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THE PART-TIME/FULL-TIME WAGE GAP IN CENTRAL AND EASTERN EUROPE: THE CASE OF ESTONIA

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Abstract

Unlike Western countries, there are no studies focusing on the full-time/part-time wage gap in Central and Eastern Europe despite high wage inequalities observable in many of these countries. The focus of this paper is the incidence and reasons for the part-time wage gap in Estonia, a small Eastern European catch up economy. We use Estonian Labour Force Survey data for 1997–2007, and the part-time wage gap is decomposed using the Heckman selection model and Oaxaca-Blinder wage decompositions. The results for females indicate that the part-time premium observable is

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unexplained with the controls used. For males, the full-time raw premium exists, but it is to a large extent captured by explanatory variables. For both genders, the labour market situation is remarkably better for voluntary part-timers. The probable explanations for this are the generally low wage levels, the cyclical behaviour of wage gaps, black income and unobserved heterogeneity of employees and firms.

JEL Classification: C13, J22, J31

Keywords: part-time work, wage gap, Central and Eastern Europe

1. INTRODUCTION

The incidence of part-time work has considerably increased in many Western European countries, the United States and Australia during the past couple of decades and the creation of part-time jobs has contributed to an increase in total employment. According to Eurostat data, 13% of employed people were working on a part-time basis in the EU-12 countries in 1987, while this figure had increased to 21% by 2007. Part-time employment accounted for about 65% of the creation of employment between 2004 and 2005 (Employment in Europe, 2006). There are several factors that explain this tendency. From the labour supply side, the dominant factors are the increased labour market participation of females and the increased participation in higher education among young people. From the demand side, the structural changes that have occurred – most importantly the growth of the services sector and increased global competition – have favoured a rise in part-time work.

Previous studies have found remarkable differences between the hourly wages of part-time and full-time employees in many EU countries and the US; in particular, part-timers earn substantially less per hour than full-timers. The earliest studies in this field date back to the 1970s for the US (Jones and Long, 1979), 1980s for Canada (Simpson, 1986) and the early 1990s in the UK (Ermisch and Wright, 1993). Bardasi and Gornick (2008) and O'Dorchai et al. (2007) analyse the topic from the perspective of international comparison. The gap has been persistent despite legislative initiatives [2] during the last two decades that have been clearly

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[2] For example, on the EU level, the European Council Directive 97/81/EC of 15th December 1997 (1997) concerning the Framework Agreement on part-time work concluded by UNICE, CEEP and ETUC was aimed at removing all forms of discrimination against part-time workers and facilitating the development of part-time and other flexible working arrangements. In a more global dimension, the Part-Time Work Convention (1994) was adopted by the International Labour Organization in 1994 and it is aimed at guaranteeing the equal

aimed at abolishing any discrimination of part-time workers compared to full-time. Part of this gap is explained by the differences in worker and work characteristics – part-time jobs tend to be 'lousy' jobs in the sense that they require lower qualifications, are simpler in nature and provide less opportunities for promotion (this conclusion was drawn by Manning and Pertongolo (2008) based on UK data, and Hirsch (2005) on US data, etc). However, according to Bardasi and Gornick (2008), the part-time penalty was still remarkable in the mid-90s: 17% in the US, 14.4% in Italy, 9.3% in Canada and 7.7% in Germany. For more recent data, Preston (2003) found an 8% part-time wage penalty in Australia. Yet, there are studies where either no wage gap is found (for example, Aaronson and French (2004) for women in the US; Hardoy and Schone (2006) for females in Norway) or a part-time premium is observable (Booth and Wood (2008) for Australia; O'Dorchai et al (2007) for Denmark)[3].

The aim of our study is to examine the part-time/full-time wage gap in Estonia, a small country in Central and Eastern Europe with a converging economy. While the empirical approach used in this paper based on the decomposition of observed wage gaps is fairly standard, there are a number of contributions to the existing literature. Firstly, according to the best knowledge of the authors, there are no studies focusing on the full-time/part-time wage gap in Central and Eastern European countries (hereinafter called CEECs), and only a few have analysed the incidence and determinants of part-time work in CEECs, for example, Krillo et al. (2007) in Estonia, Rastrigina and Popova (2003) in Latvia, Raabe (1998) in the Czech Republic and Gregory et al. (1998) in Poland. There is a rationale behind the low emphasis on part-time work topics in CEE countries: probably due to the formerly strong

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treatment of part-time and full-time workers; however, by 2009 only 11 countries have ratified this convention.

[3] However, when comparing the adjusted part-time/full-time wage of different studies, one should be aware of the differences in the definition of part-time workers, the variables used in analysis, group taken under observation (for example only married women) and methods used that may make the results of the studies incomparable.

Soviet influence, part-time employment is relatively rare in most CEECs. According to Eurostat data, in 2006 only 7.5% of all employees worked on a part-time basis in the 10 new member states compared to 20.8% in the EU-15. These Soviet attitudes are persistent and it takes time to change them. As Gregory et al. (1998, p. 135) concluded:

> *"in CEE countries until the 1980s, the state would seem to have put pressure on women to work full-time in order to compensate for labour shortages/.../ Furthermore, the use of antiquated technology in Polish industry and the small size of the service sector may also have mitigated against the use of part-time work".*

The latter applies to other CEECs as well. There is clearly a need to pay more attention to the topic of part-time work in order to make more reasoned policy decisions in the near future. In light of the demographic situation characterized by the aging of the population, low birth rates, an increase in the retirement age and the dependency rate (Schlitte and Stiller 2006), CEECs need to find alternatives to full-time work in the very near future to avoid the pressure on the countries' social security systems. As it is clear that full-time employment cannot be increased substantially; other solutions have to be found with the promotion of part-time employment being one of them. In some countries like Poland the incidence of part-time work has increased considerably in the last two decades indicating that practices are changing.

While generally wage inequalities in the CEECs have been much higher than in the old EU member states, especially Estonia and the other Baltic States have been characterized by the highest levels of wage inequalities among EU countries. While in most EU states the value of the 90th/10th wage decile ratio was in the range of 2 to 3.5 in 2002, in all three Baltic States the ratio exceeded 4.5 (Employment in Europe, 2005). That is in part a result of the institutional setting of the labour market characterized by low minimum wages, a low density of unions and a low coverage of collective agreements (Masso and Krillo, 2008). In such conditions, the wage gaps between particular labour market groups

can also be considerable, and it is important to take this into account when making policy decisions. For instance, earlier studies have documented a large gender wage gap (see Rõõm and Kallaste, 2004) and a gap between the earnings of Estonians and non-Estonians (Leping and Toomet, 2008) in the Estonian labour market. Consequently, it is interesting to analyze the full-time/part-time wage gap by using Estonian data.

The second novelty of this paper is that while most of the existing papers on the part-time/full-time wage gap have treated part-timers as a homogeneous group (two exceptions being the studies by Hardoy and Schone (2006) on Norway, and Barrett and Doiron (2001) on Canada), we distinguish between voluntary and involuntary part-time workers. That is important because the motivation to work part-time is completely different for these two groups. For voluntary part-timers, the shorter working hours help them to reconcile their participation in the labour market with their family obligations while involuntary part-time work is a form of underemployment or hidden unemployment. Therefore, it may not be correct to pool these two categories together. In addition, we may also observe different wage effects. Especially if involuntary part-time employment in CEECs constitutes a much higher percentage of total part-time employment (in 2004 the proportion was respectively 17.1% in the EU15 and 26.9% in the 10 new member states, and reaching 51.8% in Lithuania). We also analyse whether the part-time/full-time wage gap differs once the 'moonlighting' dimension (working on multiple jobs) is incorporated into the analysis.

For this analysis, data from the Estonian Labour Force Surveys will be used. The dataset is of a fairly high quality, has been used in several internationally published studies (Leping and Toomet 2008; Lehmann et al. 2005) and includes a rich set of individual and firm specific variables. The long period covered, 1997–2007, enables us to analyze developments over a period characterized by rather diverse macroeconomic and labour market developments – 1997 was characterized by strong GDP growth peaking at 11.7%, the Russian crisis hit the economy rather hard increasing the unemployment rate from 9.6% in 1997 to 13.6% in 2000. The strong growth both before and after joining the EU in 2004

decreased unemployment to 4.7% in 2007 resulting in labour shortages. In such conditions the determinants of part-time work are expected to vary over time as well. By applying the Oaxaca-Blinder decompositions, we examine which part of the wage gap is related to the differences in the workers' characteristics (i.e. explained or objective gap) and which part is related to the differences in returns to these characteristics, for example, different returns to education (i.e. unexplained or subjective gap). The latter may indicate either discrimination and/or different motivational effects for part-time and full-time employees.

The remainder of the paper is structured as follows: section 2 gives a short overview of the theoretical background of the part-time/full-time wage gap. In Section 3, we describe the data and compare the characteristics of full-time and part-time employees. In Section 4, we introduce the econometric approaches used. In Section 5, we present the results and possible explanations for the wage-differences observed, and the last section concludes.

2. REVIEW OF LITERATURE ON THE THEORETICAL FOUNDATIONS OF THE PART-TIME/FULL-TIME WAGE GAP

In theory, the direction of the part-time/full-time wage gap is not determined ambiguously. In addition to demand (i.e. employer-side) and supply-side (i.e. person specific) factors, it depends on many other country-specific factors such as the institutional setting, cultural value judgements and living standards. However, it is possible to draw some general conclusions based on the results of previous studies. As summarized by Hirsch (2005), the most important factors determining an equilibrium of the part-time/full-time wage gap are worker- and employer preferences in terms of working hours, and heterogeneous skills. We will analyse each of these in turn. Further in this section we will discuss the relevant theories, such as the compensating wage differential, segmentation, the dual labour market and human capital theory. Hu and Tijdens

(2003) summarize that most explanations for the wage gap between part-timers and full-timers rely on standard labour economic theories and there is no systematic theoretical framework.

According to the compensating wage differentials theory (for example, see Rosen, 1986), the direction and magnitude of the part-time/full-time wage gap depends on the relative bargaining position of employers and employees. Workers are compensated for working conditions that they find undesirable and may accept lower wages if they prefer such working conditions. Employers may pay higher pro rata wages to part-time employees if it is economically reasonable to hire part-time employees due to the particular nature of the business. It is rather difficult to estimate the relative importance of the employee- and employer-side effects. Yet, Allaart and Bellmann (2007), based on the analysis of distribution of workers among part-time categories on Dutch and German labour market data, have found that workers' preferences are more important than the management's needs. The same pattern is found in Estonia (Krillo et al 2007). Allaart and Bellman (2007) have also found that sector effects on part-time employment are important, compared to the construction and manufacturing industry, all other sectors have more part-time jobs.

The segmentation theory (Doeringer and Piore, 1971) focuses on labour force segments that prefer part-time rather than full-time participation. The most well-known examples are women, students and the elderly. Females often prefer part-time work as it enables them to better reconcile paid work and family responsibilities. Students choose part-time work due to time constraints while studying and the elderly because of health problems or to make use of gradual retirement schemes. As those worker categories have clear preferences regarding the timing and hours of work, employers have stronger bargaining power and may pay lower wages on a pro-rata basis.

On the contrary, when the employer prefers to hire employees on a part-time rather than full-time basis, the employees generally are in a better bargaining position and may demand higher hourly wages. This applies to many service sector companies where there are

predictable demand peaks during the day (or week or season). Moreover, it is argued that in sectors where the intensity of workload fluctuates (i.e. primarily in services sector jobs, for example sales workers, tellers, etc.) part-time employees may be more productive than full-time workers because they do not spend part of the working day idle (Barzel, 1973). Therefore, their wages should be higher.

According to the dual labour market theory, the part-time wage gap is an objective phenomenon. The wage gap exists because part-time jobs are disproportionately more concentrated in the secondary labour market where jobs are poorly paid and provide few opportunities for self-development. Full-time jobs by contrast are 'good' jobs characterized by higher wages and bonuses and converged to the primary labour market, or more often found in sectors, occupations and geographic areas where higher wages and non-wage benefits are paid (this is known as the 'objective' gap). As Manning and Pertongolo (2008, pp. F28) declare:

> *"The rise in the pay penalty [for a part-time worker – authors' remark] over time is partly a result of a rise in occupational segregation and partly the general rise in wage inequality. Policies to reduce the pay penalty have had little effect and it is likely that this will not change much unless better jobs can be made available on a part-time basis."*

Although this statement is based on UK data, occupation is found to be an important factor explaining much of the full-time/part-time wage gap in other countries as well (see Hirsch (2005) for the US data, and for an international comparison, please refer to Bardasi and Gornick (2008)).

