083*	*0,061*
Model 6	0,021	0,034	0,058	0,101	0,086	0,079	**0,221**	0,090	0,124	0,036
se	*0,130*	*0,055*	*0,068*	*0,074*	*0,101*	*0,081*	*0,100*	*0,111*	*0,106*	*0,093*

Note: Bold text indicates statistical significance at the 95% level, standard errors in italics.

Table 2.4.4.2.2. Racial gaps in wages and fringe benefits for other occupations

	Wage	Medical	Life	Dental	Mater-nity	Retire-ment	Flexible	Profit	Trai-ning	Child-care
Model 1	**–0.333**	**–0.084**	**–0.077**	–0.033	–0.027	**–0.108**	0.010	0.033	**–0.077**	**0.036**
se	*0.041*	*0.020*	*0.021*	*0.021*	*0.022*	*0.021*	*0.022*	*0.018*	*0.022*	*0.010*
Model 2	**–0.315**	**–0.070**	**–0.059**	–0.020	–0.008	**–0.085**	0.035	0.036	**–0.045**	**0.042**
se	*0.041*	*0.020*	*0.022*	*0.022*	*0.022*	*0.021*	*0.022*	*0.019*	*0.022*	*0.011*
Model 3	**–0.156**	–0.013	0.013	0.038	0.047	–0.022	**0.070**	**0.046**	0.019	**0.051**
se	*0.051*	*0.025*	*0.027*	*0.027*	*0.028*	*0.026*	*0.028*	*0.023*	*0.027*	*0.013*
Model 4	–0.077	0.014	0.048	**0.083**	**0.094**	0.024	**0.069**	**0.066**	0.048	**0.052**
se	*0.054*	*0.026*	*0.028*	*0.028*	*0.029*	*0.027*	*0.030*	*0.025*	*0.029*	*0.014*
Model 5	**–0.116**	0.011	0.032	**0.068**	0.101	0.023	0.051	**0.084**	0.054	**0.049**
se	*0.058*	*0.028*	*0.031*	*0.031*	*0.032*	*0.030*	*0.033*	*0.027*	*0.032*	*0.015*
Model 6	**–0.108**	–0.018	0.000	0.031	**0.093**	0.004	0.055	**0.112**	0.035	**0.047**
se	*0.045*	*0.027*	*0.032*	*0.032*	*0.037*	*0.030*	*0.039*	*0.032*	*0.036*	*0.019*

Note: Bold text indicates statistical significance at the 95% level, standard errors in italics.

For other occupations, the unexplained wage gap is in favour of whites. This result confirms that occupational segregation is a determinant of the unexplained wage gap, as those blacks that have succeeded in getting a managerial position do not have unexplained wage disadvantages. The story is quite similar for fringe benefits. For managers, the black advantage in terms of fringe benefits is larger than for non-managers. This difference is especially large for flexible working hours. Black managers are 22 percentage points more likely to have flexible working hours than their white counterparts, whereas among other occupations the difference is 5 percentage points. The fact that black managers have access to more fringe benefits (but have at the same time no wage advantage) than white managers allows us to argue that blacks prefer to receive more fringe benefits. At least some of the managerial workers have the power to decide about their wages and the fringe benefits available to them, whereas it is not likely to be the case for other occupations.

2.4.4.3. Is AFQT a determinant of industry and occupation?

Previous analysis has shown that the difference in AFQT scores is the most important cause of the black-white wage and fringe benefit gap. The relationship between AFQT scores and wages is discussed extensively in the literature (for example, Neal and Johnson (1996)), but the linkages between test scores and fringe benefits have not been investigated. If we consider fringe benefits as part of total compensation, which is not paid as wages, then that kind of relationship could be similar.

In this section we test whether the AFQT score is only a determinant of the choice of industry and occupation or whether it affects wages and fringe benefits even if we control for all job characteristics, including industry and occupation. In order to do that, we estimate model 6 of the Oaxaca decomposition, but drop the AFQT score variable and compare the estimation results with the previous results including the AFQT score variable. If AFQT were only the determinant of industry and occupation then dropping the AFQT variable will not affect the unexplained wage gap.

The results from table 2.4.4.3.1 indicate that when controlling for job characteristics, the AFQT score affects wages more than fringe benefits. Dropping the AFQT variable increases the unexplained wage gap by about 5 percentage points. This means the AFQT score affects wages within occupations and industries. As blacks have considerably lower test scores, these scores are converted into lower wages for blacks in similar jobs. The story is different for fringe benefits because leaving the AFQT variable out does not alter the result remarkably. That leads us to the conclusion that the availability of fringe benefits does not depend on ability or schooling or quality of education. Although more able workers tend to be paid higher wages in similar jobs, this does not seem to be true for fringe benefits, and therefore, lower

abilities among blacks do not reduce the availability of fringe benefits within occupations and industries.

Table 2.4.4.3.1. Unexplained wage and fringe benefits gaps with standard errors with and without the AFQT variable

	Wage	Medical	Life	Dental	Mater-nity	Retire-ment	Flexible	Profit	Trai-ning	Child-care
With AFQT	**–0.083**	–0.012	0.006	0.035	**0.081**	0.000	**0.081**	**0.115**	0.035	**0.050**
se	*0.041*	*0.024*	*0.029*	*0.029*	*0.034*	*0.028*	*0.035*	*0.031*	*0.033*	*0.018*
Without AFQT	**–0.136**	–0.031	–0.020	0.015	**0.059**	–0.019	**0.073**	**0.120**	–0.005	**0.055**
se	*0.036*	*0.021*	*0.025*	*0.025*	*0.029*	*0.024*	*0.030*	*0.027*	*0.029*	*0.017*
Without AFQT with non-missing AFQT	**–0.126**	–0.026	–0.017	0.018	**0.061**	–0.017	**0.067**	**0.117**	0.007	**0.063**
se	*0.037*	*0.022*	*0.026*	*0.026*	*0.030*	*0.025*	*0.031*	*0.027*	*0.029*	*0.017*

Note: Bold text indicates statistical significance at the 95% level, standard errors in italics.

Not all the respondents of the NLSY79 sample have taken the AFQT. Among the respondents of the 2004 survey about 6% had not taken the test. In order to test, if this affects the effect of the AFQT on the wage and fringe benefit gap, we estimated decomposition model 6 without the AFQT variable, but limited the sample to those who had taken the test. The decomposition results for the full sample and test takers are virtually the same. This means that the effect of dropping the AFQT variable is not affected by the fact that some respondents had not taken the AFQT.

These results allow us to argue that the AFQT score tends to be a determinant of industry and occupation and affects fringe benefits in an indirect way, but it has also direct wage effects. The fact that ability has no direct effect on fringe benefits could be one reason why blacks that receive relatively low wages in comparison to whites, have relatively high access to fringe benefits.

2.4.4.4. Birthplace effect

Human capital is considered to be one of the most important determinants of labour compensation. Although we have included years of schooling, AFQT scores and tenure in our analysis so far, these variables may not capture the entire human capital. Years of schooling express only the quantitative aspect of formal schooling and AFQT scores are frequently used to control for differences in school quality and also to account for ability. Tenure is frequently

considered as a measure of working experience and it could be interpreted as a proxy for the amount of on-the-job training if it is assumed that workers over the years continuously receive training at the work place. Still, there are some arguments for why these variables, including the AFQT score, do not fully capture human capital. First, human capital is definitely not limited to formal schooling. Second, AFQT tests do not measure all kinds of skills. It is naïve to think that the result of a relatively short test could give complete and thorough information about all of an individual's skills. As Black et al. (2006) point out, this test surely misses other valued traits that one might learn in school (e.g. specific domain knowledge, computer skills, persistence in completing tasks, or the ability to work with others). Third, the test results do not reflect the human capital acquired after the completion of the test. As the importance of life-long learning and on-the-job training have increased sharply during the last decade, then it is quite clear that the results of a test taken more than 20 years ago do not fully capture human capital.

A recent article by Black et al. (2006) estimates the black-white wage gaps separately for employees born in Southern states and in other states. They find that blacks born in non-Southern states receive a similar conditional wage to whites, whereas blacks born in the South show much lower wages in comparison to whites born in the South. However, their sample is limited to highly educated employees. In this section, we extend their analysis by investigating the birthplace effect not only on highly educated workers, and do not limit our analysis only to wages but consider fringe benefits too.

Birthplace could be used as a proxy for unobserved human and also cultural capital for several reasons. First, school quality in Southern states has been comparatively low and this is true both for high school and college level. Traditionally, blacks have attended low quality schools with large class sizes. As Card and Kruger (1992) note, the Southern states were the last to abolish a racially segregated school system, where segregated schools operated even in the mid-1960s. Second, the socio-economic status of blacks has been traditionally different in Southern states. During 1960s, a college education among blacks led to an upper middle class occupation far more frequently in the North than in the South (Black et al 2006). Therefore, even when controlling for parental education we do not fully take into account the effect of the parents' socio-economic status. The lower class-position of the parents of Southern born blacks could result in lower quality pre-school education. Third, there have been and still are remarkable cultural differences between Southern and other states including different attitudes towards blacks. Southern-born blacks may have experienced more hostile attitudes towards them, which may have negatively affected both their socialisation and labour market performance. Blacks born in the South may also have become less culturally integrated into society – their customs, habits and behaviour could be more different from whites than the cultural differences between blacks and whites born elsewhere.

In order to analyse the birthplace effect on wages and fringe benefits we estimate the Oaxaca decomposition models separately depending on birthplace. We use an identical set of control variables as in the previous analysis.

Table 2.4.4.4.1. Unexplained wage and fringe benefit gaps with standard errors from the decomposition models for employees born in the South

	Wage	Medical	Life	Dental	Mater-nity	Retire-ment	Fle-xible	Profit	Trai-ning	Child-care
Model 1	**–0.267**	–0.035	–0.044	–0.008	0.056	–0.055	**0.086**	**0.052**	–0.010	0.022
se	*0.060*	*0.029*	*0.031*	*0.031*	*0.032*	*0.031*	*0.032*	*0.026*	*0.031*	*0.015*
Model 2	**–0.238**	–0.023	–0.030	0.006	0.069	–0.036	**0.101**	**0.053**	0.011	0.028
se	*0.061*	*0.029*	*0.031*	*0.031*	*0.032*	*0.031*	*0.032*	*0.026*	*0.031*	*0.015*
Model 3	–0.007	0.015	0.035	0.064	**0.100**	0.026	**0.162**	**0.071**	**0.097**	0.034
se	*0.086*	*0.041*	*0.043*	*0.044*	*0.045*	*0.043*	*0.044*	*0.036*	*0.044*	*0.020*
Model 4	0.067	0.050	**0.099**	**0.137**	**0.155**	0.084	**0.178**	0.077	**0.136**	0.040
se	*0.094*	*0.044*	*0.046*	*0.046*	*0.048*	*0.046*	*0.048*	*0.040*	*0.047*	*0.022*
Model 5	0.033	0.042	0.096	**0.118**	**0.153**	0.079	**0.151**	**0.089**	**0.133**	0.044
se	*0.102*	*0.048*	*0.050*	*0.051*	*0.053*	*0.050*	*0.053*	*0.044*	*0.051*	*0.024*
Model 6	–0.149	–0.070	–0.026	–0.055	0.060	–0.077	0.130	0.048	0.022	–0.014
se	*0.109*	*0.068*	*0.081*	*0.087*	*0.101*	*0.084*	*0.090*	*0.078*	*0.090*	*0.048*

Note: Bold text indicates statistical significance at the 95% level

Table 2.4.4.4.2. Unexplained wage and fringe benefit gaps with standard errors from the decomposition models for employees not born in the South

	Wage	Medical	Life	Dental	Mater-nity	Retire-ment	Fle-xible	Profit	Trai-ning	Child-care
Model 1	**–0.391**	**–0.115**	**–0.111**	–0.033	–0.055	**–0.124**	–0.021	0.003	**–0.085**	**0.070**
se	*0.055*	*0.027*	*0.030*	*0.030*	*0.031*	*0.029*	*0.031*	*0.026*	*0.031*	*0.016*
Model 2	**–0.343**	**–0.096**	**–0.084**	–0.010	–0.030	**–0.090**	0.012	0.013	–0.041	**0.079**
se	*0.052*	*0.029*	*0.031*	*0.030*	*0.031*	*0.030*	*0.031*	*0.027*	*0.031*	*0.019*
Model 3	**–0.216**	–0.040	–0.024	0.047	0.025	–0.040	0.053	0.033	0.013	**0.087**
se	*0.059*	*0.032*	*0.035*	*0.034*	*0.036*	*0.034*	*0.036*	*0.031*	*0.035*	*0.021*
Model 4	**–0.150**	–0.027	–0.005	0.058	0.048	–0.016	0.030	0.041	0.024	**0.085**
se	*0.062*	*0.033*	*0.036*	*0.036*	*0.038*	*0.035*	*0.038*	*0.032*	*0.037*	*0.022*
Model 5	**–0.210**	–0.043	–0.030	0.038	0.033	–0.041	0.019	0.065	0.013	**0.080**
se	*0.066*	*0.035*	*0.038*	*0.038*	*0.040*	*0.037*	*0.041*	*0.034*	*0.039*	*0.023*
Model 6	–0.064	–0.016	–0.029	0.053	0.024	–0.036	0.042	**0.118**	0.014	**0.095**
se	*0.062*	*0.035*	*0.042*	*0.040*	*0.049*	*0.040*	*0.050*	*0.044*	*0.047*	*0.032*