If the productivity of a worker is determined by his/her working experience, then lower wages among part-time workers should be expected because as a result of the shorter amount of time worked they acquire less human capital with the same job experience across years (and are therefore less productive) than full-time employees. Consequently, part of what is typically interpreted as a part-time penalty reflects the differences in accumulated human

capital regarding prior work experience. Hirsch (2005), Hardoy and Schone (2006), and Manning and Robinson (2004) have found empirical support for this hypothesis: the returns on education and tenure tend to be higher for full-time workers when compared to part-timers. Moreover, the results of several studies (Blank (1998) for the US; Manning and Robinson (2004) for the UK) indicate that an individual's working hours tend to be auto correlated over time, so the wage penalty may be persistent and even increase over time. Russo and Hassink (2008) have found an empirical rationale for the statement using Dutch data: the results of their study showed that among the youth, the hourly wages of part-time and full-time employees are equal; however, for the elderly a substantial part-time wage gap exists.

Another objective reason for the part-time penalty is supported by classical human capital theory, which states that the level of an individual's human capital is positively correlated with his/her potential wage. If their leisure time is normal good, an individual will increase the desired number of working hours in the labour market as his/her wage increases (the substitution effect). Therefore, workers with higher levels of human capital are more likely to work on a full-time basis, and we would expect their wages to be higher than part-time workers (at least before taking into account human capital controls). Ermisch and Wright (1993) found empirical evidence supporting the theory based on US data. According to the results of their study, full-timers gain more from an additional year of working than part-timers, indicating a 60% lower rate of return to job-specific human capital investments in part-time jobs. However, somewhat controversially, the human capital theory may be used as the basis of the part-time premium as well. More specifically, if the wage earners with a high level of human capital value their leisure time, it is possible that they may prefer shorter working hours (the income effect), in which case part-timers are found to earn higher hourly wages. Therefore, the direction of the gap depends on which of the two effects prevails.

From the employers' side, the part-time wage penalty is based on the existence of quasi-fixed costs; that means costs that are proportional to the number of workers employed not the hours worked (e.g. hiring, training, administrative, monitoring,

coordinating costs, etc). Although the size of quasi-fixed costs generally do not differ for part-time and full-time employees, the part-time worker is relatively 'costly' to the employer in the sense that it takes longer to get a return on the investment made in the worker. To compensate for this, an employer may either pay lower wages to part-time employees or fill the positions on a full-time basis. Montgomery (1988) provides empirical evidence for this effect.

This effect is further strengthened by the fact that in the 'good' jobs (i.e. the jobs where wages and bonuses are higher), the hiring and training costs are typically higher than in the 'bad' jobs, so employers prefer to hire full-time workers in this case. According to Rosen (1986), in cases where the position is filled with a part-time worker, the fixed costs would entail a lower hourly wage *ceteris paribus*. High labour taxation costs and other fixed labour costs are seen by employers as also important factors in limiting part-time employment in CEECs (Cazes and Nesporova, 2007).

The institutional setting of the country may either directly or indirectly influence the part-time/full-time wage gap. For example, as claimed by Apps (2004), the effective marginal tax rates are high for low-skilled second earners in Australia. As a consequence, firms that hire part-time workers have to pay more to attract those people to the labour market. The same applies to 'casual' workers (i.e. workers that are ineligible for sick and holiday pay): for those people the pro-rata wage may be higher to compensate for lower non-wage benefits (for further details, please refer to Booth and Wood (2008)).

However, although there are a lot of theories explaining the part-time penalty and only a few backing the part-time premium, in reality the importance of *unobservable personal characteristics* should not be underestimated. People are heterogeneous; they have different preferences and needs. People employed part-time and full-time may differ in a host of unobservable characteristics that may either directly or indirectly influence their motivation and productivity and cause wage differences. If those with the 'part-time characteristics' were less productive than the full-time employed, they would have lower wages than those who prefer to

work full-time, even after controlling for human capital variables. On the contrary, if the individuals with 'part-time characteristics' are more productive than full-timers, we should expect to see a part-time premium.

To conclude this section, it is worth emphasizing once more that wage setting is a complicated process. Both the part-time/full-time penalty and premium may occur depending on many demand- and supply-side factors that are interrelated and influence the final working hours/wage outcome. Moreover, the process is influenced by each country's labour market situation (e.g. unemployment rate, skill mix in the labour force, general living standards, wage rates), institutional setting (e.g. the tax rules for part-time and full-time employees) and the labour relations system.

3. DATA, VARIABLES AND THE RAW WAGE GAP

3.1. Data and preliminary analysis

Our analysis is based on the Estonian Labour Force Survey[4] (hereinafter called ELFS) data for 1997–2007. The ELFS is a nationally representative random-sample panel survey of individuals and contains information about a rich set of individual and job specific controls. Our sample is limited to the workers aged between 15 and 74. Following the approach often used, we excluded "marginal part-time workers" or those part-timers that

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[4] The first wave in 1995 was based on the 1989 census database and the later waves on the data from the population register. During 1997-2000 the survey was arranged as an annual cross-section (see also Leping and Toomet 2008). Since 2000 the survey has been organised quarterly as a rotating panel sample: each individual is surveyed 2 quarters, then not observed sequent 2 quarters, and thereafter again surveyed for 2 quarters. The sample comprises of the permanent residents of Estonia at the age 15-74 years. Till 1999 about 12 thousand adults were surveyed annually, since 2000 in each quarter about 4,000 people are surveyed.

worked less than 5 hours per week (428 observations) to avoid a possible bias due to the misreporting of working hours. To avoid the influence of the outliers, we dropped the top and bottom 5 percent of the annual wage distribution (e.g. Bardasi and Gornick, 2008, used a similar criterion)[5]. After these adjustments, the hourly nominal wages varied from 2.97 to 186.84 Estonian kroons (0.19 EUR to 11.94 EUR). The wage variable was deflated using the consumer price index for 2005 kroons; while earlier studies seem not to have done this, in our case that is important because of the rather long period included in the analysis. While during some years Estonian LFS data also included retrospective questions on labour market history (e.g. on the jobs held, unemployment and inactivity periods in the past), we included only observations during survey week, whereas for the retrospective part, the data on the reasons for part-time work was not available. After the adjustments, there remained 63,228 observations in the database, including 4,855 part-time and 58,373 full-time employed. As one can see from Figure 1, weekly working hours in the sample vary quite broadly, but the vast majority (88%) report working 40 hours a week. About 12% of the employed work more than 40 hours per week. There are three peaks in part-time working: at 20 hours, 30 hours and 35 hours. The latter gives support to the idea that a 35-hour working week is relatively more frequently used when compared to other neighbouring hours. So, we decided, as in several other studies, to use this as a cut-off value distinguishing between people working part-time and full-time.

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[5] Finally, following some earlier studies we also considered the need to exclude self-employed from the analysis since self-employed have more possibilities to affect the wage paid and could collect revenues in other forms than wages (e.g. through dividends). However, in our data there remained only a negligible number of self-employed with available wage data.
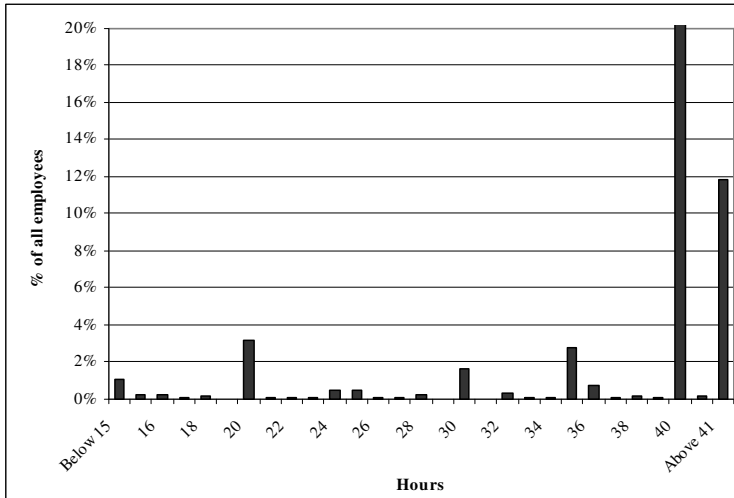
Figure 1 The distribution of weekly working hours, 1997-2007
Note. The proportion of those working 40 hours per week is about 88%; not 20%, as it may seem from the figure.

The general national standard for working time is eight hours per day or forty hours per week in Estonia. During the period under observation, the issues related to working time were regulated by the Estonian Working and Rest Time Act[6] (hereinafter called WRTA). When defining part-time employment, we follow the definition described by Statistics Estonia: *a part-time employee is an employed person whose usual working time per week is less than 35* hours[7]. There were several occupations provided in the WRTA whose full-time working hours were less than the national standard (seven hours per day or thirty-five hours per week): 1) employees who perform underground work, work that poses a health hazard or work of a special nature; 2) teachers and educators

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[6] On 1 July 2009, the new Employment Contracts Act entered into force and the WRTA became void.

[7] This cut-off value is often used as an alternative of the self-definition (subjective) of the part-time/full-time working week; for example, Booth and Wood (2007), and Aaronson and French (2004) among others have used this approach.

working in schools and other child care institutions, and other persons working in the area of education, as well as psychologists and speech therapists working on the basis of employment; and 3) providers of health care services. In order to identify these cases, we used a question about the reasons for not working full-time, and in particular, that question also included the option "At this job, less than 35 hours per week is considered full-time". These employees were considered as full-time and their hourly wage was calculated by dividing the monthly wage not with the actual working hours, but by the working hours corresponding to a normal working week.

Figure 2 shows that the part-time employment rate was relatively stable in Estonia for the period 1997–2007 fluctuating between 6.8 and 10.2%. While it is comparable to the average of the new member states (EU-10, around 10% for females and 5%–5.8 % for males from 2000 to 2006), the incidence of part-time work is much lower than in the EU-15 countries (around 33.4%–33.6% on average for females and 6.2%–8% for males during the same period, Eurostat data). The proportions of full-time and part-time employees, according to our data and Eurostat, overlap almost one-to-one.

It has been mentioned in the literature that the relatively lower extent of part-time work in CEE countries could be related to payroll taxes on part-timers (e.g. to pay for health insurances) that are not granted to most part-timers in some countries like the US (Brown et al. 2006). In Estonia the labour taxation laws promote rather than hinder the use of part-time work. Keeping in mind the focus of the study, there are two important taxes in this regard – income tax and social security tax. Although in principle income tax is a flat rate in Estonia, therefore neither promoting nor hindering the use of part-time work, due to the existence of the tax deductible minimum rate (which is set by the Government each year), the income tax system is progressive at some rate in Estonia, favouring (although only slightly) part-timers.
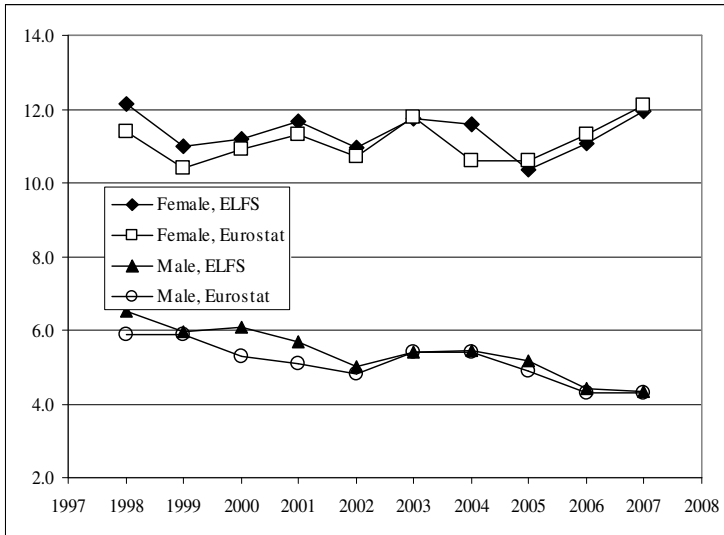
Figure 2 The proportion of part-time workers in Estonia according to ELFS and Eurostat data
Source: authors' own calculations based on Estonian LFS data; Eurostat.