Note: Bold text indicates statistical significance at the 95% level

The raw wage gap for employees born in the South[6] is actually smaller than for employees born elsewhere, but if we control for all explanatory variables then the result is the opposite. If we compare models 2 and 3 then we see that the effect of the AFQT score on the wage gap is larger for those born in the South (23% vs 13%). This means that the direct effect of ability on the wage gap is larger for workers born in the South. Comparing the results from models 5 and 6 leads us also to an interesting conclusion. Taking the job characteristics into account, the wage gap grows in favour of blacks for the non-Southern-born sample and in favour of whites for the Southern-born sample. This means that blacks born in the South have relatively low wages in comparison to whites in similar jobs, but the situation is the other way round for non-Southern-born blacks. So it seems to be that for the non-Southern-born sample, the ethnic wage gap is largely explained by job characteristics, but for the Southern-born sample it seems to be that in the case of similar job characteristics there are considerable racial differences. If we view ethnic wage discrimination as blacks receiving lower wages in comparison to whites in similar jobs, then it could be argued that this kind of discrimination is more likely to be present for blacks born in the South. If we compare the unexplained wage gaps after controlling for all explanatory variables then it also suggests that wage gaps favour whites for employees born in the South (15% vs 6%). However, these results do not necessarily indicate greater wage discrimination against blacks born in the South because, as discussed earlier, birthplace may act as a proxy for unobserved human capital and these wage gaps could be caused by differences in human capital as well.

If we look at the raw fringe benefit gaps then we document a statistically significant gap in favour of whites not born in the South for a number of benefits, with the exception of company provided childcare, which is more available for blacks. For the Southern-born sample there is no clear pattern of ethnic advantage in terms of fringe benefits. Blacks have greater access to flexible working hours and profit sharing, but for the majority of fringe benefits the raw gap is not statistically significant. If we control for all explanatory variables then it could be said that in general the unexplained wage gaps are somewhat larger than the corresponding gaps in fringe benefits for both subsamples. For medical and dental insurance, the remaining gap is in favour of Southern-born whites, whereas for the non-Southern-born sample there are virtually no differences in the availability of medical insurance, but there is a slightly higher availability of dental insurance for whites. Southern-born blacks get some compensation for low wages in the form of flexible hours and maternity leave, but non-Southern-born blacks get compensated more for their lower wages. To sum up, Southern-born blacks are in a worse position in comparison to blacks born in other regions both in terms of wages and fringe

[6] South region includes the following states: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia

benefits. Therefore, it could be concluded that the birthplace effect explains the ethnic gaps in wages and fringe benefits to some extent.

2.4.5. Conclusions

The aim of this chapter was to estimate black-white wage and fringe benefit gaps based on US data. The results indicate that for wages, there is a raw gap of about 39% in favour of whites, but if we take differences in observable characteristics into account, this gap reduces to 8%, but it still remains statistically significant. Most of the wage gap is explained by differences in schooling and AFQT scores. In the case of fringe benefits there is a significant raw gap in favour of whites for some benefits, but the unexplained fringe benefit gaps tend to be in favour of blacks. If we estimate the compensation gap as the weighted average of wage and fringe benefit gaps then we find that the unexplained compensation gap is more than twice lower than the corresponding wage gap. Therefore, it could be argued that if the racial compensation gap is estimated without taking fringe benefits into account, this overstates the compensation gap. We recommend that when analysing ethnic discrimination in the labour market then not only wages, but also fringe benefits should be investigated.

According to the result that blacks in many cases have better access to fringe benefits, it could be said that this is how blacks are compensated for lower wages. If we analyse the effect of industrial segregation on the ethnic wage and fringe benefit gaps, then we find that industrial and occupational segregation is an important determinant of black-white gaps in wages, but for the fringe benefit gap, only industrial segregation seems to matter. Next we investigated whether black preferences for fringe benefits could explain the fact that blacks receive relatively low wages, but have relatively high access to fringe benefits. We estimate the decomposition models separately on the sub samples of managerial occupations and other occupations. As we find that blacks, who are employed as managers have more fringe benefits available than whites in similar occupations, we argue that it could be the result of black preferences for fringe benefits. Additionally, we take a more detailed look into the AFQT test score's effect on the wage and fringe benefit gap. We find that the AFQT score tends to be a determinant of industry and occupation and affects fringe benefits in an indirect way, but it also has direct wage effects. The fact that AFQT has no direct effect on fringe benefits could be one reason why blacks that have considerably lower test scores, receive relatively low wages in comparison to whites, but have relatively high access to fringe benefits.

Similarly to Black et al. (2006), we find that wage and fringe benefit gaps differ according to the employee's birthplace. The unexplained racial wage gap is smaller for the non-Southern-born sample. In the case of fringe benefits, we find that blacks regardless of their birthplace receive some compensation for

lower wages in the form of fringe benefits, but non-Southern-born blacks get compensated more. According to this, it could be concluded that Southern-born blacks are worse off both in terms of wages and fringe benefits. That kind of result could be interpreted as birthplace being a proxy for unobserved human capital, as blacks born in the South could be argued to have a lower attainment of unobserved human capital than blacks born in other regions.

3. CONCLUSIONS

3.1. Main findings

The thesis investigates the topic of heterogeneity of human capital and its valuation in the labour market. This dissertation does not have the aim to cover all aspects of this complex issue, but instead it focuses on the following areas of that topic: 1) human capital specificity, 2) the public-private sector wage gap, 3) the ethnic wage gap, and 4) the ethnic fringe benefit gap.

The theoretical and empirical background of the dissertation provides an overview of the literature about heterogeneity of human capital and its valuation in the labour market. Human capital is heterogeneous in a variety of ways. Heterogeneity of human capital can arise from the fact that human capital consists of different components or from differences in the quantity, quality or specificity of human capital. Besides the fact that human capital is heterogeneous, there exists heterogeneity in valuation of human capital in the labour market. First, human capital is valued in a number of different ways (wages, fringe benefits, working conditions, employment probability etc.) on the labour market. Second, there exist several explanations why human capital of observably similar employees will be valued at different rates on the labour market. Under perfect competition wages reflect labour productivity. So wage differences are generated by productivity differences. Additionally, there exist trade offs between wages, fringe benefits and working conditions. Under imperfect competition, different individuals may have different bargaining power, or there may exist discrimination on the labour market. Those previously listed arguments can be applied to explain the wage differences between males and females, different ethnic groups, union and non-union employees and public and private sector employees.

Below, the main results of the four studies comprising the thesis are presented. The paragraph titles below correspond to the respective studies.

Measuring the Specificity of Human Capital: a Skill-based Approach (Study I)

Study I develops a skill-based measure for human capital specificity and tests the validity of that measure on data from Estonian job advertisements. The results of this study are as follows:

- Development of skill-specificity and job-specificity measures, which allow us to account for the specificity of human capital.
- Skill-specificity is decreasing in the number of jobs, in which the skill affects productivity
- Job-specificity is increasing in the number of skills, which affect productivity on the job and in the skill-specificities of these skills

- Empirical estimation of the job specificity measures on Estonian data indicates that more specific human capital is required in occupations that require higher qualifications.
- There is greater probability of training being offered in the jobs that require more specific skills.

The Evolution of the Public–Private Sector Wage Differential during Transition in Estonia (Study II)

Study II estimates the public–private sector wage differential in Estonia over the transition period from 1989 to 2004 by applying a quantile regression. The results of this study are as follows:

- For the whole sample period, the public-private sector wage differential is more positive or less negative for lower percentiles and more negative or less positive for higher percentiles of the wage distribution. This means that employees with low potential wages tend to gain more or lose less from working in the public sector than workers with high potential wages.
- During early transition, the public-private sector wage differential was negative, but the gap decreased after Estonia regained independence
- During the privatisation process, the public-private sector wage differential continued to decrease
- The only year when the differential was positive – conditional wages in the public sector were higher than in the private sector – was 1999, which was probably as a result of the Russian crisis.
- For the period from 2000–2004, the public-private sector wage differential has been negative at the median of the wage distribution.
- Overall, the transition processes have caused conditional wages in the private sector to increase at a higher rate in comparison to the public sector.
- Political cycles do not have any significant effect on the public-private sector wage differential.

Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition (Study III)

Study III analyses the unexplained wage gap between Estonians and minority groups in the Estonian labour market during the transition period from 1989 to 2005. The results of this study are as follows:

- During the transition period, a substantial unexplained wage gap between Estonian and non-Estonian males emerged in Estonia. While there was virtually no unexplained differential in the early 1990s, the gap increased

thereafter and reached 10–15% of the mean wage in favour of Estonian workers. The gap started to decrease at the end of the sample period.
- The main sources of the ethnic wage gap are different wage premium for jobs in the capital and different returns on education for different ethnic groups.
- The unexplained wage gap is larger in the capital in comparison to other regions of Estonia.
- Selection effects, language skills, schooling choice based on different expectations, regional effects, and migration could all be excluded as the main reasons for the unexplained ethnic wage gap.
- Potential reasons for the unexplained ethnic wage entry are barriers to the labour market and segregated social networks.

Racial differences in the availability of fringe benefits as an explanation for the unexplained black-white wage gap for males in the US (Study IV)

Study IV analyses the black-white wage and fringe benefits gaps in the US. The results of this study are as follows:

- There exists a substantial wage advantage for white males in the US, which is to a large extent explained by differences in education and ability.
- Racial differences in the availability of fringe benefits are smaller in comparison to wage differences. For some fringe benefits blacks have higher availability than whites.
- To some extent, blacks are compensated for lower wages by higher availability of fringe benefits.
- The Black-white wage gap is larger than the black-white compensation gap.
- The Black-white wage gap could be related to the preferences of blacks.

3.2. Suggestions for future research

In this section there will be given an overview of the potential for extending the research on the topic of this dissertation.

The analysis of human-capital specificity has a variety of both theoretical and empirical opportunities for future research. From the theoretical point of view, the idea that human capital is neither entirely general nor specific could be applied to the theoretical models explaining human capital investment, wages and job turnover. From the empirical point of view the specificity of human capital should be calculated on the basis of a larger number of skills, which covers the majority of productive skills. Different datasets could be used to calculate the specificity of human capital. For example, data from the

vocational standards or job descriptions about critical skills in different jobs could be used for that purpose. The relationship between human capital specificity and employer financed training should also be analysed on the basis of richer data that consists of information about the actual provision of employer financed training.

In the case of the analysis of the public-private sector wage differential it would be interesting to conduct similar analyses on the basis of other Central and Eastern European countries. Although such analyses based on some transition countries have been done, there has been no similar research, which covers the whole transition period and studies the relationship between the transition process and the public-private sector wage gap. This will allow us to find out whether similar trends in the public-private sector wage differential are found across transition countries or whether there are some country-specific effects. Furthermore, a cross-country analysis on the data of different transition countries in order to investigate the institutional determinants of the public-private sectors wage gap in transition countries could be conducted.

The analysis of the public-private sector wage gap will also benefit from the implementation of research methods that allow us to treat the selection of public or private sector employment as endogenous. Possible sample selection problems and the processes by which employees decide whether to work in the private or public sector should be analysed. Therefore, other econometric methods; for example, the instrumental variables method, should be combined with quantile regression and the decision to be employed in the public sector should be treated as endogenous.

The analysis of the ethnic wage gap in Estonia could be extended via the deeper investigation of the sources of the unexplained wage gap. As entry barriers and segregated social networks are the most possible explanations for that kind of wage gap, then a closer look at these is necessary. In the case of entry barriers, it would be useful to study the differences of Estonian and minority youths in the transition from school to the labour market. Additionally, the entry barriers can be related to differences in the entrepreneurial activity between different ethnic groups and these differences are also worth closer investigation. In the case of social networks, it would be interesting to investigate the segregation of these networks and the number and strength of the social contacts between the members of different ethnic groups.

There is also a lack of comparative analysis of the ethnic wage gap for different countries. Therefore, there is room for a cross-country analysis of this issue. One interesting option is to do this on the basis of ex-Soviet Union countries, as they have both a similar historical background and in a large number of cases only one ethnic minority group. The second option is to conduct such an analysis on the basis of a set of European Union countries as these countries form a common labour market, but have different institutional settings as well as different ethnic minorities.