The social security tax is a financial obligation imposed on taxpayers to obtain revenue required for pension insurance and state health insurance (Estonian Social Tax Law, § 1). The Social Tax Law that entered into force on 1 January 2001 includes articles that both favour and hinder the use of part-time work. The general rule is that there is a minimum level of the monthly rate of social tax established by the state budget for the budgetary year in proportion to the time worked during the given month (in 2009 the minimum rate was EUR 278 implying tax EUR 92). In principle this could decrease the employers' motivation to hire part-time workers. However, the recipients of a state pension are exempt from this rule and this worker category tends to work part-time. Until July 2009 (i.e. since 2000 for the period under consideration), it was stipulated in the law (§ 2) that social tax shall be paid on remuneration (i.e. the minimum level did not apply) to employees or public servants for a particular month if 1) employees for whom part-time working was applied or who were sent on holiday with partial pay; 2) employees or public servants

for whom reduced working time was applied for the given month; thus the minimum rate is rather an issue for the registered self-employed.

Hereinafter, we follow the approach used by Barrett and Doiron (2001) and calculate the wage gap by distinguishing between voluntary and involuntary part-time workers. There is a simple rationale for this: for voluntary part-timers the shorter working hours provide an opportunity to combine participation in the labour market with other obligations, whereas involuntary part-time work is often considered a form of under-employment. Therefore, if the theory of compensating wage differentials holds, we should see different wage effects. When distinguishing between voluntary and involuntary part-time employees, we use a broader approach than that used by Eurostat[8] and define involuntary part-time employees as those who work part-time because they did not find full-time work (similar to the Eurostat definition)[9] or due to employer-side restrictions (different from the Eurostat definition): little work, few orders; scarcity of raw materials; reparations, technical breakdowns, etc.

Accordingly, the voluntary part-timers are those who work part-time due to all other reasons (studies, health, children, other personal or family related reasons, does not want to work full-time, altogether 11 different reasons). As expected, the share of involuntary part-time employees as a percentage of total part-time employment is remarkably higher according to our definition. However, for a robustness check we also calculated the share of part-timers as a percentage of total employment according to the Eurostat definition. As can be seen from Figure 3, in this case our calculations are very similar to Eurostat figures. The minor differences are due to the employment of the 35-hour threshold instead of self-reporting when defining part-time status.

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[8] According to the Eurostat definition, persons working on an involuntary part-time basis are those who declare that they work part-time because they are unable to find full-time work.

[9] The Estonian LFS includes the questions "Why did you not work full-time and how many hours a week did you work then?" with 11 to 14 (depending on year) answer choices.
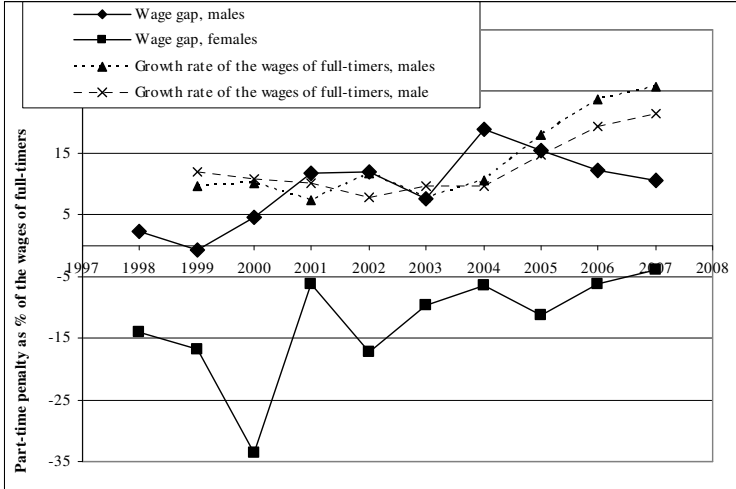
Figure 3 The proportion of voluntary part-timers out of all part-timers.
Source: Authors' own calculations based on Estonian LFS data, Eurostat
Note: the strict definition refers to the definition used by Eurostat; the wider definition refers to our definition.

We include a gender dimension and then control for other determinants of wages. The dependent variable is the log hourly net wage in the main job. The original variable in the database is the hourly net wage; the hourly net wage is calculated from the latter by using the reported number of weekly working hours and the official number of working hours in a week (around 40) and a month (around 170, the numbers vary due to the number of public holidays). There is a difference between using gross and net hourly wages if the tax rate is different for different incomes (e.g. progressive). Although the income tax rate is flat in Estonia, the existence of a tax deductible minimum (income up to the minimum threshold is not taxed) alters the tax system indirectly towards a progressive one. In such a case, since the first working hours are taxed at a lower rate, when the net wages are used, the observed wage gap is more in favour of part-timers. When gross wages are used, it is more in favour of full-timers.

We use a rich set of controls in the analysis. In addition to demographic (age, language skills, regional dummies), household (marital status, number of children of different ages in the household) and human capital variables (3 education level dummies), job-specific controls (tenure, 9 occupational dummies, 3 sector dummies and trade union membership dummy) and company-specific variables (dummies for size and ownership structure) are also included. Appendix 1 provides the definitions and descriptive statistics of the variables. The explanatory variables used in the wage equations and the equation for the choice of part-time versus full-time employment, are similar to those of earlier studies.

3.2. Unadjusted wage gap

Next we analyze the unadjusted part-time/full-time wage gap (i.e. not controlling for other variables, such as differences in human capital endowment and the job-specific differences of part-timers and full-timers). The positive values of the gap refer to the part-time penalty and the negative values to the part-time premium. On an unadjusted basis, there is a part-time premium observable for females during the whole period in Estonia (see Figure 4). For males, the part-time premium was observable in the late 1990s, which reflects the influence of high inflation (note that we use inflation-corrected wages in our analysis); nominal (i.e. non-inflation corrected) wages of the part-time and full-time employed were almost equal in 1998–1999. From 2000, wages for full-time employees have been higher than part-time employees[10].

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[10] When looking at the aggregate data, it is quite clear that one should analyze the wage gap between part-timers and full-timers separately for males and females. According to Statistics Estonia, the gap between the wages of full-timers and part-timers was around 30% during 2000–2007, but to a large extent it is simply a gender wage gap (as men quite often work full-time and also have about 30–35% higher wages).
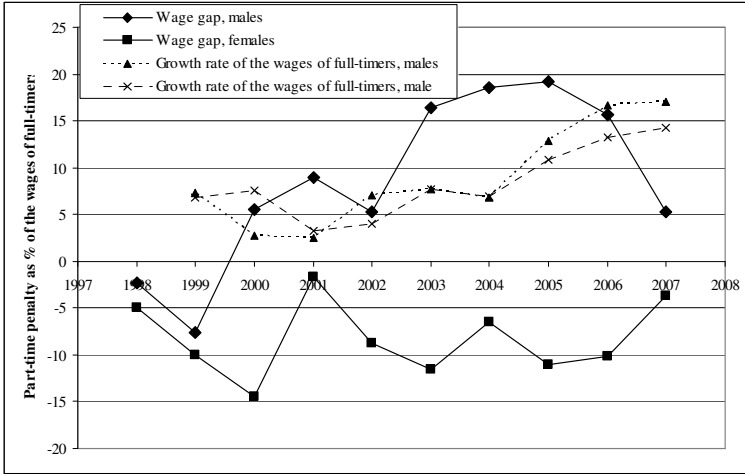
Figure 4 Part time/full time wage gap by gender in Estonia 1998–2007.
Source: own calculations based on Estonian LFS data
Note: wages have been deflated using the consumer price index.

The scale of the wage gap has not been constant, however. During the period of the Russian financial crisis and structural changes (1998–2000), when the unemployment rate increased vastly (from 9.8 % in 1998 to 13.6% in 2000) in Estonia, the part-time pay premium increased for females. In 2001, when the unemployment rate started to decrease in Estonia, we can observe a vast decrease in the gap for females and an increase in the wage penalty for males due to the fact that the wage increase for full-time employees was more rapid than that for part-time workers (because of high growth, employers probably preferred to employ full-timers to meet the demand). From 2004 onwards, which marks the beginning of the period of fast economic growth (which ended in 2007)[11], we can see some narrowing of the wage differences. In this period, labour force was relatively scarce in Estonia, firstly because of the favourable domestic situation and work-related migration: in 2004 when Estonia joined the EU, several countries –

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[11] In 2004, 2005, 2006 and 2007 the annual GDP growth rate was 7.2, 9.4 and 10 and 7.2 percents, respectively (Statistics Estonia).

the UK, Ireland and Sweden – opened their borders to the labour force of the new member states. In 2006, Finland, Spain, Greece, Portugal and Italy opened their borders, and in 2007, also the Netherlands. Due to rapid economic development, wage increases were particularly high in the period 2004–2007. As the wage increase for part-time employees was more rapid than for full-timers, the part-time/full-time wage gap decreased.

For males, the wage distribution of full-timers stochastically dominates that of part-timers (i.e. for any given wage, the value of the cumulative distribution function is higher for part-timers). For females the picture is a bit more complicated. While for lower wages, the cumulative wage distributions of part-time and full-time employed are very similar, the differences favouring the part-time employed occur for higher wages (see Figure 5).
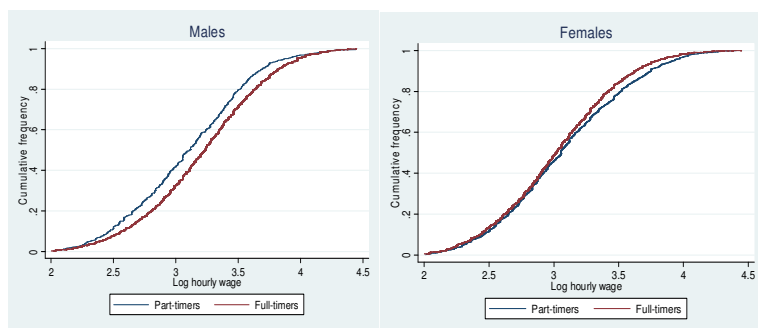
Figure 5 Cumulative distribution of wages for part-timers and full-timers, 1997–2007

Information about the incidence of part-time work and the unadjusted wage gap on the basis of gender and employment status in selected worker categories are provided in Table 1. In total, 10.5% of females and 4.5% of males were on average employed on a part-time basis during the period 1997–2007. There is some evidence of segmentation other than simply on the basis of gender in Estonia: the incidence of part-time work is higher for youth and elderly (compared to 25–49-year-olds), for those studying (compared to those who are not studying) and for females with small children in the household.

The fact that for many part-time workers this is not a voluntary choice – every second female and 40% of males – indicates that some support for the assumption of high employer-side bargaining power could explain part of the observed wage gap. Not surprisingly, for the majority of youth and students, part-time work is a voluntary choice. Yet, compared to other age groups, the part-time premium is considerably higher for youth, and average full-time wages are similar in all three age categories. The same results apply to students.

There is a clear industrial segregation of part-time employment. Similar to experiences in other countries, part-time work is relatively rare in the industrial sector compared to the agriculture and service sector. The comparison of wage gaps and the share of voluntary part-time workers gives some support to the relatively strong bargaining power of employers in the agriculture sector: the wages of full-timers as well as the proportion of voluntary part-time workers are lowest and the wage penalty highest in agriculture when compared to the industrial and service sectors. In the service sector, the gender dimension is important: while the part-time premium is highest in this sector for females compared to the agriculture and industrial sectors, for males employed in the service sector a large part-time wage penalty is observable. The unadjusted wage gap is large for males holding skilled agricultural and fishery positions, where the incidence of involuntary part-time work is particularly high and wages low compared to other occupations, indicating the high bargaining power of employers (due to the scarcity of jobs and difficult situation in this sector). Contrary for females, the incidence of part-time work is low in this occupation group and their wages are still higher than for full-time employees. This may be partly due to the under-reporting of working hours and wages (i.e. envelope wages) for self-employed males in agriculture in order to pay less tax[12].

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[12] According to Working Life Barometer data, the proportion of employees sometimes receiving unreported income was 19% in 1999 and 10% in 2002 (Antila and Ylöstalo, 2003). According to the surveys of the Estonian Institute for Economic Research, the share of working age respondents receiving unreported wages decreased from 19% in 1999 to 14% in 2004 (Kriz et al. 2007).

Language skills and occupation are also important. The share of part-timers, incidence of voluntary part-time work and wages are higher for Estonian speakers compared to non-Estonian speakers. This reflects, at least to some extent, industry effects: Estonians tend to be over represented in service sector jobs where the incidence of part-time working is higher (Krillo et al 2007). As expected, white-collar workers are in a favourable situation when compared to blue-collar workers. Although the incidence of part-time work is similar in those groups, both the wages of full-timers and the wage premium are higher for female (the wage penalty is lower for male) white-collar workers.

The proportion of part-time employees is relatively high among professionals and clerks. Wages in those occupations are among the highest, and the part-time pay premium is observable for both males and females. One explanation could be the income effect – as this category may include several well-paid specialists (e.g. dentists), it seems that they choose to work part-time due to their high hourly wages. By contrast, legislators, officials and managers clearly tend to work full-time, earn the highest wages and in those occupations part-time workers on average earn less than full-timers. Therefore, a substitution effect prevails for those occupations and they prefer longer working hours. The same results apply to plant and machine operators and assemblers; however, their wages are substantially lower as is expected.

Table 1 The wage gap for different worker categories (1997–2007, averages)

Variable	Females				Males			
	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap. %	Wage of full-timers, EEK	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap, %	Wage of full-timers, EEK
All observations	10.5	51	-8.0	23.3	4.5	42	11.5	30.3
DEMOGRAPHICS								
Education								
Basic education	15.2	52	-5.6	16.9	5.9	38	19.7	23.8
Secondary education	9.1	48	-8.5	21.2	3.6	43	3.0	30.0
Higher education	11.7	55	-7.7	33.8	5.4	45	16.5	43.3
Language								
Estonian	11.3	53	-4.4	24.4	5.0	46	12.7	31.3
Non-Estonian	8.2	40	-18.1	20.2	3.1	26	10.9	27.6
Region								
Northern Estonia	11.1	58	-5.6	28.9	4.3	54	6.7	38.2
Central Estonia	10.1	47	-9.4	21.5	3.3	26	20.0	27.1
North-Eastern Estonia	6.6	29	-7.2	17.9	3.0	17	-14.2	24.8
Western Estonia	10.5	51	-8.7	21.2	4.6	40	19.0	27.6
Southern Estonia	11.7	51	-5.2	22.2	5.8	44	16.6	27.6
Married								
With partner	9.6	46	-8.6	23.4	3.6	32	16.7	31.3
Without partner	12.2	58	-7.5	23.1	7.0	55	-2.3	27.1
Children								
No children	12.0	51	-5.4	23.3	5.9	43	7.7	28.7
Children 0-3 years old	14.9	67	-30.1	22.9	3.0	33	14.2	32.8
Children 4-6 years old	10.8	52	-23.0	23.2	3.0	29	11.0	33.0
Children 7-17 years old	8.3	47	-7.0	23.3	2.9	42	16.6	31.5

Table 1 (*continuation*)

Variable	Females				Males			
	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap. %	Wage of full-timers, EEK	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap. %	Wage of full-timers, EEK
Studying								
Studies	23.3	88	-2.3	30.0	22.1	90	6.0	36.3
Does not study	9.8	46	-6.5	23.0	3.8	31	16.5	30.1
Age								
Age 0-25	18.7	81	-30.3	21.2	8.7	72	-21.8	26.3
Age 25-49	7.2	43	-8.4	24.1	2.8	27	18.5	32.3
Age 50-75	15.8	51	-7.7	21.9	6.6	40	10.5	27.4
WORK ATTRIBUTES								
Sector								
Primary sector	10.7	39	1.5	18.8	5.5	26	20.3	21.5
Secondary sector	3.9	50	-6.3	22.0	2.5	40	3.7	28.5
Service sector	12.5	51	-7.1	24.0	5.3	45	13.4	32.4
Occupation								
Legislators, senior officials and managers	4.5	50	10.2	33.5	2.2	51	20.4	45.5
Professionals	13.0	54	-23.7	31.4	10.1	48	1.4	40.1
Technicians and associate professionals	10.5	52	0.3	25.7	6.6	55	12.0	35.3
Clerks	12.1	46	-5.8	21.9	5.2	50	-2.1	31.1
Service workers and shop and market sales workers	8.5	54	-14.7	17.7	6.9	57	-4.8	25.4
Skilled agricultural and fishery workers	5.3	50	-13.9	18.3	5.8	14	19.7	20.8
Craft and related trade workers	3.6	65	-7.7	19.4	2.9	39	13.7	27.9

Table 1 (*continuation*)

Variable	Females				Males			
	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap. %	Wage of full-timers, EEK	Proportion of part-timers, %	Share of voluntary part-timers, %	Wage gap. %	Wage of full-timers, EEK
Plant and machine operators and assemblers	1.6	60	5.9	21.1	2.2	25	12.1	27.0
Elementary occupations	20.9	45	-14.6	15.2	10.1	37	11.5	19.5
Skills								
Blue-collar	10.3	49	-3.9	17.9	4.1	37	17.2	26.1
White-collar	10.7	52	-9.7	28.5	5.6	51	11.1	40.4
Trade union membership								
Trade union	9.1	50	-42.5	23.8	3.8	34	-22.1	29.4
Size of the company								
1-10	15.1	45	-6.2	20.5	7.9	30	21.5	27.3
11-49	11.1	51	-13.0	23.0	4.2	49	4.0	29.9
50-199	7.7	58	-14.0	25.1	3.2	51	3.2	31.2
200-499	5.5	51	-8.4	25.2	2.7	53	22.4	33.9
More than 500	5.4	61	-8.5	25.0	3.1	27	-9.6	32.8
Company's ownership								
State firm	12.4	49	-12.3	24.2	7.4	35	4.4	30.3
Private firm	9.3	52	-3.3	22.7	3.6	46	15.9	30.2
Domestic private firm	10.1	50	-5.1	21.5	4.0	45	13.2	28.7
Foreign firm	5.8	66	-7.7	27.8	1.5	60	16.1	38.1
Moonlighting								
Moonlight	25.8	39	-16.4	26.6	13.4	32	-6.2	31.0
No moonlight	9.6	52	-4.9	23.1	4.0	43	14.8	30.2

Compared to public sector employers, in the private sector the incidence of part-time employment is lower and the part-time penalty higher for males and premium lower for females, although the wages of full-timers are similar. There is a remarkable difference observable between domestic and foreign-owned private companies: the incidence of part-time work is twice as high for females and almost three times higher for males and wages lower in domestic companies. Yet, although the wage premium is higher for females working in foreign-owned companies when compared to domestic companies, the contrary is true for males. This may reflect sector-based segregation effects. Hourly wages are lower in smaller firms, and this can be explained by the costs of employee monitoring, capital-skill complementarity and the complementarity between labour skills and advanced technology capital (Troske, 1994). The wage gap seems to be more in favour of full-timers in micro firms (those with up to 10 employees) and in favour of part-timers among those with more than 500 employees, though the relationship between the wage gap and firm size is not absolute.

4. THE ECONOMETRIC FRAMEWORK

We next introduce the econometric methodology used for the analysis of the part-time and full-time wage gap. Let the wage equations for part-time (denoted with subscript pt) and full-time (ft) employees be given as follows:

(1) $\qquad \log(w_{pt}) = \beta_{pt} X_{pt} + \varepsilon_{pt}$,

(2) $\qquad \log(w_{ft}) = \beta_{ft} X_{ft} + \varepsilon_{ft}$,

where dependent variables w_{pt} and w_{ft} are the hourly wage rate of part-time and full-time employees, respectively; X_{pt} and X_{ft} are the vectors of explanatory variables in the regression equations for the part-time and full-time workers, respectively; β_{pt} and β_{ft} are vectors of the estimated parameters of the part-time and full-time wage equations, respectively; ε_{pt} and ε_{ft} are the error terms

for the part-time and full-time wage equations, respectively (assumed to be normally distributed, with a mean of zero and standard deviations σ_{pt} and σ_{ft}).

Equations (1) and (2) can be estimated using ordinary least squares (OLS). However, OLS estimations of equations (1) and (2) yield biased results if the selection of the workers into part-time/full-time work is not random; or at least some of the explanatory variables of the wage equations are correlated with an error term. This is likely to be the case in our study because, for example, occupation is probably correlated with the motivation captured by the error term. Therefore, in the empirical part we firstly calculate the wage gap between part-time and full-time employed without taking endogenous selection into account and after that calculate the selection-corrected wage gap. The problem with sample selection is standard in econometric literature and to correct for a possible bias, we follow the approach of several earlier studies (for example Hardoy and Schone, 2006; Bardasi and Gornick, 2008) and use the Heckman (1979) two-step estimation strategy[13].

In the first step we estimate a probit model explaining the selection into full-time and part-time work. Suppose that individual i ($i = 1,\ldots,n$) chooses his/her the working time according to the following rule:

(3) $I_i^* = \gamma Z_i + v_i$,

where I_i^* is the latent variable for the choice of working hours that cannot be observed by the researcher. Instead, we observe whether the person works part-time or full-time; that is, a dummy variable:

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[13] Among the different approaches used in the literature, Hardoy and Schone (2006) modeled the selection between part-time and full-time employment using the probit model at the first step of the Heckman estimation. Bardasi and Gornick (2008) estimated a multinomial logit model at the first step in order to explain the selection into full-time work, part-time work and non-employment. Hu and Tijdens (2003) estimated an ordered probit model in order to explain the selection into full time, long-part-time and short part-time.

(4) $I_i = 1$ if $I_i^* > 0$, that is, person works part-time,

(5) $I_i = 0$ if $I_i^* \leq 0$, that is, person works full-time.

The expected values of the residuals in equations (1) and (2) are given by:

(6) $E\left(\varepsilon_{pt} \mid I = 1\right) = \sigma_{pt,v} \lambda_{pt}$,

(7) $E\left(\varepsilon_{ft} \mid I = 0\right) = -\sigma_{ft,v} \lambda_{ft}$,

where $\lambda_{pt} = \dfrac{\phi(\mu Y_i)}{\Phi(\mu Y_i)}$ and $\lambda_{pt} = \dfrac{-\phi(\mu Y_i)}{1 - \Phi(\mu Y_i)}$.

In the above equations, ϕ is the density function and Φ the cumulative distribution function of the standard normal. λ_{pt} and λ_{ft} are the inverse Mill's ratios that capture the effect of unobserved heterogeneity; that is, selection into part-time and full-time employment. The terms $\sigma_{pt,v}$ and $\sigma_{ft,v}$ are respectively the covariances between error term v_i in the choice equation (3) and error terms ε_{pt} and ε_{ft} in the wage equations (1) and (2).

In the second step, we estimate equations (1) and (2) where the extra regressor ('correction factor') constructed is based on the results of the first step, taking into account the possible selectivity that is added as an explanatory variable. According to the sample selection formulas by Heckman (1976, 1979), it follows that:

(8) $E\left(w_{pt} \mid I = 1\right) = \beta_{pt} X_{pt} + \sigma_{pt,v} \lambda_{pt}$

(9) $E\left(w_{ft} \mid I = 0\right) = \beta_{ft} X_{pt} + \sigma_{ft,v} \lambda_{ft}$.

If the estimated parameters of the correction factors ($\hat{\sigma}_{pt,u}$ and $\hat{\sigma}_{ft,u}$) are statistically significant, it indicates that the error terms of the selection equation and regression equation are correlated;

that is, there are unobservable characteristics that are correlated with the variables in vector X_{pt} and X_{ft} in the wage equations.

The validity of the selection model crucially depends on the instruments used in the equation for the choice between part-time and full-time employment. We will follow the approach used in most of the papers in the literature (see Pertongolo and Manning, 2008; Ermisch and Wright, 1993), and use household variables (marital status and the presence of children of various ages) as instruments in order to identify the model[14].