The analysis of ethnic fringe benefit gaps could be extended by using datasets that consist of information about a larger number of fringe benefits, which will allow us to test whether the present analysis suffers from an omitted fringe benefit bias. Besides that, more data about the characteristics of the fringe benefits offered should be taken into account. That does not necessarily mean accounting for the monetary value of the fringe benefits, but it would be interesting to account for the amount or level of particular fringe benefits offered to individuals, as different individuals could be offered different amounts of the same fringe benefit. Third, a more sophisticated method for accounting for the relative importance of fringe benefits should be developed, as the importance of different fringe benefits could be unequal. Accounting for the preferences of individuals will allow us to address the issue from the viewpoint of employee utility.

Besides wages and fringe benefits, employees may be compensated for labour also via working conditions. Therefore, it could be beneficial in the analysis of the ethnic wage gap to consider additionally the ethnic differences in working conditions.

REFERENCES

1. Abraham, K. G., Farber, H. S. (1987); "Job Duration, Seniority, and Earnings", *American Economic Review*, Vol. 77, No. 3, pp 278–97
2. Acemoglu, D., Pischke, J.-F. (1999); "The Structure of Wages and Investment in General Training", *The Journal of Political Economy*, Vol. 107, Issue 3, pp. 539–572.
3. Adamchik, V. A., Bedi, A. S. (2000); "Wage differentials between the public and the private sectors: evidence from an economy in transition", *Labour Economics*, Vol. 7, pp. 203–224.
4. Adamchik, V., Hyclak, T., King, A. (2003); "The wage structure and wage distribution in Poland 1994–2001", *International Journal of Manpower*, Vol.24, No. 8, pp. 916–946
5. Aigner, D. J., Cain, G. C. (1977); "Statistical Theories of Discrimination in Labor Markets", *Industrial and Labor Relations Review*, Vol. 30, No. 2, pp. 175–187.
6. Allanson, P., Atkins, J. P., Hinks, T. (2002); "No end to the racial wage hierarchy in South Africa?", *Review of Development Economics*, Vol. 6, No. 3, pp. 442–459.
7. Altonji, J. G. (1995); "The effects of high school curriculum on education and labor market outcomes", *Journal of Human Resources*, Vol. 30, No. 3, pp. 409–438
8. Altonji, J. G., Blank, R. M. (1999); "Race and gender in the labor market", in Ashenfelter, O. and Card, D. (Eds.), *Handbook of Labor Economics*, Vol. 3C, pp. 3143–3259.
9. Antecol, H., Bedard, K. (2004); "The Racial Wage Gap: The Importance of Labor Force Attachment Differences across Black, Mexican, and White Men", *The Journal of Human Resources*, Vol. 39, No. 2, pp. 564–583.
10. Arias, O., Yamada, G., Tejerina, L. (2004); "Education, family background and racial earnings inequality in Brazil", *International Journal of Manpower*, Vol. 25, No. 3–4, pp. 355–374.
11. Arrow, K. J. (1962); "The economic implications of learning by doing," *Review of Economic Studies*, Vol. 29, No. 1, pp. 155–73.
12. Arulampalam, W., Booth, A. L., Bryan, M. L. (2004); "Training in Europe", *The Journal of European Economic Association*, Vol. 2, No. 2, pp. 346–360
13. Avaliku teenistuse seadus. – Riigi Teataja I osa 1995, nr. 16, art. 228.
14. Backes-Gellner, U., Mure, J. (2004); "The Skill-Weights Approach on Firm Specific Human Capital: Empirical Results for Germany", *Institute for Strategy and Business Economics Working Paper*, No. 56.
15. Barron, J., Black, D., Loewenstein, M. (1993); "Gender Differences in Training, Capital, and Wages", *Jounzal of Hurnan Resources*, Vol. 28, No. 2, pp. 343–64.
16. Bartel, A. P. (1979); "The Migration Decision: What Role Does job Mobility Play?", *American Economic Review,* Vol. 69, pp. 775–786.
17. Becker, G. S. (1962); "Investment in Human Capital: A Theoretical Analysis", *The Journal of Political Economy*, Vol. 70, Issue 5, Part 2, pp. 9–49.
18. Becker, G. S. (1964, 1993, 3rd ed.). "Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education", Chicago, University of Chicago Press.
19. Becker, G. S. (1971); "The economics of discrimination", 2nd edition, Chicago, University of Chicago Press

20. Becker, G. S., Mulligan, C. (1997); "The Endogenous Determination of Time Preference", *Journal of Quarterly Economics*, No. 112, Vol. 3, pp. 729–758.
21. Bernstein, D. (2002) "Fringe benefits and small businesses: evidence from the federal reserve small businesses survey", *Applied Economics*, Vol. 34, pp. 2063–2067
22. Bhumaik, S. K., Gang, I. N., Yun, M.-S. (2006); "Ethnic conflict and economic disparity: Serbians and albanians in Kosovo", *Journal of Comparative Economics*, Vol. 34, pp. 754–773.
23. Bishop, J (1997); "What we know about employer-provided training: A review of the literature", *Research in Labor Economics*, Vol.16, pp. 19–87.
24. Black S., Devereux, P., Salvanes, S. (2005); "Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital", *The American Economic Review*, Vol. 95, No. 1, pp. 437–449.
25. Black, D., Haviland, A., Sanders, S., Taylor, L. (2006); "Why Do Minority Men Earn Less? A Study of Wage Differentials Among Highly Educated", *The Review of Economics and Statistics*, Vol. 88, No. 2, pp. 300–313
26. Blackaby, D. H., Leslieb, D. G, Murphya, P. D,O'Leary, N. C. (1998); "The ethnic wage gap and employment differentials in the 1990s: Evidence for Britain", *Economics Letters*, Vol. 58, Issue 1, pp. 97–103.
27. Blau, F. D. (1998); "Trends in the Well-Being of American Women, 1970–1995", *Journal of Economic Literature*, Vol. 36, No. 1, pp. 112–165.
28. Blau, F. D., Kahn, L. M. (1997); "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s", *Journal of Labor Economics*, Vol. 15, No. 1, Part 1, pp. 1–42.
29. Bloch, F.E., Smith, S. P. (1977); "Human Capital and Labor Market Employment", *The Journal of Human Resources*, Vol. 12, No. 4., pp. 550–560.
30. Boeri, T., Terrell, K. (2002); "Institutional Determinants of Labor Allocation in Transition", *Journal of Economic Perspectives*, Vol. 16, No.1, pp.51–76.
31. Borjas, G. J (1980); "Wage determination in the federal government: the role of constituents and bureaucrats", *Journal of Political Economy*, Vol. 88, pp. 1110–1147.
32. Borjas, G. J (1984); "Electoral cycles and the earnings of federal bureaucrats", *Economic Inquiry*, Vol.22, pp. 447–459.
33. Borjas, G. J. (2002); "The Wage Structure and the Sorting of Workers into the Public Sector", *NBER Working Paper*, No. 9313.
34. Borjas, G. J., Freeman, R. B., Katz, L. F. (1996); "Searching for the effect of immigration on the labor market", *American Economic Review*, Vol. 86, No. 2, pp. 246–251.
35. Bound, J., Freeman, R. B. (1992); "What went wrong? the erosion of relative earnings and employment among young black men in the 1980s", *Quarterly Journal of Economics,* Vol. 107, No. 1, pp. 201–232.
36. Bratsberg, B., Terrell, D. (2002); "School Quality and Returns to Education of US Immigrants", *Economic Inquiry*, Vol. 40, Issue 2, pp. 177–198.
37. Brooks, P. (2001); "Compensation Inequality", *Quarterly Journal of Economics*, Vol. 116, No. 4, pp. 1493–1525.
38. Brown, C., Medoff, J. (1989); "The employer size-wage effect", *The Journal of Political Economy*, Vol. 97, No. 5, pp.1027–1059.
39. Budd, J. W. (2004); "Non-Wage Forms of Compensation", *Journal of Labor Research*, Vol. 25, No.4, pp. 597–622.

40. Budd, J. W., Na, I.-G. (2000); "The Union Membership Wage Premium for Employees Covered by Collective Bargaining Agreements", *Journal of Labor Economics,* Vol. 18, No. 4, pp. 783–807.
41. Burdett, K, Smith, E. (1996); "Education and matching externalities", in Booth, A. L and D. J. Snower (Eds.), *Acquiring Skills: Market Failures, their Symptoms and Policy Responses*, Cambridge University Press.
42. Brown, C., Corcoran, M. (1997); "Sex-Based Differences in School Content and the Male-Female Wage Gap", *Journal of Labor Economics*, Vol. 15, No. 3, Part 1, pp. 431–465.
43. Calvo-Armengol, A., Jackson, M. O. (2004); "The effects of social networks on employment and inequality", *American Economic Review*, Vol. 94, No.3, pp. 426–454.
44. Card, D. (1996); "The Effect of Unions on the Structure of Wages: A Longitudinal Analysis", *Econometrica*, Vol. 64, No. 4, pp. 957–979.
45. Card, D., Krueger, A. B. (1992); "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States", *The Journal of Political Economy*, Vol. 100, No. 1, pp. 1–40.
46. Carliner, G. (1996); "The Wages and Language Skills of U.S. Immigrants", *NBER Working Paper*, No. 5763.
47. Casas-Arce, P. (2004); "Firm Provision of General Training and Specific Human Capital Acquisition", *University of Oxford, Department of Economics in its series Economics Series Working Paper*, No. 198.
48. Chauvin, K. W., Ash, R A. (1994); "Gender Earnings Differentials in Total Pay, Base Pay, and Contingent Pay", *Industrial and Labor Relations Review*, Vol. 47, No. 4, pp. 634–649.
49. Chiswick, B. (1978); "The Effect of Americanisation on the Earnings of Immigrant Men", *Journal of Political Economy*, Vol. 86 No. 5., pp. 897–921.
50. Chiswick, B. (1983); "An Analysis of The Earnings and Employment of Asian-American Men", *Journal of Labor Economics*, Vol. 2, pp. 197–214.
51. Chiswick, B., Miller, P. (1985); "Immigrant Generation and Income in Australia", *Ecoriortlic Record*, Vol. 61, pp. 540–53.
52. Cingano, F. (2003); "Returns to specific skills in industrial districts", *Labour Economics*, Vol. 10, pp. 149–164.
53. Cornell, B., Welch, I. (1996); "Culture, information and screening discrimination", *Journal of Political Economy*, Vol. 104, No. 3,pp. 542–571.
54. Constant, A., Kahanec, M., Zimmermann, K. (2006); "The Russian-Ukrainian earnings divide", *IZA Discussion Paper*, No. 2330.
55. Crepon, P., Deniau, N., Perez-Duarte S. (2002); "Wages, Productivity, and Worker Characteristics: A French Perspective", CREST-INSEE.
56. Daneshavry, N., Herzog, H., Hofler, R., Schlottman, H. (1992); "Job Search and Immigrant Assimilation: An Earnings Frontier Approach", *Review of Economics and &Statistics*, Vol. 74, No. 3, pp. 482–492.
57. DaVanzo, J. (1983); "Repeat Migration in the United States: Who Moves Back and Who Moves On?", *The Review of Economics and Statistics*, Vol. 65, No. 4, pp. 552–559.
58. Disney R, Gosling, A., (1998); "Does it pay to work in the public sector?", *Fiscal Studies*, Vol. 19, pp. 347–374.
59. Dolton, P. J., Vignoles, A. (2002); "The return on post-compulsory school mathematics study", *Economica*, Vol. 69, pp. 113–141.