After estimating the parameters of the wage equations, the Oaxaca (1973) and Blinder (1973) methods are employed to decompose the wage differentials into price effects and characteristics effects. In particular, the wage gap can be decomposed into the following parts:

$$(10) \quad \overline{\log(w_{pt})} - \overline{\log(w_{ft})} = (\overline{X}_{pt} - \overline{X}_{ft})\beta_{ft} + \overline{X}_{ft}(\beta_{pt} - \beta_{ft}) + (\hat{\sigma}_{pt,v}\overline{\lambda}_{pt} - \hat{\sigma}_{ft,v}\overline{\lambda}_{ft}),$$

where $\overline{\log(w_j)}$ is the average log of the hourly gross wage and $\overline{X}_j$ is the vector of the mean values of explanatory variables $j = pt, ft$. The first part in the right hand side of the regression equation describes the explained part of the wage gap; that is, the part of the wage gap that is due to the differences in observable characteristics between part-timers and full-timers (the

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[14] This is a widely acknowledged approach. Another instrument sometimes used is non-labour market-related income (Hardoy and Schone 2006), but we cannot include this as the Estonian LFS do not contain such information. One of the referees suggested using the labour income of other household members as an instrument (in the Estonian Labour Force Survey, all adult members of the household are surveyed). However, the labour income earned by other household members had only a modest effect on the wage gap decomposition results. In the probit regressions for part-time employment this variable had either insignificant or negative impact on the probability of working part-time. The only case where the variable had (as expected) positive impact on the probability to work part-time was that of voluntary part-time female.

'endowment effect', often referred to as a 'fair part' of the wage differences). The second term is the wage gap attributable to the differences in returns to observable characteristics (the "price effect"). Although it is often considered to be a discrimination component, it also includes all potential effects in differences due to unobserved variables (Altonji and Blank, 1999). The third term characterizes the selection into part-time and full-time employment due to unobserved traits. In our analysis, we also include the models without the correction for the non-random selection into part-time employment, in which case the last term does not appear in equation (10).

When decomposing wages, we use part-time employees as the reference category. In our calculations we used the programme developed by Jann (2008) for the implementation of the Blinder-Oaxaca decomposition for Stata; at the place of the reference coefficients in equation (10), the coefficients from the pooled model over both samples were used with a pooled model containing a group membership indicator (i.e. the part-time dummy). In the explained part, we also calculated the contribution of each regression variable to the wage gap.

Following Bardasi and Gornick (2008), we use the Duncan (or dissimilarity) index to measure the segregation effects. This index is based on the distribution of two categories (in our case, full-time and part-time employees) across specific groups (in our case across different occupations, firm size groups etc.). The dissimilarity index can be expressed as

(11) $DI = \dfrac{1}{2} \sum_i \left| \alpha_{i,ft} - \alpha_{i,pt} \right|,$

where $\alpha_{i,ft}$ refers to the proportion of full-time employees in group i and $\alpha_{i,pt}$ refers to the proportion of part-time employees in group i. It holds that $0 < DI < 1$ and is interpreted as the sum of the minimum proportion of part-timers and the minimum sum of full-timers who would have to change their occupation in order for the proportion of part-timers to be equal in all occupational groups (Anker, 1998). Hence, the higher index value refers to the higher level of segregation in the labour market.

5. ESTIMATION RESULTS

5.1. Part-timers as a homogenous group

In the following, the results of the Oaxaca-Binder decomposition are presented. To capture the effect of different variables on the wage gap, four different models are estimated. The first model includes only a constant term and year dummies as controls; in the second we add human capital variables (education, tenure at current job); in the third, employer-side controls are added, such as location, firm size, ownership dummies; and the fourth model includes all the previous variables plus 9 occupational dummies[15]. The 5th model has the same explanatory variables as model 4, but takes into account the correction for sample selection.

The results of the 1st step of the Heckman two-step estimation (probit model) are presented in Appendix 2 and the marginal effects in Table 2[16]. The parameter estimates of the probit model

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[15] Due to the large number of regressions estimated, we only present the coefficients of the model with the full set of control variables in Appendix 3. The other estimations are available from the authors upon request.

[16] As the samples of full-time and part-time employees are unbalanced (approximately 90% of employees work on a full-time and only 10% on a part-time basis), the probit model parameters are estimated as such to maximize the probability of working full-time (the major group) correctly. Therefore, the model overestimates the incidence of full-time work and underestimates the share of part-time work. In other words, in the binary models estimated on the unbalanced samples, the estimated likelihood to belong to the smaller group (in our case, part-time work) is lower than in reality (Greene 2000). To correct for the bias, we followed the approach suggested in Cramer (1999). We sub-sampled our data such that all part-time and only a part of the full-time employees were included. To guarantee the adequacy of the results, we randomly selected 6000 observations on full-time employees for the sample. For explanatory variables, we used age and its square in the probit regression, 2 educational dummies, a language skill dummy, 4 regional dummies, 8 occupational dummies and as instruments, the household variables –

have expected signs and are largely in line with the results of a previous similar study in Estonia (Krillo et al. 2007). Compared to non-students, male students have about a 46% and female students a 22% higher probability of working part-time instead of full-time (the marginal effects are calculated at the means of the variables). The strong language skill and educational effects are observable for males – compared to non-Estonian speakers, Estonian speakers are more likely to work part-time and the more educated, full-time (the reference group is basic education). However, for females these differences are not statistically significantly different from zero. The regional differences are of minor importance: the only effect that is statistically significant is that observed for southern Estonia. This may reflect employer-side restrictions. Krillo et al. (2007) have found that in southern Estonia, part-time employees who would like to change employer are more likely to search for a full-time job compared to part-time workers in northern Estonia. This indicates that employer-side working time restrictions are more important in the southern part of the country, although with the raw data no such difference is observable. Also, sector is quite important as there are much less part-time jobs in the secondary sector; similarly, Allaart and Bellmann (2007) found industry to be an important determinant of the incidence of part-time.

Table 2 The marginal effects of the probit model for working part-time

Variable	Males		Females	
	Marginal effect	P-value	Marginal effect	P-value
Secondary education	-0.061	0.001***	-0.037	0.085*
Higher education	-0.074	0.007***	-0.023	0.421**
Estonian	0.051	0.015**	-0.001	0.972**
Central Estonia	-0.006	0.83	0.014	0.555**
North-Eastern Estonia	0.059	0.065*	-0.044	0.11**
Western Estonia	0.019	0.493	0.022	0.342**
Southern Estonia	0.084	0.000***	0.078	0.000***
Professionals	0.325	0.000***	0.205	0.000***

dummies on the presence of children in the household and a cohabiting dummy.

Variable	Males		Females	
	Marginal effect	P-value	Marginal effect	P-value
Technicians and ate professionals	0.202	0.000***	0.198	0.000***
Clerks	0.185	0.005***	0.235	0.000***
Service workers and nd market sales workers	0.129	0.009***	0.128	0.000***
Skilled agricultural and workers	0.136	0.073*	0.005	0.945**
Craft and related trade rs	0.058	0.104	0.080	0.098**
Plant and machine ors and assemblers	0.016	0.654	-0.028	0.585**
Elementary occupations	0.277	0.000***	0.351	0.000***
With partner	-0.100	0.000***	0.009	0.571**
Children 0-3 years old	0.027	0.244	0.158	0.000***
Children 4-6 years old	0.034	0.193	0.080	0.000***
Children 7-17 years old	-0.004	0.722	0.035	0.000***
Studies	0.461	0.000***	0.215	0.000***
Age	-0.027	0.000***	-0.051	0.000***
Age squared	0.000	0.000***	0.001	0.000***
Secondary sector	-0.107	0.000***	-0.189	0.000***
Tertiary sector	-0.039	0.207	0.020	0.619**

Note. The marginal effects are calculated at the means of variables. The reference groups are basic education, non-Estonian, north Estonia, primary sector, legislators, senior officials and managers.

Concerning occupations, compared to legislators and other higher officials (the reference group in the probit model), employees in all other occupational groups are more likely to work on a part-time basis (the exceptions are females working as plant and machine operators). The effects are statistically significant and of a considerable size only for highly-skilled workers (professionals, technicians and other associate professionals, service workers) and for elementary occupations. The instrumental variables (the household variables) are much more important for females than for males. Whereas the variables for the presence of children are not statistically significant in the males' model, employed females who have children in the household are more likely to work part-time and the effects are stronger for the presence of small children, as

expected. There is some support for the male breadwinner theory: males who are cohabiting are more likely to work full-time (compared to single males) and females part-time, although the latter effect is not statistically significantly different from zero.

Next, we comment briefly on the results of estimating the wage equation. As one can see from Appendix 3, the estimated parameters of the inverse Mill's ratio is positive and statistically significant in full-time models for both genders, indicating that it is important to take into account the non-random section in full-time and part-time work for both males and females. The reason for this could be the limited number of part-timers, large wage inequality, limited amount of family benefits and possible discrimination in the labour market (though the regulations prohibiting that need not be fully enforced). The positive and significant parameter estimates indicate that full-timers are positively selected compared to the random group of the population. The parameters of the selection-corrected wage models are mostly significant and with expected values. Wages are higher for people who are more educated, students (compared to non-students), Estonians (compared to non-Estonians), those who live in the capital area, trade union members (the effect is much more important for part-time employees), workers in larger firms and foreign-owned firms (compared to domestically owned) and in certain occupations (the results are similar to earlier estimations of wage equations as in Leping and Toomet (2008) and Philips (2001)). The returns on education are higher for part-timers in the case of males, and full-timers in the case of females. Working in foreign-owned firms increases the wages of full timers for males, for females the impact is positive and a bit stronger regarding part-timers. Sector-based and occupational effects are mostly important for full-timers and not statistically significant for part-timers. Previous evidence has shown that during part-time employment, the accumulation of human capital is lower (i.e. there are low returns on tenure, see Hirsch, 2005; Hardoy and Schone, 2006; and Manning and Robinson, 2005). Studying contributes significantly and strongly to the hourly wages of full-timers, but not part-timers. Our results indicate that tenure is a relatively unimportant determinant of wages, which is in accordance with earlier studies (Philips, 2001).

The results of the wage gap decomposition with and without the correction for non-random selection are presented in Table 3. As the comparison of Models 1–4 indicates, company-specific variables and occupation are the main factors explaining the wage gap. We will elaborate on this in more detail later. In what follows, we discuss the results of the model with a full set of controls. For males in the model corrected for sample selection, the part-time pay penalty is much larger than in the non-corrected model, 31 and 13 log points, respectively. However, in the corrected model, the unexplained part (often interpreted as the discrimination effect) is much higher than in the uncorrected model, indicating that for males endogenous selection into part-time and full-time jobs is important.

For females, the picture is quite different. According to the controls used in the analysis, the wages of part-time employees should be lower than full-timers and the observable part-time penalty is due to the unexplained effect (in a more formal setting, the explained part is positive and the unexplained part negative). The results of the non-corrected and corrected selection models are similar, but in the latter both explained and unexplained wage gaps are smaller in absolute value.

Table 3 Oaxaca-Blinder wage decompositions with and without correction for non-random selection into part-time employment

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Males					
W_{ft}, EEK	24.88	24.88	24.88	24.88	24.88
W_{pt}, EEK	22.26	22.26	22.26	22.26	22.26
Wage gap	0.11	0.11	0.11	0.11	0.11
Selection					-0.17*** (-153.3%)
Explained	0.04*** (32.9%)	0.04*** (40%)	0.1*** (85.9%)	0.12*** (108.7%)	0.02 (22.3%)
Unexplained	0.07*** (67.1%)	0.07*** (60%)	0.02 (14.1%)	-0.01 (-8.7%)	0.26** (231%)
Female					
W_{ft}, EEK	20.58	20.58	20.58	20.58	20.58
W_{pt}, EEK	21.67	21.67	21.67	21.67	21.67
Wage gap	-0.05	-0.05	-0.05	-0.05	-0.05
Selection					-0.02 (-35.9%)
Explained	0.00 (-4.3%)	0.00 (9.5%)	0.04*** (82.9%)	0.06*** (122.1%)	0.03*** (49.7%)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
	-0.05***	-0.06***	-0.09***	-0.11***	-0.06
Unexplained	(-95.7%)	(-109.5%)	(-182.9%)	(-222.1%)	(-113.8%)
Year dummies	X	X	X	X	X
Human capital		X	X	X	X
Other controls			X	X	X
Occupation				X	X
Selection correction	No	No	No	No	Yes

Note: * significant at 10%; ** significant at %; *** significant at 1 %.

Table 4 presents the importance of various variables for explaining the wage gap. The human capital differences measured using education and tenure are of minor importance in explaining the wage gap between part-time and full-time employees in Estonia. For females, the most important factors contributing to the wage gap are occupation, age and firm size. For males, the developments in time captured by year dummies are of paramount importance, but employer-side characteristics (size and ownership of the company) are also important – as we saw, part-timers tend to work in smaller and domestically owned firms that also have lower wages. The negative contribution of the dummy on studying is in accordance with the impact of studying on wages in the wage equations and the higher proportion of people studying in the data (i.e. studying would explain the part-time wage premium). The values of the Duncan index (or dissimilarity index) presented in the last two columns in Table 4 indicate the segregation across different groups such as the occupational and ownership groups. Generally, the higher the value of the dissimilarity index for that group, the higher the importance of different factors in accounting for the wage gap (especially for females, where the R-squared between the two indicators is 0.68).