60. Duncan, G J. (1976); "Earnings Functions and Nonpecuniary Benefits", *Journal of Human Resources*, Vol. 11, No. 3, pp. 464–83.
61. Easterlin, R. A. (2003); "Explaining happiness", *PNAS*, Vol. 100, No. 19, pp. 11176–11183
62. Eberts, R. W, Stone, J. A. (1985); "Wages, Fringe Benefits, and Working Conditions: An Analysis of Compensating Differentials", *Southern Economic Journal*, Vol. 52, No.1, pp. 274–280.
63. Ericson, T. (2005); "Personnel Training: a Theoretical and Empirical Review", *IFAU Working Paper*, No. 2005–01.
64. Farber, H. S. (1980); "Unionism, labor turnover, and wages of young men." in R. E. Ehrenberg (Eds.), *Research in Labor Economics*, Vol. 3, pp. 33–53.
65. Flanagan, R. J. (1974); "Labor Force Experience, Job Turnover, and Racial Wage Differentials", *The Review of Economics and Statistics*, Vol. 56, No. 4, pp. 521–529.
66. Frank, B. (2003); "Location Decisions in a Changing Labour Market Environment", *German Institute for Economic Research Discussion Paper*, No.380.
67. Freeman, R. B. (1980); "Unionism and the Dispersion of Wages", *Industrial and Labor Relations Review*, Vol. 34, No. 1, pp. 3–23.
68. Freeman, R B. (1981);"The Effect of Unionism on Fringe Benefits", *Industrial and Labor Relations Review*, Vol. 34, No. 4, pp. 489–509.
69. Fryer, R. G., Tortelli, P. (2005), "An empirical analysis of 'acting white'", *NBER Working Paper*, No. 11334.
70. Galor, O., Moav, O. (2004); "From Physical to Human Capital Accumulation: Inequality and the Process of Development", *The Review of Economic Studies*, Vol. 71, No.4, pp. 1001–1026.
71. Gathmann, C., Schönberg, U. (2006); "How General Is Specific Human Capital?", *IZA Discussion Paper*, No. 2485,.
72. Giddings, L., (2002); "Has the shift toward markets hurt ethnic minorities? Changes in ethnic earnings differentials in Bulgaria's early transition", *International Journal of Manpower*, Vol. 23, No. 1, pp. 9–31.
73. Green, F. (1993); "The impact of trade union membership on training in Britain", *Applied Economics*, Vol. 25, No. 8, pp. 1033–43.
74. Gregory, R. G. (1999); "Recent Developments in Public Sector Labor Markets", in O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, pp. 3573–3630.
75. Gronau, R. (1988); "Sex-related Wage Differentials and Women's Interrupted Labor Careers-the Chicken or the Egg?", *Journal of Labor Economics*, Vol. 6, No. 3, pp. 227–301.
76. Grossman, M. (1972); "On the Concept of Health Capital and the Demand for Health", *The Journal of Political Economy*, Vol. 80, No. 2. pp. 223–255.
77. Grossman, M., Benham, L. (1974); "Health, Hours and Wages", in Perlman, M., (Ed.),*The Economics of Health and Medical Care*, London: Macmillan, pp. 205–233.
78. Gunderson, M. (1979); "Earnings Differentials between the Public and Private Sectors", *The Canadian Journal of Economics*, Vol. 12, No. 2, pp. 228–242.
79. Hashimoto, M. (1981); "Firm-Specific Human Capital as a Shared Investment", *American Economic Review*, Vol. 71, pp. 475–82.
80. Haveman, R., Wolfe, B., Kreider, B., Stone, M. (1994); "Market Work, Wages, and Men's Health", *Journal of Health Economics*, Vol. 13, pp. 163–182.

81. Helemäe, J., Saar, E., Vöörmann, R. (2000); "Kas haridusse tasus investeerida", Tallinn, Teaduste Akadeemia Kirjastus.
82. Hellerstein, J. K., Neumark, D., Troske, K. T. (1999); "Wages, Productivity, and Worker Characteristics: Evidence from Plant-Level Production Functions and Wage Equations", *Journal of Labor Economics*, Vol. 17, No. 3, pp. 409–446.
83. Hersch, J. (1996); "Male-Female Differences in Hourly Wages: The Role of Human Capital, Working Conditions, and Housework", *Industrial and Labor Relations Review*, Vol. 49, No. 3, pp. 472–483.
84. Holzer, H. (1990); "The Determinants of Employee Productivity and Earnings: Some New Evidence", *Industrial Relations*, Vol. 29, No. 3, pp. 403–22.
85. Ingram, B. F., Neumann, G. R. (1999); "An Analysis of the Evolution of the Skill Premium", University of Iowa, mimeo.
86. Johnes, G. (2005); "don't know much about history... : Revisiting the implact of curriculum on subsequent labour market outcomes", *Bulletin of Economic Research*, Vol. 57, No. 3, pp.249–271.
87. Jones, D. C., Simon, K .I. (2005); "'Wage determination under plan and early transition: Bulgarian evidence using matched employer–employee data", *Journal of Comparative Economics*, Vol. 33, pp. 227–243
88. Jones, E. B., Long, J. E. (1979); "Human Capital and Labor Market Employment: Additional Evidence for Women", *The Journal of Human Resources*, Vol. 14, No. 2, pp. 270–279.
89. Jovanovic, B. (1979); "Firm-specific Capital and Turnover", *The Journal of Political Economy*, Vol. 87, No. 6, pp. 1246–1260.
90. Jurajda, Š. (2003); "Three Stages of Czech Labor Market Transition: Reallocation, Incentives and EU Standards', CERGE-EI, Prague.
91. Kahn, L. M. (1980); "Union Spillover Effects on Organized Labor Markets", *The Journal of Human Resources*, Vol. 15, No. 1, pp. 87–98.
92. Kahneman, D., Knetsch, J. L., Thaler, R. H. (1990); "Experimental tests of the endowment effects and the Coase theorem", *Journal of Political Economy*, Vol. 98, pp. 1325– 1348.
93. Kallaste, E. (2004); "Ametiühingute mõju töötingimustele Eestis", Tartu.
94. Kambourov, G., Manovskii, I. (2002); "Occupational Specificity of Human Capital", *University of Toronto Working Paper*.
95. Katz, E., Ziderman, A. (1990); "Investment in General Training: The Role of Information and Labour Mobility", *The Economic Journal*, Vol. 100, pp. 1147–1159.
96. Kee, P. (1995); "Native-Immigrant Wage Differentials in the Netherlands: Discrimination?", *Oxford Economic Papers*, New Series, Vol. 47, No. 2, pp. 302–317.
97. Kessler J. C., House J. S., Turner, J. B. (1987); "Unemployment and health in community sample", *Journal of Health and Social Behaviour*, Vol. 18, pp. 51–59.
98. Kiker, B. F. (1966); "The Historical Roots of Conecpt of Human Capital", "The Journal of Political Economy", Vol. 74, Issue 5, pp.481–499.
99. Koch, J.V. (1972); "Student Choice of Undergraduate Major Field of Study and Private Internal Rates of Return", *Industrial and Labor Relations Review*, Vol. 26, No. 1, pp. 680–685.
100. Kroncke, C., Smith, K. (1999); "The wage effects of ethnicity in Estonia, *Economics of Transition*, Vol. 7, No. 1, pp. 179–199.

101. Kugler, A. D. (2003); "Employee referrals and efficiency wages", *Labour Economics*, Vol. 10, pp. 531–556.
102. Lahelma, E. (1989); "Unemployement, re-employment and mental well being: a survey of industrial job-seekers in Finland", *Scandinavian Journal of Social Medicine*, Supplementum 49, pp.11–23.
103. Laroche, M., Merette, M., Ruggeri, G. C. (1999); "On the Concept and Dimensions of Human Capital in a Knowledge-Based Economy Context", *Canadian Public Policy*, Vol. 25, No. 1 , pp.87–100.
104. Lasibille, G. (1998); "Wage Gaps between the Public and Private Sectors in Spain", *Economics of Education Review*, Vol. 17, No.1, pp. 83–92.
105. Lazear; E. P. (1977); "Education: Consumption or Production?", *The Journal of Political Economy*, Vol. 85, No. 3, pp. 569–598.
106. Lazear; E. P. (2003); "Firm-Specific Human Capital: A Skill-Weights Approach", *NBER Working Paper*, No. 9679.
107. Lee, L. (1982); "Health and Wages: A Simultaneous Equation Model with Multiple Discrete Indicators", *International Economic Review*, Vol. 23, pp. 199–221.
108. Lehmann, E., Warning, S. (2001); "Decision Making and Gender Differences: A 15 Million DM Game", *Behavioral and Experimental Economic Abstracts Working Paper Series*, Vol. 2 , No.19.
109. Leibbrandt, M., Levinsohn, J., McCray, J. (2005); "Incomes in South Africa since the fall of apartheid", *NBER Working Paper*, No. 11384.
110. Leping, K.-O. (2005); "Public-private sector wage differential in Estonia: evidence from quantile regression", *University of Tartu, Faculty of Economics and Business Administration Working Paper*, No.39
111. Leping, K.-O., Eamets. R. (2005); "Töötajate koolitamine erasektoris Järvamaa ettevõtete näitel", *XIII majanduspoliitika teaduskonverentsi artiklid*, Tallinn, Mattimar, pp. 388–397.
112. Leping, K.-O., Toomet, O. (2007); "Ethnic Wage Gap and Political Break-Ups: Estonia During Political and Economic Transition", *University of Tartu, Faculty of Economics and Business Administration Working Paper*, No.53
113. Levy, H. (2006); "Health Insurance and the Wage Gap", *NBER Working Paper*, No. 11975.
114. Lewis, G .B. (1996); "Gender Integration of Occupations in the Federal Civil Service: Extent and Effects on Male-Female Earnings", *Industrial and Labor Relations Review*, Vol. 49, No. 3, pp. 472–483.
115. Lewis, H. (1963); "Unionism and Relative Wages in the United States: An empirical Inquiry", Chicago: University of Chicago Press.
116. Lewis, H. (1986); "Union Relative Wage Effects", Chicago: University of Chicago Press.
117. Liiklusseadus. – Riigi Teataja, I, 2001, No. 3, art. 6.
118. Lind, N. C. (1992); "Some thoughts on the human development index", *Social Indicators Research*, Vol. 27, pp. 89–101.
119. Lucas, R .E., Jr. (1988); "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Vol. 22, No. 1, pp. 3–42.
120. Lynch, L. (1992); "Private-Sector Training and the Earnings of Young Workers", *The American Economic Review*, Vol. 82, No. 1, pp. 299–312

121. Magnuson, K. A., Meyers, M. K., Ruhm, C. J., Waldfogel, J. (2004); "Inequality in Preschool Education and School Readiness", *American Educational Research Journal*, Vol. 41, No. 1, pp. 115–157.
122. Marini, M. M. (1989); "Sex Differences in Earnings in the United States", *Annual Review of Sociology*, Vol. 15, pp. 343–80.
123. McConnell, Campbell R., Stanley L. Brue, Macpherson, D. A. (1999); Contemporary Labor Economics, Fifth Edition. Boston: Irwin/McGraw Hill.
124. McManus, W., Gould, W and Welch, F. (1983); "Earnings of Hispanic Men: The Role of English Language Proficiency", *Journal of' Labor Economics*, Vol. 1, pp. 101–30.
125. Meja, D., Posada, C. E. (2005); "Populist Policies in the Transition to Democracy", *Bank of Colombia Working Paper*, No. 349.
126. Melly, B. (2005); "Public-private sector wage differentials in Germany: evidence from quantile regression", *Empirical Economics*, Vol. 30, Issue 2, pp. 505–520.
127. Mincer, J. (1958); "Investment in Human Capital and Personal Income Distribution", *The Journal of Political Economy*, Vol. 66, No. 4, pp. 281–302.
128. Mincer, J. (1962); "On-the-Job Training: Costs, Returns and Some Implications", *The Journal of Political Economy*, Volume 70, Issue 5, Part 2, pp. 50–79.
129. Mincer, J. (1974); "Schooling, Experience and Earnings Schooling, experience and earnings", New York: Columbia University Press.
130. Mincer, J. (1983); "Union Effects: Wages, Turnover, and Job Training", *Research in. Labor Economics*, Supplement 2, pp. 217–52.
131. Mincer, J. (1991)Education and unemployment, NBER Working Paper No. 3838, 1991.
132. Mlushkin, S. J. (1962); "Health as an Investment.", *Journal of Political Economy*, Vol. 70, No. 2, pp. 129–57.
133. Monheit A, Vistnes J. (2000); "Race/Ethnicity and Health Insurance Status: 1987 and 1996.", *Medical Care Research and Review*, Vol. 57, Supplement 1, pp. 11–35.
134. Montgomery, J. D. (1991); "Social networks and labour market outcomes: Toward and economic analysis", *American Economic Review*, Vol. 81, No. 5, pp. 1408–1418.
135. Moore, R. L. (1987); "Are Male/Female Earnings Differentials Related to Life-Expectancy-Caused Pension Cost Differences?", *Economic Inquiry*, Vol. 25, Issue 3, pp. 389–401.
136. Moore, W. J., Raisian, J. (1991); "Government Wage Differentials Revisited", *Journal of Labor Research*; Vol. 12, Issue 1, pp. 13–33.
137. Moretti, E. (2003); "Human Capital Externalities in Cities", *NBER Working Paper*, No. 9641.
138. Mueller, R. (1998); "Public–private sector wage differentials in Canada: evidence from quantile regressions", *Economics Letters*, Vol. 60, pp. 229–235.
139. Münich D., Svejnar, J., Terrell, K. (2005); "Returns to Human Capital under the Communist Wage Grid and During the Transition to a Market Economy", *The Review of Economics and Statistics*, Vo. 87, No. 1, pp. 100–123.
140. Nakosteen, R., Zimmer, M. (1980); "Migration and Income: The Question of Self-Selection", *Southern Economic Journal*, Vol. 46, pp. 840–851.
141. Neal, D. (1995); "Industry-Specific Human Capital: Evidence from Displaced Workers", *Journal of Labor Economics*, Vol. 13, pp. 663–677.