Table 4 The importance of different factors in accounting for the part-time wage gap as a percentage of the explained wage gap (average for 1997–2007)

Variable	Male, without selection	Male, with selection	Female, without selection	Female, with selection	Duncan index, males	Duncan index, females
Education	0.9	-1.2	-2.1	-6.8	0.12	0.10
Tenure	3.0	14.9	8.0	18.9	0.11	0.09
Sector	-1.7	-22.7	2.0	-15.6	0.14	0.16

Variable	Male, without selection	Male, with selection	Female, without selection	Female, with selection	Duncan index, males	Duncan index, females
Region	-2.5	-18.6	-11.6	-31.4	0.10	0.05
Firm size	15.6	75.4	24.9	61	0.15	0.14
Firm owner	6.4	30.4	14.5	35.4	0.11	0.06
Occupation	16.8	-20.8	42.6	61.8	0.31	0.22
Nationality	-7.5	-44.8	-11.2	-27.6	0.09	0.06
Union membership	1.0	5.0	0.7	1.8	0.01	0.02
Year dummies	28.6	139.9	-2.9	-7.1	0.07	0.02
Age	35.1	50.6	42.3	38.5	0.24	0.22
Studies	4.3	-108	-7.4	-28.8	0.15	0.07

We also present the decomposition results for three periods (1997–2000, 2001–2004, 2005–2007). The first period covers the years of restructuring due to the Russian crisis. The second period is characterized by the stabilization and recovery of the Estonian economy. The third is the period of fast growth, characterized by low unemployment and high GDP growth. The results in Table 5 show that in all periods the wage gap estimated from the model without selection correction is positive for males; that is, a part-time pay penalty is observable. The explained part is positive, indicating that taking into account the controls used in the analysis, the lower wages of part-time employees are due to their worse 'endowment' (i.e. they are less skilled and concentrated in enterprises where lower wages are paid) compared to full-timers. In both the non-selection corrected and selection corrected models, the wage penalty has a countercyclical nature. In the late 90s, which was characterized by a vast increase in the unemployment rate and structural changes due to the Russian crisis, the wages of part-time employees were just slightly lower than full-time workers. According to the results of both the non-selection corrected and selection corrected model, taking into account the explanatory variables, we should have seen a 6–7% wage penalty, so the 'discrimination' actually worked in the opposite direction, favouring part-time employees. This was probably due to employer-side restrictions; that is, those working part-time were paid higher wages on a pro rata basis compared to full-time employees to secure at least a minimum living standard. At the

beginning of the new millennia, when the Estonian economy recovered from the shock, the part-time penalty for males increased. The selection-corrected wage gap is still in favour of part-time employees, but lower when compared to the previous period. Rapid GDP and wage growth rates characterized Estonia in the period 2005–2007. The part-time wage penalty increased, which could be explained by a preference among employers for full-timers.

For females, the part-time/full-time wage gap has evolved differently than for the males. The differences between the selection-corrected and non-corrected models are not as remarkable as for males. The part-time gap shows a pro-cyclical pattern, increasing (although in small volumes) over time. According to the division of the wage gap between the explained and unexplained part, the observable part-time premium is not an objective phenomenon because when taking into account the differences in person- and company-specific variables, the wages of part-time employees should be lower than full-time workers.

So far, we have only used information regarding a person's main job in the analysis. However, while applying this approach, we may lose useful information if the number of persons having multiple jobs is substantial or if they form a particular labour-market segment having distinctive characteristics. For theoretical considerations, it is not *a priori* clear which labour market category (full-time or part-time) employees with several jobs belong to. On the one hand, if the reason for the part/full-time wage gap is quasi-fixed costs, then people with several part-time jobs should be kept in the category of part-time employees, even if their total working hours from all their jobs add up to full-time hours. On the other hand, if the reason for the wage gap is a lower accumulation of human capital in part-time jobs, then people with several jobs that add up to full-time work should belong to the category of full-timers – then there is no reason for the wage gap

Table 5 Estimated wage gaps and the Oaxaca-Blinder decomposition, by periods

	Variable	All years		1997-1999		2000-2004		2005-2007	
		Model 4	Model 5	Model 4	Model 5	Model 4	Model 5	Model 4	Model 5
Males	W_{ft}, EEK	24.88	24.88	18.37	18.37	21.35	21.35	32.48	32.48
	W_{pt}, EEK	22.26	22.26	17.86	17.86	20.02	20.02	28.43	28.43
	Wage gap	0.11	0.11	0.03	0.03	0.06	0.06	0.13	0.13
	Selection		-0.17*** (-153.3%)		0.50 (1772%)		0.23 (355%)		-0.27*** (-200.8%)
	Explained	0.12*** (108.7%)	0.02 (22.3%)	0.07*** (244.9%)	0.06** (226.5%)	0.08*** (116.9%)	0.04** (62.9%)	0.13*** (94.1%)	0.05** (39%)
	Unexplained	-0.01 (-8.7%)	0.26** (231%)	-0.04 (-144.9%)	-0.54 (-1898.6%)	-0.01 (-16.9%)	-0.21* (-317.9%)	0.01 (5.9%)	0.35*** (261.8%)
Females	W_{ft}, EEK	20.58	20.58	15.02	15.02	17.96	17.96	26.13	26.13
	W_{pt}, EEK	21.67	21.67	15.56	15.56	18.89	18.89	27.69	27.69
	Wage gap	-0.05	-0.05	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06
	Selection		-0.02 (-35.9%)		-0.05 (-147.3%)		-0.08 (-153.3%)		0.02 (27.4%)
	Explained	0.06*** (122.1%)	0.03*** (49.7%)	0.05*** (155.4%)	0.01 (4.2%)	0.06*** (119.5%)	0.03** (58.2%)	0.07*** (119.4%)	0.04*** (60.3%)
	Unexplained	-0.11*** (-222.1%)	-0.06 (-113.8%)	-0.09*** (-255.4%)	0.02 (51.5%)	-0.11*** (-219.5%)	0.00 (-4.9%)	-0.13*** (-219.4%)	-0.11** (-187.7%)

Note: * significant at 10%; ** significant at %; *** significant at 1 %. Model 4 and Model 5 include year dummies, human capital, occupation and other controls. Model 4 is not and Model 5 is corrected for selection.

According to Eurostat, 9% of employees in Estonia had multiple jobs in 1997, and 3.5% in 2007. In our sample, the proportion of moonlighters is 4.6% for male and 5.2% for female employees; however, moonlighters could be found much more often among part-timers than full-timers. On average, in the period 1997–2007, male moonlighters constituted 13% of all part-timers and just 4% of full-timers; for females, the numbers were 26% and 9% respectively. As the information provided in Table 1 indicates, among moonlighters, the wage gap is in favour of part-timers for both males and females, while among workers without off-hour jobs the wage gap is similar to the total sample, negative for females and positive for males. Thus, in order to check for robustness, the wage decompositions were also undertaken without moonlighters. The results (Table 6) are largely in line with the core model, so all the previous results apply. The only difference is a slightly larger pay penalty for males once moonlighters are excluded.

For a robustness check we replicated our analysis by dropping students below the age of 25. A similar approach is used by Hirsch (2005), and Hardoy and Schone (2006), who excluded students. As highlighted by Hirsch (2005), youth and students working part-time form a distinct group and are quite different from other part-timers as they are constrained regarding the timing of their work. As the descriptive analysis indicated, it applies to Estonia too: the incidence of voluntary part-time work is particularly high in the age group below 25 and for students in Estonia. The results of the decomposition (not reported) indicate that excluding the youth increases the part-time wage penalty for males to 14% and decreases the wage premium to females to 4%. The final robustness check was to exclude employees working between 32 to 38 hours per week. The wage gap for males decreased as a result; for females the wage premium increased; that is, for both genders the wage gaps changed more in favour of part-timers.

Table 6 The wage decompositions without moonlighters

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Males					
W_{ft}, EEK	24.9	24.9	24.9	24.9	24.9

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
W_{pt}, EEK	21.74	21.74	21.74	21.74	21.74
Wage gap	0.14	0.14	0.14	0.14	0.14
Selection					-0.18*** (-133%)
Explained	0.04*** (25.9%)	0.06*** (41.4%)	0.12*** (89.1%)	0.15*** (110.4%)	0.05*** (37.5%)
Unexplained	0.1*** (74.1%)	0.08*** (58.6%)	0.01 (10.9%)	-0.01 (-10.4%)	0.27** (195.4%)
Female					
W_{ft}, EEK	20.49	20.49	20.49	20.49	20.49
W_{pt}, EEK	21.21	21.21	21.21	21.21	21.21
Wage gap	-0.03	-0.03	-0.03	-0.03	0.03
Selection					0.00 (-13.3%)
Explained	0.00 (-11.4%)	0.01 (27.8%)	0.05*** (143.4%)	0.07*** (213.5%)	0.03*** (99.1%)
Unexplained	-0.03*** (-88.6%)	-0.04*** (-127.8%)	-0.08*** (-243.4%)	-0.11*** (-313.5%)	-0.06 (-185.8%)
Year dummies	X	X	X	X	X
Human capital		X	X	X	X
Other controls			X	X	X
Occupation				X	X
Selection correction	No	No	No	No	Yes

5.2. Voluntary versus involuntary part-time work

In the previous analysis we considered part-timers to be a homogenous group in a similar fashion to most other researchers. However, this may cause a substantial loss of information because people work part-time for different reasons. Voluntary part-timers choose to work part-time because it enables them to flexibly combine participation in the labour market with non-market activities (family obligations, studying, hobbies, etc.). On the contrary, involuntary part-time workers are those who would prefer to work full-time, but cannot for one reason or another (e.g., due to the inability find full-time work, a lack of work or orders in the enterprise, etc). For this segment, employer-side restrictions and the inability to find a more favourable job are the main reasons for working part-time.

As we can see from Table 7, it is crucial to take into account the voluntariness dimension. As expected, in line with the results from Barrett and Doiron (2001), the labour market position in terms of hourly wages earned is much better for voluntary part-time workers. For females, the wage premium is found only for voluntary part-timers. Although on an unadjusted basis, the wages of the involuntary part-time and full-time employees are almost equal (the difference is 1 log point), based on the controls used in the analysis we should observe an 11-log point pay penalty. This indicates that involuntary part-timers are relatively poorly endowed with the characteristics necessary to earn high wages. The comparison of Models 1–4 indicates that the reason is not in human capital and employer-related factors, but in occupational differences: involuntary part-time jobs are concentrated in jobs where lower wages are paid (elementary occupations, skilled agricultural and fishery workers). Once the non-random selection effect is taken into account, a large part-time penalty is observable and about half of this is explained by the variables used in the analysis.

Voluntarily part-time working females earn approximately 12% more per hour than full-time employees and most of this gap is due to unobservable characteristics; that is, not explained by the explanatory variables used in the analysis. In the selection-corrected model, the part-time wage premium is even more striking and remains largely unexplained. A comparison of the explained part of Models 1–4 indicate that adding controls does not decrease the unexplained wage premium. The wage premium observable is therefore due to factors other than those captured in the analysis.

Although without the correction for sample selection both voluntary and involuntary part-time working males earn less than full-time employed, the wage gap is substantially higher for involuntary part-time workers compared to voluntary part-timers – 5 and 16 log percentage points respectively. Unlike females, most of the wage penalty is explained by the control variables. The comparison of the explained part of Models 1–4 indicates that for the involuntary part-time working males the most important factors accounting for the wage penalty are employer-side factors and differences in the effects captured with constant and year dummies.

The human capital variables, on the contrary, are of minor importance in explaining the wage penalty of part-time employees. For voluntary part-time working males, the variables used in the first two models would result in a small part-time premium. The differences in the employer-side factors (controls used in Model 3) and occupation (Model 4) are again disadvantageous to voluntary part-time employees compared to full-timers.

Once the non-random selection is taken into account, the explained wage gap of voluntary and involuntary part-time employed males diminishes and becomes insignificant for voluntary part-timers. Thus for the latter group the observable pay penalty is due to the large positive unexplained gap, that is, differences in the immeasurable characteristics and discrimination.