142. Neal, D. A., William R. Johnson. (1996); "The Role of Premarket Factors in Black-White Wage Differences", *The Journal of Political Economy*, Vol. 104, No.5, pp. 869–895.
143. Noorkôiv, R., Orazem, P. F., Puur, A., Vodopivec, M. (1998); "Employment and wage dynamics in Estonia 1989–95", *Economics of Transition*, Vol. 6 , No. 2, pp. 481–503.
144. Oaxaca, R. (1973); "Male-female wage differentials in urban labor markets", *International Economic Review*, Vol. 14, No. 3, pp. 693–709.
145. OECD (2001); "The Well-being of Nations. The role of human and social capital", Paris.
146. O'Neill, J. (1990); "The Role of Human Capital in Earnings Differences Between Black and White Men", *The Journal of Economic Perspectives*, Vol. 4, No. 4, pp. 25–45.
147. Orazem, P. F., Vodopivec, M. (2000); "Male-female differences in labor market outcomes during the early transition to market: The cases of Estonia and Slovenia", *Journal of Population Economics*, Vol. 13, pp. 283–303.
148. Oreopoulos P., Page, M., Stevens, A. (2003); "Does Human Capital Transfer from Parent to Child? The Intergenerational Effects of Compulsory Schooling", *NBER Working Paper*, No. 10164.
149. Parent, D. (2000); "Industry-Specific Capital and the Wage Profile: Evidence from the National Longitudinal Survey of Youth and the Panel Study of Income Dynamics," *Journal of Labor Economics*, Vol. 18, No. 2, pp. 306–323.
150. Parsons, D. O. (1972); "Specific Human Capital: An Application to Quit Rates and Layoff Rates", *The Journal of Political Economy*, Vol. 80, No. 6, pp. 1120–1143.
151. Pesando, J.E., Gunderson, M., McLaren, J. (1991); "Pension Benefits and Male-Female Wage Differentials", *The Canadian Journal of Economics / Revue canadienne d'Economique*, Vol. 24, No. 3, pp. 536–550.
152. Pettai, I. (2002); "Eestlaste ja mitte-eestlaste vastastikune sallivus", Valk, A. (toim.) *Eesti ja eestlased võrdlevas perspektiivis; kultuuridevahelisi erinevusi 20. sajandil lõpust*, lk. 213–233.
153. Phelps, E. S. (1972); "The Statistical Theory of Racism and Sexism", *The American Economic Review*, Vol. 62, No. 4, pp. 659–661.
154. Poletaev, M., Robinson, C. (2006); "Human capital skill and industry specificity: evidence from the dictionary of occupational titles and displaced worker surveys 1984–2000", University of Western Ontario, unpublished work.
155. Ponarin, E. (2000); "The prospects of assimilation of the russophone populations in Estonia and Ukraine: A reaction to David Laitin's research", *Aurope-Asia Studies,* Vol. 52, No. 8, pp. 1535–1541.
156. Poterba, J. M., Rueben, K. S. (1994); "The distribution of public sector wage premia: new evidence using quantile regression methods", *NBER Working Paper*, No. 4734.
157. Psacharopoulos, George. Returns to Investment in Education: A Global Update. World Development 22 (9), 1994, pp. 1325–43.
158. Psacharopoulos, G. (2006); "The Value of Investment in Education: Theory, Evidence, and Policy", *Journal of Education Finance*, Vol. 32, No. 2, pp. 113–136.
159. Psacharopoulos, G, Patrinos, H. A. (2004); "Returns to Investment in Eduation: A Further Update", *Education Economics*, Vol. 12, No. 2., pp. 111–134.

160. Reily, B. (2003); "The Private Sector Wage Premium in Serbia (1995 – 2000): A Quantile Regression Approach", *University of Sussex Discussion Papers in Economics*, No. 98.
161. Rhine, S. L. W. (1987); "The Determinants of Fringe Benefits: Additional Evidence", *Journal of Risk & Insurance*, Vol. 54, pp. 790–799.
162. Richardson, D. B., Loomis, D., Bena, J. F. Bailer, A. J. (2004); "Fatal Occupational Injury Rates in Southern and Non-Southern States, by Race and Hispanic Ethnicity", *American Journal of Public Health*, No. 10, pp. 1756–1761.
163. Rodgers III, W. M. Spriggs. W. E. (1996); "What does the AFQT really measure: Race, wages, schooling and the AFQT score", *Review of Black Political Economy*, Vol. 24, No. 4, pp. 13–47.
164. Romer, P. M. (1986); "Increasing Returns and Long-Run Growth", *Journal of Public Economics*, Vol. 94, pp. 1002–1037.
165. Rosen, S. (1974); "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition", *The Journal of Political Economy*, Vol. 82, No. 1, pp. 34–55.
166. Rosenzweig, M. R., Wolpin, K. I. (1985); "Specific Experience, Household Structure, and Intergenerational Transfers: Farm Family Land and Labor Arrangements in Developing Countries", *Quarterly Journal of Economics*, Vol. 100, pp. 961–87.
167. Ross, C. E., Wu, C. (1995); "The Links Between Education and Health", *American Sociological Review*, Vol. 60, No. 5, pp. 719–745.
168. Rõõm, M. (2002); "Unemployment and Labour Mobility in Estonia: Analysis using Duration Models", *Working Papers of Bank of Estonia*, No 7, 33 p.
169. Rõõm, M. (2003); "Estonian Labour Market Institutions in International Comparison", *Kroon&Economy*, No.1, pp. 46–57.
170. Sattinger, M, (1996); "Search and discrimination", *Labour Economics*, Vol. 3, pp. 143–167.
171. Schultz, T. (1960); "Capital Formation by Education", *Journal of Political Economy*, Vol. 68, No. 6, pp. 571–583.
172. Schultz, T. W. (1961); "Investment in Human Capital", *The American Economic Review*, Vol. 51, Issue 1, pp. 1–17.
173. Seidel, M.-D. L., Polzer, J. T., Stewart, K. J. (2000), "Friends in high places: The effects of social networks on discrimination in salary negotiations", *Administrative Science Quarterly* ,Vol. 45, No. 1, pp. 1–24.
174. Sianesi, B., van Reenen, J. (2003); "The returns to education: macroeconomics", *Journal of Economic Surveys*, Vol. 17, No. 2, pp. 157–200.
175. Sicherman, N. (1996); "Gender Differences in Departures from a Large Firm", *Industrial and Labor Relations Review*, Vol. 49, No. 3, pp. 484–505.
176. Sjaastad, Larry. A. (1962), "The Costs and Returns of Human Migration", *Journal of Political Economy*, Vol. 70, No. 1, pp. 80–93.
177. Smith, A. (1776); "An Inquiry into the Nature And Causes of the Wealth of Nations", London.
178. Smith, S.P. 'Pay differentials between federal government and private sectors workers', Industrial and Labour Relations Review, No. 29, 1976, pp. 233–257.
179. Solberg, E., Laughlin, T. (1995); "The Gender Pay Gap, Fringe Benefits, and Occupational Crowding", *Industrial and Labor Relations Review*, Vol. 48, No.4, pp. 692–708.
180. Stewart, T. A. (1999); "Intellectual Capital. The New Wealth of Organizations", New York: Doubleday.

181. Sunden, A., Surette, B. J. (1998); "Gender Differences in the Allocation of Assets in Retirement Saving Plans", *American Economic Review*, Vol. 63, No. 3, pp.
182. Tang, K.-K., Tseng, J.-P. (2001); "Industry-specific human capital, knowledge labour, and industry wage structure in Taiwan", *Applied Economics*, Vol. 33, Issue 13, pp. 1639–1648.
183. Topel, R. (1991); "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority", *The Journal of Political Economy*, Vol. 99, No. 1, pp. 145–176.
184. van Ommeren, J., van der Vlist, A., Nijkamp, P. (2002); "Transport-Related Fringe Benefits", *Tinbergen Institute Discussion Paper*, No. 02–063/3.
185. Variyam, J. N., Kraybill, D. S. (1998); "Fringe Benefits Provision by Rural Small Businesses", *American Journal of Agricultural Economics*, Vol. 80, No. 2, pp. 360–368.
186. Vihalemm, T. (2002); "Eesti keele roll kultuuridevahelises kommunikatsioonis", Valk, A. (toim.) *Eesti ja eestlased võrdlevas perspektiivis; kultuuridevahelisi erinevusi 20. sajandil lõpust*, lk. 246–261.
187. Viscusi, W. K., Aldy, J. E. (2003); "The Value of a Statistical Life: A Critical Review of Market Estimates throughout the World", *NBER Working Paper*, No. 9487.
188. Weinberg, B. A. (2001); "Long-Term Wage Fluctuations with Industry-Specific Human Capital", *Journal of Labor Economics*, Vol. 19, No. 1, pp. 231–264.
189. Welch, F. (1966); "Measurement of the Quality of Schooling", *The American Economic Review*, Vol. 56, No. 1/2, pp. 379–392.
190. Õpetajate koolituse raamnõuded. Riigi Teataja I osa, 2000, nr. 87, art. 575.
191. Õppelaenu tagasimaksmise ning kustutamise tingimused ja kord. – Riigi Teataja I osa 2004, nr. 63, art. 453.
192. Õppetoetuste ja õppelaenu seadus. – Riigi Teataja I osa 2003, nr. 58, art. 387.

SUMMARY IN ESTONIAN – KOKKUVÕTE

INIMKAPITALI JA SELLE TÖÖTURUL VÄÄRTUSTAMISE HETEROGEENSUS

Töö aktuaalsus

Käesolevas dissertatsioonis uuritakse inimkapitali ja selle tööturul väärtustamise heterogeensust. Inimkapital on kõige olulisemaks tööjõu tootlikkust määravaks teguriks. Täieliku konkurentsi korral võrdub tööjõu piirtoodang, mis on määratud inimkapitaliga, töötajale makstava palgaga. Sellisel juhul peegeldavad erinevused töötajate palkades erinevusi töötajate inimkapitalis. Niisugust käsitlust kasutatakse kirjanduses sageli töötajate palgaerinevuste selgitamiseks, kuid selline analüüs eeldab ka inimkapitali õigesti mõõtmist. Samas on inimkapital oma olemuselt heterogeenne ja selle empiiriline mõõtmine keeruline. Vaatamata nimetatule ei pöörata olemasolevas kirjanduses inimkapitali mõõtmise küsimustele kuigi suurt tähelepanu ning analüüsis kasutatakse enamasti väga lihtsaid mõõdikuid. Seetõttu on peaaegu kõikide seniste palgaerinevuste analüüside puhul probleem, et inimkapitali ei ole mõõdetud korrektselt. Järelikult annaks täpsemate inimkapitali mõõdikute väljatöötamine võimaluse tulevikus selliseid uuringuid paremini teha.

Peale inimkapitali erinevuste on teisigi tegureid, mis palku mõjutavad. Seega on võimalik, et võrdse inimkapitaliga töötajate inimkapitali väärtustakse tööturul erinevalt, mistõttu nad saavad erisugust palka. See asjaolu põhjustab töötajate eri gruppide, näiteks naised ja mehed, mitmesugused rahvusgrupid jne., palgaerinevusi. Et töötajad ei saa oma töö eest kompensatsiooni mitte ainult palga, vaid ka lisasoodustuste vormis, siis võivad gruppidevahelised erinevused esineda ka lisasoodustuste puhul.

Käesoleva dissertatsiooni ülesandeks ei ole hõlmata kogu inimkapitali ja selle tööturul väärtustamise heterogeensuse temaatikat, vaid selle asemel keskendutakse neljale kitsamale valdkonnale:

- inimkapitali spetsiifilisus,
- avaliku ja erasektori palgaerinevus,
- rahvusgruppide palgaerinevus,
- rahvusgruppide lisasoodustuste erinevus.

Dissertatsioon täidab mitmeid lünki varasemas uurimistöös kõigis neljas eespoolnimetatud valdkonnas.

Inimkapitali spetsiifilisuse analüüsimisel lähtutakse olemasolevas kirjanduses kõige rohkem Beckeri (1962, 1964) käsitlusest, mille kohaselt inimkapital jaguneb üldiseks ja spetsiifiliseks. Kuigi ka Becker ise on märkinud, et praktikas ei ole inimkapital enamikul juhtudel täielikult üldine või ettevõttespetsiifiline, on vaatamata sellele valdav enamus järgnevaid uurijaid ikkagi niisugusest käsitlusest lähtunud. Alles viimase kümne aasta jooksul on tekkinud

uusi teoreetilisi seisukohti, mille kohaselt inimkapital on haru- (Neal 1995, Parent 2000), ametiala- (Kamburov, Manovskii 2002) või ülesandespetsiifiline (Gathmann, Schönberg 2006, Poletaev, Robinson 2006). Lisaks on Lazear (2003) välja töötanud oskuskaalude käsitluse (*skill-weights approach*).

Et need uued teooriad ei vaatle inimkapitali täielikult üldise või ettevõttespetsiifilisena, siis kerkib nende rakendamisel üles küsimus, kui spetsiifiline on inimkapital ja kuidas inimkapitali spetsiifilisust mõõta. Senistes uurimistöödes kasutatavad inimkapitali spetsiifilisuse indikaatorid on oma olemuselt väga üldised (nt. tööstaaž kokku ja antud ettevõttes) ning nende rakendamine eeldab, et inimkapitali saab jaotada üldiseks ja spetsiifiliseks komponendiks. Niisugused indikaatorid ei ole vastavuses uute inimkapitali spetsiifilisust käsitlevate teooriatega, mistõttu on vaja välja töötada uued mõõdikud. Käesolevas dissertatsioonis töötatakse välja oskustepõhine indikaator inimkapitali spetsiifilisuse mõõtmiseks.

Inimkapitali mõõtmise täpsus on eri töötajate gruppide palgaerinevuste analüüsis kriitilise tähtsusega. Ainult siis, kui inimkapitali mõõdetakse õigesti, on võimalik vastata korrektselt küsimusele, millises ulatuses on inimeste palgaerinevused põhjustatud inimkapitali (nii üldine kui spetsiifiline) erinevustest. Sellist küsimust on uuritud kõige rohkem meeste ja naiste, avaliku ja erasektori töötajate, ametiühingusse kuuluvate ja mittekuuluvate töötajate ning erinevate rahvusgruppide puhul.

Avaliku ja erasektori palgaerinevuste valdkonnas on tehtud palju uurimistööd USA ja Lääne-Euroopa riikide andmete põhjal, sama ei saa öelda Kesk- ja Ida-Euroopa maade kohta. Nende riikide puhul põhineb senine uurimistöö vaid üksikute aastate andmetel ning selle põhjal ei ole võimalik teada saada, kuidas mõjutavad avaliku ja erasektori palgaerinevust siirdeprotsessid. Et avaliku ja erasektori hõive siirdeprotsesside käigus olulisel määral muutuvad, siis võib eeldada, et see avaldab mõju ka nende sektorite palgaerinevusele. Selle kindlakstegemiseks on aga vaja uurida avaliku ja erasektori palgaerinevust kogu siirdeperioodi kestel, milleks Eesti on sobilik riik, sest Eesti tööjõu-uuringu andmed võimaldavad teha sellist uurimust kogu siirdeperioodi hõlmavate andmete põhjal. Selle teema uurimine käesolevas doktoritöös kogu siirdeperioodi kohta võimaldab kindlaks teha, kuidas siirdeprotsessid mõjutavad avaliku ja erasektori palgaerinevust.

USA ja Lääne-Euroopa riikide andmete põhjal on tehtud palju uuringuid ka rahvusgruppide palgaerinevuste kohta, kuid siirderiikide puhul ei ole seda teemat piisavalt uuritud. Samas on selliste riikide uurimine vajalik, sest nendes riikides toimusid suured poliitilised ja majanduslikud muutused, mis avaldasid erinevate rahvusgruppide sotsiaalsele ja majanduslikule seisundile tugevat mõju. Eesti sobib selle teema uurimiseks hästi, sest erinevalt paljudest teistest riikidest on Eestis ainult üks põhiline vähemusrahvus, mis moodustab 30% rahvastikust. Samuti võivaldavad tööjõu-uuringu andmed uurida seda teemat kogu siirdeperioodi ulatuses, samas kui varasemad siirderiikide andmete põhjal tehtud analoogilised uuringud põhinevad oluliselt lühematel ajaperioodidel.

Selle teema käsitlemine kogu siirdeperioodi jooksul Eesti näitel võimaldab teada saada, millised on rahvusgruppide palgaerinevuste muutused siirdeperioodi jooksul.

Rahvusgruppide lisasoodustuste erinevuste uurimisega on doktoritöös uuritavatest teemadest seni kõige vähem tegeldud. Peaaegu kõik seni tehtud rahvusgruppide palgaerinevusi kajastavad uurimused keskenduvad ainult palkadele ning jätavad lisasoodustused vaatluse alt välja. Siiski on võimalik, et osa töötajaid saab madalamate palkade arvelt rohkem lisasoodustusi. Seega võib asjaolu, et ühe rahvusgrupi esindajad saavad madalamat palka, olla mõjutatud nende saadavatest lisasoodustustest. Vaatamata sellele, ei ole seda teemat erinevate rahvusgruppide põhjal peaaegu üldse uuritud, kuid analoogilisi uuringuid on tehtud meeste ja naiste (Solberg, Laughlin 1995) ning ametiühingutesse kuuluvate ja mittekuuluvate töötajate kohta (Budd 2004). Rahvusgruppide erinevusi lisasoodustuste kättesaadavuses on uuritud vaid USA andmete põhjal tervisekindlustuse kohta, samas ei piirdu lisasoodustused tegelikkuses üksnes tervisekindlustusega.

USA andmed on sobilikud rahvusgruppidele antavate lisasoodustuste erinevuse uurimiseks, sest esiteks on rahvusgruppide palgaerinevust USA andmete põhjal, võrreldes teiste riikidega, suhteliselt rohkem uuritud, mistõttu uurimistulemused asetuvad juba põhjalikult käsitletud valdkonda. Samuti on USA kohta põhjalikud andmed mitmete lisasoodustuste kättesaadavuse kohta. Antud teema käsitlemine käesolevas doktoritöös võimaldab aru saada, millises ulatuses selgitavad lisasoodustuste kättesaadavuse erinevused rahvusgruppide palgaerinevusi USAs.

Uurimuse eesmärk ja ülesanded

Käesoleva dissertatsiooni eesmärgiks on uurida inimkapitali ja selle tööturul väärtustamise heterogeensust. Töös olev empiiriline analüüs põhineb suuremas osas Eesti andmetel, ühes peatükis kasutatakse ka USA andmeid. Kui teemat uuritakse põhiliselt Eesti näitel, on töö eemärgiks anda panus käsitletava valdkonna uurimisse üldisel tasandil.

Doktoritöö koosneb neljast uuringust, mille uurimisülesanded on järgmised.

Esimeseks uurimisülesandeks on välja töötada oskustepõhine inimkapitali spetsiifilisuse indikaator. Seda indikaatorit rakendatakse töös Eesti andmete põhjal ning testitakse selle valiidsust (Uuring I).

Teine uurimisülesanne on hinnata avaliku ja erasektori palgaerinevust Eesti andmete põhjal kogu siirdeperioodi ulatuses, alates varajasest siirdeperioodist kuni Eesti ELiga ühinemiseni. Täiendavalt uuritakse siirdeprotsesside, majandus- ja poliitiliste tsüklite mõju avaliku ja erasektori palgaerinevusele (Uuring II).

Kolmas uurimisülesanne on hinnata eestlaste ja mitte-eestlaste põhjendamata palgaerinevust Eesti andmete põhjal siirdeperioodi jooksul 1989.–2005. a. (Uuring III).

Neljas uurimisülesanne on uurida mustanahaliste ja valgete töötajate palkade ning lisasoodustuste kättesaadavuse erinevust USA andmete põhjal, näitamaks, et üheks mustanahaliste ja valgete palgaerinevuse põhjuseks on lisasoodustuste kättesaadavuse erinevus (Uuring IV).

Teoreetiline ja empiiriline taust

Doktoritöö teoreetilise tausta moodustavad inimkapitali ja selle heterogeenust, samuti inimkapitali tööturul väärtustamist kirjeldavad teooriad. Töö empiiriliseks taustaks on käsitletavate teemade kohta põhiliselt USA ja Lääne-Euroopa riikide, samuti Kesk- ja Ida-Euroopa maade andmete põhjal tehtud uuringute tulemused.

Inimkapitali puhul on tegemist mõistega, mida kasutati juba üle 300 aasta tagasi, kuigi tänapäeva majandusteaduses hakati inimkapitali laialdasemalt uurima 1960. aastatel. Eri autorid on defineerinud inimkapitali eri moodi, kuid enamasti seostatakse inimkapitali inimeste oskuste ja teadmistega, mis suurendavad nende tööjõu tootlikkust.

Inimkapital on oma olemuselt heterogeenne. Esiteks, inimkapital koosneb väga erinevatest komponentidest. Inimkapital moodustub väga erinevate komponentide tulemusena, näiteks formaalne haridus, tööalane koolitus, töökogemused, tervishoid, laste kasvatamine vanemate poolt, migratsioon. Teiseks, ka nimetatud komponentide siseselt on inimkapital heterogeenne. Näiteks formaalne haridus sisaldab väga palju õppetasemeid ja erialasid. On selge, et inimkapital, mis moodustub põhikoolis õppides, erineb inimkapitalist, mis luuakse magistriõppes. Samuti erinevad üksteisest majandusteaduse ja bioloogia magistriõpe. Kolmandaks, inimkapitalil on ka kvalitatiivne aspekt. Näiteks erinevates ülikoolides omandatav kõrgharidus on erisuguse kvaliteediga, kuigi õppekavad võivad olla samasugused. Neljandaks, inimkapitali heterogeensus tuleneb ka sellest, et teatud tüüpi inimkapital on tootlik väga paljudes ettevõtetes, aga teist tüüpi inimkapital ainult mõnes üksikus (äärmuslikul juhul ainult ühes) ettevõttes. Sellist inimkapitali heterogeensuse vormi nimetatakse inimkapitali spetsiifilisuseks.

Inimkapitali spetsiifilisuse mõiste sai alguse Beckeri (1962, 1964) teoreetilistest töödest, milles ta jagas inimkapitali üldiseks ja spetsiifiliseks. Üldine inimkapital suurendab tööjõu tootlikkust kõikides ettevõtetes, spetsiifiline inimkapital aga ainult ühes ettevõttes. Niisuguse käsitluse puhul räägitakse ettevõttespetsiifilisest inimkapitalist. Hiljem on välja töötatud ka teooriaid, mille puhul inimkapital ei ole ettevõtte-, vaid haru- (Neal 1995, Parent 2000), ametiala- (Kamburov, Manovskii 2002) või ülesandespetsiifline (Gathmann,

Schönberg 2006, Poletaev, Robinson 2006). Veel on inimkapitali käsitletud asukoha- ja kultuurispetsiifilisena.

Inimkapitali omanikud saavad inimkapitalist väga erinevat kasu. Samas saavad inimkapitali tehtud investeeringutest kasu ka kolmandad osapooled. Seetõttu on võimalik eristada inimkapitalist saadavat era- ja sotsiaalset kasu. Inimkapitalist saadakse kasu selle väärtustamise kaudu tööturul, aga ka tööturu väliselt. Selle alusel jaotatakse inimkapitalist saadav kasu turu- ja turuväliseks kasuks. Käesolevas töös keskendutakse inimkapitali tööturult saadavale erakasule, mille moodustavad palk, lisasoodustused, töötingimused ja tööhõive. Põhjalikumalt vaadeldakse kahte esimest.

Erinevate inimeste inimkapitali võidakse tööturul väärtustada eri moodi. Kui tegemist on täieliku konkurentsiga tööturuga, siis saab esile tuua kaks põhilist teoreetilist põhjendust, miks töötajad saavad erisugust palka ja lisasoodustusi. Esiteks, töötajate palgad võrduvad sellisel juhul nende tööjõu piirtoodanguga. Seega väljendavad töötajate palkade erinevused nende tööjõu tootlikkuse erinevusi, mis omakorda on põhjustatud töötajate inimkapitali erinevustest. Teiseks, vastavalt Roseni (1974) hedonistlikule palgateooriale väljendavad töötajate palgad töötingimuste erinevusi, halvemate töötingimuste eest makstakse töötajatele kõrgemat palka. Samasugune kompensatsioonimehhanism võib toimida ka lisasoodustuste puhul (Eberts, Stone 1985). Seega, täieliku konkurentsiga tööturu korral väljendavad töötajate palkade erinevused töötajate tööjõu tootlikkuse, töötingimuste ja lisasoodustuste erinevusi. Samalaadselt väljendavad lisasoodustuste erinevused tööjõu tootlikkuse, palkade ja töötingimuste erinevusi.