Table 7 The wage decompositions for involuntary and voluntary part-time employees: a broader definition of involuntary part-time work

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Males, involuntary part-time					
W_{ft}, EEK	24.88	24.88	24.88	24.88	24.88
W_{pt}, EEK	21.26	21.26	21.26	21.26	21.26
Wage gap	0.16	0.16	0.16	0.16	0.16
Selection					-0.02 (-13.4%)
Explained	0.06*** (39.9%)	0.08*** (48.4%)	0.15*** (94.1%)	0.17*** (109.9%)	0.13*** (84.6%)
Unexplained	0.09*** (60.1%)	0.08*** (51.6%)	0.01 (5.9%)	-0.02 (-9.9%)	0.05 (28.7%)
Males, voluntary part-time					
W_{ft}, EEK	24.88	24.88	24.88	24.88	24.88
W_{pt}, EEK	23.71	23.71	23.71	23.71	23.71
Wage gap	0.05	0.05	0.05	0.05	0.05
Selection					-0.13 (-279.4%)
Explained	-0.02* (-50.8%)	-0.01 (-25.1%)	0.02 (47.2%)	0.05*** (111.4%)	0.02 (32.6%)
Unexplained	0.07*** (150.8%)	0.06*** (125.1%)	0.03 (52.8%)	-0.01 (-11.4%)	0.17 (346.8%)
Female, involuntary part-time					
W_{ft}, EEK	20.58	20.58	20.58	20.58	20.58
W_{pt}, EEK	20.42	20.42	20.42	20.42	20.42
Wage gap	0.01	0.01	0.01	0.01	0.01
Selection					-0.22** (-2768%)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Explained	0.01* (150%)	0.03*** (331.5%)	0.09*** (1187.1%)	0.11*** (1440.5%)	0.08*** (966.8%)
Unexplained	0.00 (-50%)	-0.02* (-231.5%)	-0.08*** (-1087.1%)	-0.1*** (-1340.5%)	0.15 (1901.2%)
Female, voluntary part-time					
W_{ft}, EEK	20.58	20.58	20.58	20.58	20.58
W_{pt}, EEK	23.09	23.09	23.09	23.09	23.09
Wage gap	-0.12	-0.12	-0.12	-0.12	-0.12
Selection					0.03*** (24.7%)
Explained	-0.04*** (31.1%)	-0.03*** (24.9%)	-0.01 (9.7%)	0.01 (-10.7%)	-0.02 (-15.9%)
Unexplained	-0.08*** (68.9%)	-0.09*** (75.1%)	-0.1*** (90.3%)	-0.13*** (110.7%)	-0.13*** (-108.8%)

Note: * significant at 10%; ** significant at %; *** significant at 1 %.

5.3. Short versus long part-time working

As mentioned before, in the previous literature it has been found that marginal part-timers; that is, those who participate in the labour market only a few hours – typically 10 hours (Bardasi, Gornick 2008) or 12 hours (Tam, 1997, Hu and Tijdens, 2003) – form a particular segment of part-time workers. For instance, Tilly (1996) argued that short part-time work could be a form of involuntary part-time used by firms during business downturns in order to avoid firing their employees (Tilly, 1996). A few earlier studies have distinguished between short part-time and long part-time in wage decompositions; for instance, Hu and Tijdens (2003) found that the wage gap with full-timers could be smaller for employees on long part-time jobs compared short part-time jobs. Therefore, we replicated the analysis by distinguishing three groups of part-timers – those working 1) 21–34 hours (long part-time), 2) 5–10 hours (short part.-time) and 3) 5–9 hours.

As can be seen quite clearly from Table 8, the part-time wage penalty among males emerges among both groups working more than 10 hours, yet the gap is larger for short part-time jobs (the results are not reported for those working less than 10 hours due to the negligible number of observations in this group), while among females, wage gap is visible among those working up to 20 hours (and especially among marginal part-timers). For males most of the

wage gap is explained by the explanatory variables used in the analysis. However, the selection-corrected wage gap is extremely high for males working 25-30 hours (compared to full-time employed) probably due to the small sample size. For females, a small part-time penalty is observable for those working more than 20 hours, but according to the explained part this gap should be even higher taking into account the differences in measurable characteristics. For females working 10-20 hours or less than 10 hours, a part-time premium is observable, which increases after controlling for various other determinants of wages (i.e. part-timers being positively discriminated). Thus, in the case of both male and female part-timers, short part-timers are better off compared to long part-timers.

Table 8 Wage decompositions according to the degree of part-time working

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Males, 10-20 hours					
W_{ft}, EEK	24.88	24.88	24.88	24.88	24.88
W_{pt}, EEK	22.82	22.82	22.82	22.82	22.82
Wage gap	0.09	0.09	0.09	0.09	0.09
Selection					0.10 (112.7%)
Explained	0.00 (2.8%)	0.00 (4.4%)	0.06*** (67.1%)	0.09*** (100.9%)	0.03 (33.9%)
Unexplained	0.08*** (97.2%)	0.08*** (95.6%)	0.03* (32.9%)	0.00 (-0.9%)	-0.04 (-46.6%)
Males, 21-34					
W_{ft}, EEK	24.88	24.88	24.88	24.88	24.88
W_{pt}, EEK	21.1	21.1	21.1	21.1	21.1
Wage gap	0.16	0.16	0.16	0.16	0.16
Selection					-0.43* (-261.7%)
Explained	0.07*** (45.3%)	0.09*** (54.6%)	0.14*** (84.8%)	0.16*** (98.6%)	0.14*** (83.8%)
Unexplained	0.09*** (54.7%)	0.07*** (45.4%)	0.02 (15.2%)	0.00 (1.4%)	0.46 (277.9%)
Female, 5-9 hours					
W_{ft}, EEK	20.58	20.58	20.58	20.49	20.58
W_{pt}, EEK	21.21	21.21	21.21	21.21	26.4
Wage gap	-0.03	-0.25	-0.03	-0.03	-0.25
Selection					0.25*** (100.7%)
Explained	0.02 (70.1%)	-0.02 (-7.7%)	0.05*** (143.4%)	0.06** (163.9%)	0.04* (17.4%)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Unexplained	-0.27*** (-784.6%)	-0.23*** (-92.3%)	-0.08*** (-243.4%)	-0.11*** (-313.5%)	-0.54*** (-218.2%)
Female, 10-20 hours					
W_{ft}, EEK	20.58	20.58	20.58	20.58	20.58
W_{pt}, EEK	21.88	21.88	21.88	21.88	21.88
Wage gap	-0.06	-0.06	-0.06	-0.06	-0.06
Selection					-0.05 (-82.6%)
Explained	-0.03*** (42.4%)	-0.01 (12.6%)	0.04*** (-65.6%)	0.07*** (-112.9%)	0.03** (46.4%)
Unexplained	-0.04*** (57.6%)	-0.05*** (87.4%)	-0.1*** (165.6%)	-0.13*** (212.9%)	-0.04 (-63.9%)
Female, 21-34 hours					
W_{ft}, EEK	20.58	20.58	20.58	20.58	20.58
W_{pt}, EEK	20.52	20.52	20.52	20.52	20.52
Wage gap	0	0	0	0	0
Selection					-0.21 (-7090%)
Explained	0.03*** (991.1%)	0.03*** (1017.4%)	0.05*** (1788.3%)	0.06*** (2186.6%)	0.04*** (1217.8%)
Unexplained	-0.03** (-891.1%)	-0.03** (-917.4%)	-0.05*** (-1688.3%)	-0.06*** (-2086.6%)	0.17 (5972.2%)

Note: * significant at 10%; ** significant at %; *** significant at 1 %.

6. CONCLUSION AND DISCUSSION

In this paper we studied the wage gap between part-timers and full-timers using Estonian Labour Force Survey data from 1997–2007. The wage gap was estimated from wage regressions and decomposed using the Oaxaca-Blinder approach into the components due to the different characteristics of part-timers and full-timers, different returns on these characteristics between these two groups (i.e. the different parameters of the wage regressions) and the non-random selection between part-time and full-time employment. As explanatory variables of hourly wages and the choice between part-time and full-time employment, we used various individual-specific, human capital, firm-specific and occupational variables and household characteristics.

The results were quite different for males and females. Part-time working females earn more compared to full-time working females on an hourly basis in Estonia. The contrary is true for males. Therefore, quite interestingly and differently from the experience

of most developed countries, at first sight it may appear that gender segregation works in favour of females in the part-time/full-time wage gap dimension in Estonia; that is, females are segregated to higher-paid part-time jobs. However, the picture is more complicated than this.

The 'objective' wage gap, (i.e. the gap we should observe if we compare the part-time and full-time employed who have similar characteristics) is in favour of full-time employees for both genders. According to the results of the wage decomposition, both female and male part-time employees are 'worse' endowed compared to full-timers. In other words, part-time employees work relatively more often in sectors and companies and occupy positions where lower pro rata wages are paid. However, the individual-specific characteristics are much less important in explaining the wage gap because there are no stark differences in the structure of educational level, tenure, age and proportion of students between full-time and part-time employees. Therefore, the part-time wage premium for females remains a largely unexplained phenomenon in Estonia (at least in case of the the controls used in this analysis). The differences are lower than predicted by the model, indicating that 'discrimination' works in the opposite direction in Estonia, favouring part-timers not full-timers as found in most previous studies relying on the data of Western countries.

The most probable reason for this remarkable difference between Estonia and many of the EU-15 countries, Australia and the US is the differences in the standard of living. The monthly wages of part-time employees are low and to guarantee at least the minimal subsistence level, employers are forced to pay part-time female employees a somewhat larger rate, and part-time male employees comparable wages when compared to full-time workers. Otherwise, those people might not prefer to participate in the labour market at all. One bit of evidence that is contrary to this interpretation of the results is that if this explanation is true, then we should observe a larger part-time premium for the labour market segments with lower wages, such as in rural areas, those with lower levels of education, small firms etc. However, that is generally not the case (one exception is the ethnic dimension, whereby the female part-time premium is indeed higher for non-

Estonians). Yet another reason may be the higher productivity of part-time employees, which is not very likely because when accounting for the measurable differences, part-time employees should expect to receive lower wages. Yet it may be the case that our control variables are unable to capture the differences in productivity, such as the differences due to the nature of the work at hand. For instance, employers' preferences for part-time workers due to fluctuations in workload may explain the higher productivity of part-timers, yet that effect might not be captured by our broad sector dummies. One other possibility is the use of envelope wages (unreported income); if that is more common among part-timers, it is possible for them to have higher after-tax wages. It seems that it cannot explain much of the part-time wage premium given that the size of the premium and the frequency of unreported income do not vary in the same way; for example, there are higher part-time penalties in the public sector while unreported wages are primarily in the private sector (Antila and Ylöstalo, 2003). For certain groups of highly-paid occupational groups (professionals), one possible explanation could be the income effect; that is, in these groups relatively well-paid individuals may choose to work shorter hours. There could be something related to unionisation as well; that is, as we saw, there is a union wage premium for part-timers, but not full-timers in Estonia, yet the low overall level of unionisation in Estonia (less than 20%) limits the significance of this effect. The high unexplained wage gap in the case of males was also caused by the rather large selection effect (higher than observed in earlier studies, such as Hu and Tijdens, 2003), which might also be related to the appropriateness of our instruments (variables for family and children).

Another main message from our analysis is that voluntariness matters. Although voluntary part-time working males earn less than full-timers, the part-time penalty is much lower compared to the involuntary part-time/full-time wage gap. Without correcting for sample selection, the part-time penalty is an 'objective' phenomenon for both voluntary and involuntary part-time working males; that is, it is explained by the differences of human capital, employer-side and occupational differences. However, after taking selection into account, the (unexplained) pay-penalty for voluntary part-timers grows significantly above the level of involuntary part-

timers. While the higher wage penalty for voluntary part-timers could be explained by worker preferences for part-time jobs (and the respective stronger bargaining power of employers), the higher wage penalty of involuntary part-timers could be related to the difficulties of the firms employing these people; that is, in this case it would be ideal to compare people in the same enterprise. However, that is not possible with our data; matched employer-employee data could be beneficial in this respect. The wages of involuntarily part-time working and full-time working females are almost equal, whereas voluntary part-time working females earn considerably more compared to full-timers. Still, the factors behind the fact that there is a part-time premium especially for voluntary part-timers (and not so much in case of involuntary part-timers) remains largely unexplained by the explanatory variables used in this analysis. When taking into account the differences in job and worker characteristics, we should observe a part-time wage penalty for involuntary part-time employed females and no wage difference between voluntary part-timers and full-timers. To conclude, the labour market position is remarkably better for voluntary part-timers. This reflects motivational effects and results in the wage differences observed in reality. To better understand the reasons behind the anomaly, it would be helpful to incorporate qualitative research methods into the analysis. However, this will be left for future research.