Kui tegemist on mittetäieliku konkurentsiga tööturuga, siis on võimalik, et erinevate töötajate inimkapitali väärtustatakse tööturul eri moodi, mis tähendab, et võrdse tootlikkusega töötajad võiavad saada ebavõrdset kompensatsiooni oma töö eest. Inimkapitali heterogeenne väärtustamine mittetäieliku konkurentsiga tööturul tuleneb põhiliselt töötajate läbirääkimisjõu ning diskrimineerimise erinevustest. Töötajate läbirääkimisjõu erinevused tekivad siis, kui tööturul ei ole lõpmatult suurt arvu tööjõu nõudjaid ja pakkujaid. Mõnede erialade töötajate puhul ei pruugi olla palju ettevõtteid, kes selliseid töötajaid vajavad. Niisugusel juhul on tööandjatel tugev läbirääkimisjõud, mis vähendab nende töötajate palku. Samuti võib tööturul ette tulla olukord, kus töötajad on koondunud ametiühingutesse ning tegutsevad kollektiivse tööjõu pakkujana, mis suurendab nende läbirääkimisjõudu.

Inimkapitali väärtustamise heterogeensus võib olla põhjustatud ka diskrimineerimisest tööturul. Diskrimineerimisena saab käsitleda olukorda, kus võrdse tootlikkusega töötajate tööjõudu kompenseeritakse eri moodi lähtuvalt mittetootlikest teguritest, näiteks sugu või rahvus (Altonji, Blank 1999). Diskrimineerimist saab liigitada väärtustepõhiseks (*taste discrimination*) ja statistiliseks. Esimesel juhul eelistavad tööandjad, töötajad või kliendid ühe või teise tunnusega inimesi, mistõttu viimaste kasulikkus sõltub antud tunnuse väärtusest nendega koos töötavate või nende poolt ostetavaid kaupu või teenuseid valmis-

tavate inimeste jaoks. Näiteks võib kasulikkust vähendada koos vähemusrahvuste esindajatega töötamine. Statistiline diskrimineerimine võib esineda siis, kui tööandjatel ei ole täielikku informatsiooni töötajate tööjõu tootlikkuse kohta. Sellisel juhul võivad tööandjad valida töötajaid mingite grupitunnuste (nt. rahvus) alusel. Nii väärtuspõhine kui statistiline diskrimineerimine põhjustavad olukorra, kus töötajate inimkapitali väärtustatakse mittetootliku tunnuse alusel erinevalt.

Eespoolkirjeldatud teoreetilisi seisukohti on empiirilises analüüsis rakendatud ulatuslikult töötajate palkade, aga ka lisasoodustuste kättesaadavuse uurimiseks. On tehtud palju uurimistööd välja selgitamaks, millest on põhjustatud erinevate töötajate gruppide palkade ja lisasoodustuste kättesaadavuse erinevused. Kõige enam on uuritud naiste ja meeste, erinevate rahvusgruppide, ametiühingusse kuuluvate ja mittekuuluvate ning avaliku ja erasektori töötajate palkade ja lisasoodustuste kättesaadavuse erinevust. Selliseid analüüse on kõige rohkem tehtud USA ja Lääne-Euroopa andmete põhjal.

Naiste ja meeste palgaerinevused ei ole üldjuhul kuigi suures ulatuses põhjustatud töötajate inimkapitali erinevusest, v.a. töökogemuste erinevused (meestel suurem kui naistel). Mõnesuguses ulatuses on see põhjustatud sugude erinevatest eelistustest töötingimuste ja lisasoodustuste suhtes. Naised töötavad üldjuhul paremates töötingimustes kui mehed. Siiski ei selgita ka need põhjused kuigi suurt osa meeste ja naiste palkade erinevusest, mistõttu sageli väidetakse, et naiste madalamad palgad on põhjustatud tööturul esinevast diskrimineerimisest. Samas on diskrimineerimist empiiriliselt keeruline tõestada ning eri autorid on selle suhtes jõudnud erisugustele seisukohtadele.

Rahvusgruppide palgaerinevuste puhul on peaaegu kõikidele riikidele iseloomulik fakt, et vähemusrahvuste esindajad saavad madalamat palka kui põhirahvusest töötajad. Rahvusgruppide palgaerinevused on enamasti küllaltki suures ulatuses põhjustatud töötajate inimkapitali erinevustest. Vähemusrahvuste esindajatel on paljudel juhtudel madalam haridustase, hariduse kvaliteet, väiksemad töökogemused jne. Sageli väidetakse, et ka rahvusgruppide palgaerinevused on põhjustatud vähemusrahvuste diskrimineerimisest, kuid empiirilised uuringud ei ole enamasti suutnud selle olemasolu kinnitada.

Ametiühingutesse kuuluvate ja mittekuuluvate töötajate palgaerinevused ei ole üldjuhul põhjustatud töötajate inimkapitali erinevusest . Niisugusel juhul on kõige olulisemaks põhjuseks erinevused töötajate läbirääkimisjõus, mis on ametiühingutesse kuuluvatel töötajatel suurem.

Avaliku ja erasektori palgaerinevus on mõneti seletatav töötajate inimkapitali erinevustega, sest avalikus sektoris on reeglina töötajate keskmine haridustase mõnevõrra kõrgem. Oluliseks põhjuseks võivad olla ka töötajate läbirääkimisjõu erinevused, näiteks on ametiühingute läbirääkimisjõud avaliku sektori töötajate puhul sageli suurem. Erinevused võivad olla põhjustatud ka palgapoliitika erinevustest, sest avaliku sektori töötajatele palkade määramisel lähtutakse enamasti kasumi maksimeerimise põhimõttest. See asjaolu võib põhjustada avaliku sektori töötajate suhteliselt kõrgemaid palku.

Andmed ja meetodid

Uuringus I kasutatakse Interneti-põhise töökuulutuste andebaasi www.hyppelaud.ee töökuulutuste andmeid. Sellel veebileheküljel saavad tööandjad avaldada kuulutusi vabade töökohtade kohta ning tööotsijad saavad nendele töökohtadele kandideerida. Töös kasutatakse andmeid 1268 töökuulutuse kohta, mis olid aktiivsed ajavahemikul 10.08.2005–20.08.2005. Iga töökuulutuse puhul on andmed ametiala, töökoha asukoha, majandusharu, nõutava haridustaseme ja eelneva töökogemuse, töötundide pikkuse, nõutavate oskuste ja täienduskoolituse pakkumise kohta.

Uuringutes II ja III kasutatakse Eesti tööjõu-uuringu (ETU) andmeid. ETU korraldati esimest korda 1995. a. Esimene uuring oli retrospektiivne ja see sisaldab andmeid inimeste tööturukäitumise ajaloo kohta alates 1989. a. Järgmine uuring tehti 1997. a. nii seejärel kuni 2000. a. toimus ETU iga-aastase uuringuna. Hiljem mindi üle kvartaalsele uuringule, mis põhineb roteeruval paneelvalimil. Eri aastate uuringud sisaldavad suuremas osas sarnast informatsiooni, kuigi on mõningaid erinevusi. Aasta jooksul küsitletud inimeste arv ulatub 5000st (1997. a.) kuni 16 000ni (alates 2000. a. tehtud uuringud). ETU valimisse on kaasatud Eesti alalised elanikud vanuses 15–74 a. 1995. a. valim põhines 1989. a. rahvaloenduse andmebaasil, järgnevatel aastatel põhineb valim Rahvastikuregistri andmetel. ETU andmete põhjal on võimalik uurida palku ja nende mõjureid kogu siirdeperioodi jooksul. Uuringus II kasutatakse ETU andmeid 1989.–2004. a. ja uuringus III 1989.–2005. a. kohta.

Uuringus IV kasutatakse USA noorsoo riikliku põlvkonnauuringu 1979 (*National Longitudinal Survey of Youth 1979*) andmeid. Tegemist on paneeluuringuga, mille valim hõlmab 12 686 inimest, kes sündisid 1957.–1964. a. Kuni 1993. a. intervjueeriti neid igal aastal, järgnevatel aastatel iga kahe aasta tagant. Andmestik sisaldab informatsiooni palkade ja lisasoodustuste ning mitmesuguste isikutunnuste kohta, sh. haridustase ja töökoht. Uuringus IV kasutakse 2004. a. küsitluse andmeid.

Uuringus I arvutatakse inimkapitali spetsiifilisuse indikaatorid vastavalt töökuulutustes nõutavatele oskustele. Vastavate indikaatorite keskväärtused arvutatakse erinevate oskuste, ametialade ja majandusharude kohta. Indikaatorite valiidsuse testimiseks kasutatakse harilikku vähimruutude meetodit.

Uuringus II rakendatakse kvantiilregressiooni, et analüüsida avaliku ja erasektori palgaerinevust. See meetod võimaldab hinnata avalikus sektoris töötamise mõju palkadele palgajaotuse eri punktides. Lisaks kasutatakse selles uuringus ka harilikku vähimruutude meetodit, et uurida, kuidas mõjutavad avaliku ja erasektori palgaerinevust siirdeprotsessid, majandus- ja poliitilised tsüklid.

Uuringutes III ja IV kasutatakse Oaxaca dekompositsioonimeetodit, et analüüsida rahvusgruppide palkade ja lisasoodustuste kättesaadavuse erinevusi. See meetod võimaldab jaotada nimetatud erinevused kaheks komponendiks: selgitatud ja selgitamata erinevus. Esimene komponent väljendab seda kogu-

erinevuse osa, mis on põhjustatud kahe rahvusgrupi palku ja lisasoodustuste kättesaadavust mõjutavate tegurite väärtuste erinevustest. Teine komponent väljendab seda koguerinevuse osa, mis on põhjustatud nimetatud tegurite erisugusest mõjust palkadele ja lisasoodustuste kättesaadavusele kahe rahvusgrupi puhul.

Tulemused

Järgnevalt esitatakse doktoritöö peamised tulemused kõigi nelja peatüki kaupa.

Inimkapitali spetsiifilisuse puhul käsitletakse töös inimkapitali spetsiifilisuse mõõtmise temaatikat. Inimkapitali spetsiifilisuse mõõtmiseks töötatakse välja kaks vastavat indikaatorit, mis põhinevad erisuguste oskuste poolt tööjõu tootlikkusele avalduval mõjul. Oskuste spetsiifilisus väljendab seda, kui paljudes töökohtades on see oskus tootlik, s.t. suurendab tööjõu piirtoodangut. Mida suuremal arvul töökohtadel on oskus tootlik, seda väiksem on tema spetsiifilisus. Töökohtade spetsiifilisus väljendab seda, kui spetsiifilised on töökohal nõutavad (tööjõu tootlikkust mõjutavad) oskused. Mida spetsiifilisemad sellised oskused on ja mida rohkem neid on, seda suurem on töökoha spetsiifilisus. Töö käigus arvutatakse empiiriliselt oskuste ja töökohtade spetsiifilisuse näitajate väärtused Eesti töökuulutuste andmete põhjal. Samuti testitakse nende indikaatorite valiidsust samade andmete põhjal, näidates, et spetsiifilisemaid oskuseid nõudvatel töökohtadel pakutakse tööalast koolitust suurema tõenäosusega.

Avaliku ja erasektori palgaerinevuse puhul hinnatakse seda empiiriliselt Eesti andmetel kogu siirdeperioodi ulatuses. Analüüsi tulemusena ilmneb, et era- ja avaliku sektori tinglik palgaerinevus sõltub töötaja potentsiaalsest palgast. Kõrgema potentsiaalse palgaga töötajad võidavad avalikus sektoris töötamisest vähem või kaotavad rohkem, võrreldes erasektoris töötamisega. Kui vaadata avaliku ja erasektori palgaerinevuse arengut siirdeperioodi jooksul, siis siirdeperioodi alguses olid palgad erasektoris kõrgemad, kuid hiljem kasvasid palgad avalikus sektoris kiiremini ja nimetatud erinevus hakkas vähenema. Niisugust tendentsi toetas ka erastamisprotsess. Pärast erastamise lõppu muutus palga erinevus ajas stabiilsemaks. Üldistavalt saab välja tuua, et kogu vaadeldava perioodi jooksul, v.a. 1999. a., on tingimuslikud palgad olnud erasektoris kõrgemad kui avalikus sektoris. Hinnates siirdeprotsesside mõju avaliku ja erasektori palgaerinevusele, ilmneb, et avaliku sektori hõive langus põhjustab erasektori palkade kiirema kasvutempo, võrreldes avaliku sektori palkadega, mis omakorda viib kahe sektori palgaerinevuse vähenemisele.

Rahvusgruppide palgaerinevust käsitletakse doktoritöös eestlaste ja mitte-eestlaste palgaerinevuse näitel Eestis siirdeperioodi jooksul. Uurimistulemused näitavad, et siirdeperioodi alguses olid eestlaste ja mitte-eestlaste palgad võrdsed, kuid hiljem on eestlaste palgad olnud kõrgemad. Tingimusliku palgaerinevuse suurus on enamikul aastatel 10–15%. Põhiosas on selline palga-

erinevus põhjustatud eestlaste suhteliselt kõrgemast hariduse tulumäärast ning pealinnas töötamise tugevamast positiivsest mõjust, võrreldes mitte-eestlastega. Uurimistulemuste põhjal saab väita, et selektsiooniefektid, keeleoskus, haridus-likud valikud, regionaalsed efektid ja migratsioon ei ole rahvusliku palga-erinevuse tekkimisega oluliselt seotud. Võimalikeks palgaerinevuse põhjusteks on aga tööturule sisenemise barjäärid mitte-eestlastel ning mitte-eestlaste vähesed kontaktid eestlaste sotsiaalsete võrgustikega.

Rahvusgruppide poolt lisasoodustuste kättesaadavuse erinevust uuritakse USA mustanahaliste ja valgete töötajate näitel. Tulemused kinnitavad asjaolu, et USA valgetel töötajatel on märkimisväärselt kõrgemad palgad kui musta-nahalistel ning see palgaerinevus on suuresti selgitatav valgete kõrgema hari-dustaseme ja võimekusega. Samas on erinevused lisasoodustuste kättesaada-vuses suhteliselt väiksemad ning mitmete lisasoodustuse puhul on musta-nahalised töötajad eelistatumas olukorras. Selle põhjal saab väita, et parem lisasoodustuste kättesaadavus kompenseerib mõningas ulatuses mustanahaliste madalamaid palku. Samuti on mustanahaliste ja valgete palgaerinevus suurem kui vastav erinevus tööjõu kogukompenseerimises. Juhtivtöötajate osavalimi põhjal tehtud täiendava analüüsi tulemuste põhjal saab järeldada, et musta-nahaliste ja valgete palkade ning lisasoodustuste erinevused võivad olla põhjus-tatud mustanahaliste ja valgete erinevatest eelistustest tööjõu kompenseerimise suhtes.

Soovitusi tulevasteks uuringuteks

Kõigi nelja dissertatsioonis käsitletud valdkonna puhul leidub mitmeid võima-lusi edasiseks töötamiseks nende kallal.

Inimkapitali spetsiifilisuse puhul on vajalik edasine uurimistöö nii teo-reetilises kui empiirilises plaanis. Teoreetiline seisukoht, et inimkapital ei ole täielikult üldine ega ettevõttespetsiifiline, vajaks edasiarendamisest. Eelkõige peituvad uurimisvõimalused siin esitatud seisukoha sidumises inimkapitali investeerimist, palku ja tööjõu voolavust kirjeldavate teooriatega. Empiirilise poole pealt oleks vajalik käesolevas töös väljatöötatud inimkapitali spetsiifi-lisuse arvutamise metoodika rakendamine täpsematel ja mahukamatel andmetel, mis sisaldaksid informatsiooni senisest suurema arvu oskuste kohta. Pers-pektiivne võiks olla töökirjelduste ja kutsestandardite andmete kasutamine. Samuti tuleks uurida inimkapitali spetsiifilisuse ja ettevõtte poolt finantseeritava täienduskoolituse seost põhjalikumate andmete alusel.

Avaliku ja erasektori palgaerinevust oleks vaja uurida kogu siirdeperioodi hõlmavalt ka teiste Kesk- ja Ida-Euroopa riikide andmete põhjal. See võimal-daks välja selgitada, kas siirdeprotsesside mõju palgaerinevusele on riigiti ühesugune või on siin mingid eripärad. Viimasel juhul tuleks uurida ka seda, kuidas on siirdeprotsesside erisugune mõju seotud riikide institutsionaalsete tegurite erinevustega. Avaliku ja erasektori palgaerinevuse edasisel uurimisel

oleks kasulik rakendada ka uurimismeetodeid, mis võimaldaksid avalikus või erasektoris töötamist käsitleda endogeensena. Tuleks analüüsida võimalikke selektsiooniprobleeme ning tegureid, mis mõjutavad inimeste töötamist ühes või teises sektoris.

Rahvusgruppide palgaerinevuste uurimisel Eesti näitel oleks vaja põhjalikumalt vaadelda palgaerinevuse põhjuseid. Et töö tulemuste järgi on kõige tõenäolisemad põhjendamata palgaerinevuste põhjused tööturule sisenemise barjäärid ning eestlaste ja mitte-eestlaste vaheliste sotsiaalsete kontaktide vähesus, siis tuleks neid põhjalikumalt uurida. Oleks vaja analüüsida, kuidas tööturule sisenemise barjäärid mõjutavad eri rahvusgruppidest noorte koolist tööle siirdumist ning kuidas need barjäärid on seotud rahvusgruppide ettevõtlusaktiivsusega. Sotsiaalsete kontaktide puhul oleks vaja uurida eestlaste ja mitte-eestlaste sotsiaalsete võrgustike seostatust ning kahe rahvusgrupi kontakte ja seost tööturuga. Rahvusgruppide palgaerinevuste valdkonnas on seni tehtud vähe ka riikide võrdlevanalüüse. Üheks huvitavaks võimaluseks oleks võrrelda etnilisi palgaerinevusi endistes Nõukogude Liidu liiduvabariikides, sest neil on ühine lähiajalooline taust ning enamikul juhtudel ka üks ja sama põhiline rahvusvähemusgrupp. Teiseks võimaluseks oleks võrrelda rahvusgruppide palgaerinevusi teistes Euroopa Liidu liikmesriikides, et selgitada välja, kuidas on palgaerinevused seotud riikide institutsionaalsete eripäradega.

Lisasoodustuste uurimisel oleks vaja kasutada andmeid, mis sisaldaksid informatsiooni senisest suurema arvu lisasoodustuste kättesaadavuse kohta. Peale selle tuleks arvesse võtta mitmesuguste lisasoodustuse omadusi ja nende pakkumise ulatust, sest erinevatele töötajatele võidakse pakkuda sama lisasoodustust erisuguses koguses või erinevate omadustega. Veel oleks vaja välja töötada põhjalikum metoodika lisasoodustuste tähtsuse arvestamiseks, sest mitte kõik lisasoodustused ei ole töötajatele võrdselt tähtsad.

Peale palkade ja lisasoodustuste analüüsi oleks perspektiivne lisada veel töötingimuste analüüs, sest needki moodustavad tööjõu kompenseerimise osa ning ka rahvusgruppide töötingimuste erinevused võivad selgitada nende palga ja lisasoodustuste kättesaadavuse erinevusi.

CURRICULUM VITAE

First name and family name: Kristjan-Olari Leping
Place and data of birth: Tartu, 21.03.1980
Citizenship: Estonian
Marital status: single
Present position: lecturer of economics
Home institution: University of Tartu Pärnu College, Department of Entrepreneurship
Address: Ringi 35, Pärnu 80010 Estonia, phone +3725214512

Education:

2004 –	University of Tartu, Faculty of Economics and Business Administration, PhD student
2004	University of Tartu, Faculty of Economics and Business Administration, MA in economics
2002	University of Tartu, Faculty of Economics and Business Administration, BA in economics
1998	Pärnu Co-educational Gymnasium

Language Skills:
Estonian (native), English (excellent), Russian (basic), German (basic)

Professional Experience Record:

2005 –	University of Tartu, Faculty of Economics and Business Administration, research fellow
2004 –	University of Tartu Pärnu College, Department of Entrepreneurship, lecturer of economics
2002–2003	University of Tartu, Faculty of Economics and Business Administration, adjunct lecturer

Lecturing:

- Introduction to economics (diploma and BA studies)
- Macroeconomics (diploma and BA studies)
- Public sector economics (diploma and BA studies)
- Econometrics I (BA studies)
- Principles of scientific research (diploma and BA studies)

Main Research Areas:

- Human capital
- On-the-job training
- Wage differentials
- Ethnicity in the labour market

CURRICULUM VITAE

Ees- ja perekonnanimi: Kristjan-Olari Leping
Sünniaeg- ja koht: 21. märts 1980, Tartu
Kodakondsus: Eesti
Perekonnaseis: vallaline
Aadress: Ringi 35, Pärnu 80010, tel. +3725214512
Töökoht: Tartu Ülikooli Pärnu kolledž, ettevõtluse osakond, majandusteooria lektor; Tartu Ülikool, majandusteaduskond, erakorraline teadur

Haridus:

2004 –	Tartu Ülikool, majandusteaduskond, doktoriõpe
2004	Tartu Ülikool, majandusteaduskond, majandusteaduse eriala, MA
2002	Tartu Ülikool, majandusteaduskond, rahvamajanduse eriala, BA
1998	Pärnu Ühisgümnaasium

Keelteoskus:
eesti keel (emakeel), inglise keel (väga hea), vene keel (rahuldav), saksa keel (rahuldav)

Teenistuskäik:

2005 –	Tartu Ülikool, majandusteaduskond, erakorraline teadur
2004 –	Tartu Ülikooli Pärnu kolledž, ettevõtluse osakond, majandusteooria lektor
2002–2003	Tartu Ülikool, majandusteaduskond, õppeülesannete täitja

Õppetöö:
- sissejuhatus majandusteooriasse (diplomi- ja bakalaureuseõpe)
- makroökonoomika (diplomi- ja bakalaureuseõpe)
- avaliku sektori ökonoomika (diplomi- ja bakalaureuseõpe)
- ökonomeetria I (bakalaureuseõpe)
- teadustöö alused (diplomi- ja bakalaureuseõpe)

Peamised uurimisvaldkonnad:
- inimkapital
- täienduskoolitus
- palgaerinevused
- vähemusrahvused tööturul

DISSERTATIONES RERUM OECONOMICARUM UNIVERSITATIS TARTUENSIS

1. **Олев Раю.** Экономическая ответственность и ее использование в хозяйственном механизме. Tartu, 1994. Kaitstud 20.05.1991.
2. **Janno Reiljan.** Majanduslike otsuste analüütiline alus (teooria, metodoloogia, metoodika ja meetodid). Tartu, 1994. Kaitstud 18.06.1991.
3. **Robert W. McGee.** The theory and practice of public finance: some lessons from the USA experience with advice for former socialist countries. Tartu, 1994. Kaitstud 21.06.1994.
4. **Maaja Vadi.** Organisatsioonikultuur ja väärtused ning nende vahelised seosed (Eesti näitel). Tartu, 2000. Kaitstud 08.06.2000.
5. **Raul Eamets.** Reallocation of labour during transition disequilibrium and policy issues: The case of Estonia. Tartu, 2001. Kaitstud 27.06.2001.
6. **Kaia Philips.** The changes in valuation of human capital during the transition process in Estonia. Tartu, 2001. Kaitstud 10.01.2002.
7. **Tõnu Roolaht.** The internationalization of Estonian companies: an exploratory study of relationship aspects. Tartu, 2002. Kaitstud 18.11.2002.
8. **Tiia Vissak.** The internationalization of foreign-owned enterprises in Estonia: An extended network perspective. Tartu, 2003. Kaitstud 18.06.2003.
9. **Anneli Kaasa.** Sissetulekute ebavõrdsuse mõjurite analüüs struktuurse modelleerimise meetodil. Tartu, 2004. Kaitstud 15.09.2004.
10. **Ruth Alas.** Organisational changes during the transition in Estonia: Major influencing behavioural factors. Tartu, 2004. Kaitstud 22.12.2004.
11. **Ele Reiljan.** Reasons for de-internationalization: An analysis of Estonian manufacturing companies. Tartu, 2004. Kaitstud 25.01.2005.
12. **Janek Uiboupin.** Foreign banks in Central and Eastern European markets: their entry and influence on the banking sector, Tartu, 2005. Kaitstud 29.06.2005.
13. **Jaan Masso.** Labour Reallocation in Transition Countries: Efficiency, Restructuring and Institutions, Tartu, 2005. Kaitstud 7.11.2005.
14. **Katrin Männik.** The Impact of the Autonomy on the Performance in a Multinational Corporation's Subsidary in Transition Countries, Tartu, 2006. Kaitstud 29.03.2006.
15. **Andres Vesilind.** A methodology for earning excess returns in global debt and currency markets with a diversified portfolio of quantitative active investment models, Tartu, 2007. Kaitstud 13.06.2007.
16. **Rebekka Vedina.** The diversity of individual values and its role for organisations in the context of changes, Tartu, 2007. Kaitstud 16.11.2007.
17. **Priit Sander.** Essays on factors influencing financing decisions of companies: risk, corporate control and taxation aspects, Tartu, 2007. Kaitstud 19.12.2007.

DISSERTATIONES RERUM OECONOMICARUM
UNIVERSITATIS TARTUENSIS
18

HETEROGENEITY OF HUMAN CAPITAL AND ITS VALUATION IN THE LABOUR MARKET

KRISTJAN-OLARI LEPING

TARTU 2008

ISSN 1406–1309
ISBN 978–9949–11–841–0

KRISTJAN-OLARI LEPING HETEROGENEITY OF HUMAN CAPITAL AND ITS VALUATION IN THE LABOUR MARKET