Yet another interesting feature that appeared was the contra-cyclical nature of the part-time/full-time wage gap for females and the pro-cyclical movement of the wage gap for males. If this trend persists, we should observe a further increase in the part-time penalty for males and an increase in the premium for females in the period of economic downturn that Estonia faces at the moment. Whether this conclusion applies or other trends are prevalent is left for future research. On the other hand, the dynamics of wage gaps could also have been related to the general level of wage inequality in Estonia.

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Appendix 1 Definitions and summary statistics of variables used in descriptive tables and regression analysis

Variable	Definition	Males		Females	
		Mean	Std. Dev.	Mean	Std. Dev.
Basic education	Dummy, 1 if basic education	0.274	0.446	0.132	0.339
Secondary education	Dummy, 1 if secondary education	0.599	0.490	0.657	0.475
Higher education	Dummy, 1 if higher education	0.126	0.332	0.210	0.407
Tenure	Years with current employer	6.864	8.156	8.518	9.097
Tenure squared	Tenure squared	113.636	275.998	155.300	308.493
Primary sector	Dummy, 1 if employed in primary sector	0.086	0.281	0.043	0.203
Secondary sector	Dummy, 1 if employed in secondary sector	0.311	0.463	0.230	0.421
Service sector	Dummy, 1 if employed in tertiary sector	0.602	0.489	0.727	0.445
Legislators, senior officials and managers	Dummy, 1 if employed at occupation "Legislators, senior officials and managers"	0.098	0.298	0.078	0.268
Professionals	Dummy, 1 if employed at occupation "professionals"	0.070	0.255	0.181	0.385
Technicians and associate professionals	Dummy, 1 if employed at occupation "Technicians and associate professionals"	0.069	0.254	0.182	0.386
Clerks	Dummy, 1 if employed at occupation "Clerks"	0.026	0.159	0.074	0.262
Service workers and shop and market sales workers	Dummy, 1 if employed at occupation "Service workers and shop and market sales workers"	0.053	0.224	0.187	0.390
Skilled agricultural and fishery workers	Dummy, 1 if employed at occupation "Skilled agricultural and fishery workers"	0.017	0.130	0.020	0.139
Craft and related trade workers	Dummy, 1 if employed at occupation "Craft and related trade workers"	0.296	0.457	0.055	0.228
Plant and machine operators and assemblers	Dummy, 1 if employed at occupation "Plant and machine operators and assemblers"	0.258	0.437	0.087	0.282

Elementary occupations	Dummy, 1 if employed at elementary occupation	0.101	0.301	0.135	0.342
Blue-collar	Dummy, 1 employed in blue-collar occupation	0.733	0.442	0.485	0.500
White-Collar	Dummy, 1 employed in white-collar occupation	0.267	0.442	0.515	0.500
Estonian	Dummy, 1 if Estonian by nationality	0.714	0.452	0.736	0.441
Non-Estonian	Dummy, 1 if nationality other than Estonian	0.286	0.452	0.264	0.441
Northern Estonia	Dummy, 1 if works in Northern Estonia	0.275	0.446	0.272	0.445
Central Estonia	Dummy, 1 if works in Central Estonia	0.151	0.358	0.154	0.361
North-Eastern Estonia	Dummy, 1 if works in North-Eastern Estonia	0.133	0.339	0.118	0.323
Western Estonia	Dummy, 1 if works in Western Estonia	0.149	0.356	0.158	0.365
Southern Estonia	Dummy, 1 if works in Southern Estonia	0.293	0.455	0.297	0.457
Trade union	Dummy, 1 if member of trade union	0.094	0.292	0.145	0.352
1-10	Dummy, 1 if up to 10 employees at the firm	0.187	0.390	0.226	0.418
11-49	Dummy, 1 if 11-49 employees at the firm	0.416	0.493	0.402	0.490
50-199	Dummy, 1 if 50-199 employees at the firm	0.257	0.437	0.242	0.429
200-499	Dummy, 1 if 200-499 employees at the firm	0.069	0.253	0.077	0.266
More than 500	Dummy, 1 if more than 500 employees at the firm	0.071	0.257	0.053	0.225
State	Dummy, 1 if firm is owned by state	0.232	0.422	0.398	0.490
Private	Dummy, 1 if firm is owned by private owners	0.767	0.423	0.601	0.490
Domestic private	Dummy, 1 if firm is owned by domestic private owners	0.650	0.477	0.488	0.500
Foreign	Dummy, 1 if firm is owned by foreign owners	0.114	0.318	0.111	0.314
Moonlight	Dummy, 1 if respondent had more jobs beside the first job	0.046	0.210	0.052	0.222
No moonlight	Dummy, 1 if respondent did not have more jobs	0.954	0.210	0.948	0.222

	beside the first job				
With partner	Dummy, 1 if married or co-habiting	0.733	0.443	0.644	0.479
Children 0-3 years old	Number of children in household between 0 of and 3 years of age	0.135	0.376	0.072	0.272
Children 4-6 years old	Number of children in household between 4 and 6 years of age	0.107	0.335	0.101	0.320
Children 7-17 years old	Number of children in household between 7 and 17 years of age	0.563	0.860	0.608	0.840
Studies	Dummy, 1 if currently studying	0.035	0.183	0.049	0.216
Age	Age of the respondent in years	41.398	12.890	43.340	11.723
Part-time	Dummy, 1 if person works part-time	0.041	0.198	0.099	0.299
Hourly wage	Log of the gross wage divided by the number of hours worked and deflated by consumer price index	3.209	0.478	3.030	0.461
Number of observations		26,802		31,296	

Note. The questionnaires of the ELFS can be found at the homepage of Statistics Estonia (www.stat.ee).

Appendix 2 Probit model for the probability to work part-time

Variable	Males		Females	
	Coefficient	**Z-statistic**	**Coefficient**	**Z-statistic**
Secondary education	-0.185	(-3.19)***	-0.093	(-1.72)*
Higher education	-0.238	(-2.52)**	-0.057	(-0.81)
Estonian	0.159	(2.38)**	-0.002	(-0.03)
Central Estonia	-0.018	(-0.21)	0.035	(0.59)
North-Eastern Estonia	0.171	(1.91)*	-0.110	(-1.60)
Western Estonia	0.056	(0.69)	0.055	(0.95)
Southern Estonia	0.248	(3.77)***	0.196	(4.07)***
Professionals	0.869	(7.61)***	0.534	(6.31)***
Technicians and associate professionals	0.551	(4.69)***	0.515	(6.16)***
Clerks	0.503	(2.98)***	0.629	(6.57)***
Service workers and shop and market sales workers	0.360	(2.78)***	0.326	(3.78)***
Skilled agricultural and fishery workers	0.376	(1.92)*	0.012	(0.07)
Craft and related trade workers	0.172	(1.66)*	0.204	(1.63)
Plant and machine operators and assemblers	0.049	(0.45)	-0.070	(-0.55)
Elementary occupations	0.752	(6.73)***	0.964	(11.12)***
With partner	-0.294	(-4.46)***	0.022	(0.57)
Children 0-3 years old	0.082	(1.17)	0.397	(6.92)***
Children 4-6 years old	0.102	(1.30)	0.202	(3.82)***
Children 7-17 years old	-0.011	(-0.36)	0.087	(3.79)***
Studies	1.233	(12.15)***	0.570	(7.53)***
Age	-0.081	(-6.76)***	-0.128	(-12.91)***
Age squared	0.001	(8.89)***	0.002	(15.05)***
Secondary sector	-0.343	(-3.47)***	-0.481	(-4.33)***
Service sector	-0.117	(-1.27)	0.049	(0.50)
Constant	0.322	(1.18)	1.539	(6.08)***
Number of observations	3712.000		6013.000	
Log likelihood	-1826.335		-3514.118	
Pseudo R-squared	0.190		0.156	

Appendix 3 Selected regression results with full set of control variables, males and females

Variable	Male, part-time		Male, full-time		Female, part-time		Female, full-time	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
Secondary education	0.059	(1.87)*	0.046	(7.72)***	0.027	(1.57)	0.049	(8.33)***
Higher education	0.205	(4.29)***	0.131	(13.73)***	0.162	(7.16)***	0.245	(32.88)***
Tenure	0.007	(1.88)*	0.005	(6.85)***	0.007	(3.37)***	0.005	(8.66)***
Tenure squared	-0.000	(-0.85)	-0.000	(-4.32)***	-0.000	(-2.16)**	-0.000	(-5.23)***
Secondary sector	0.165	(2.93)***	0.076	(7.28)***	0.079	(1.90)*	0.044	(3.36)***
Service sector	0.066	(1.44)	0.141	(15.50)***	-0.005	(-0.16)	0.076	(6.57)***
Estonian	0.171	(4.68)***	0.111	(17.77)***	0.006	(0.35)	0.122	(24.82)***
Central Estonia	-0.108	(-2.57)**	-0.146	(-20.15)***	-0.084	(-4.12)***	-0.124	(-20.70)***
North-Eastern Estonia	-0.021	(-0.41)	-0.228	(-28.16)***	-0.211	(-8.11)***	-0.233	(-35.43)***
Western Estonia	-0.142	(-3.69)***	-0.163	(-22.36)***	-0.098	(-4.94)***	-0.156	(-25.98)***
Southern Estonia	-0.129	(-3.77)***	-0.140	(-19.99)***	-0.133	(-7.56)***	-0.136	(-24.38)***
Trade union	0.167	(3.66)***	0.076	(9.21)***	0.126	(6.29)***	0.007	(1.23)
11-49	0.092	(3.25)***	0.071	(11.79)***	0.038	(2.57)**	0.067	(13.71)***
50-199	0.110	(3.06)***	0.121	(17.85)***	0.050	(2.57)**	0.119	(21.31)***
200-499	0.090	(1.55)	0.154	(15.42)***	0.036	(1.12)	0.147	(18.91)***
More than 500	0.314	(4.92)***	0.193	(17.82)***	0.081	(2.09)**	0.144	(15.51)***
Foreign	-0.018	(-0.30)	0.083	(11.68)***	0.120	(4.54)***	0.091	(14.57)***

Variable	Male, part-time		Male, full-time		Female, part-time		Female, full-time	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
State	0.002	(0.08)	-0.009	(-1.41)	-0.035	(-2.31)**	-0.057	(-11.82)***
Age	-0.004	(-0.43)	0.001	(0.58)	0.001	(0.17)	0.001	(0.49)
Age squared	-0.000	(-0.05)	-0.000	(-1.11)	-0.000	(-1.01)	-0.000	(-1.32)
Studies	0.022	(0.23)	0.220	(7.80)***	-0.013	(-0.44)	0.119	(10.43)***
Professionals	0.060	(0.68)	0.064	(3.61)***	0.172	(4.29)***	-0.003	(-0.32)
Technicians and associate professionals	-0.009	(-0.12)	-0.038	(-2.87)***	-0.085	(-2.19)**	-0.098	(-10.85)***
Clerks	0.023	(0.25)	-0.083	(-5.02)***	-0.209	(-4.92)***	-0.203	(-18.25)***
Service workers and shop and market sales workers	-0.073	(-1.02)	-0.259	(-20.39)***	-0.246	(-6.57)***	-0.368	(-44.57)***
Skilled agricultural and fishery workers	-0.098	(-0.94)	-0.115	(-5.84)***	-0.171	(-2.52)**	-0.243	(-14.28)***
Craft and related trade workers	-0.124	(-2.19)**	-0.178	(-21.07)***	-0.191	(-3.37)***	-0.265	(-24.96)***
Plant and machine operators and assemblers	-0.088	(-1.50)	-0.220	(-26.49)***	-0.293	(-4.64)***	-0.301	(-31.42)***
Elementary occupations	-0.208	(-2.56)**	-0.294	(-18.14)***	-0.353	(-7.72)***	-0.403	(-29.25)***
Inverse Mills ratio	0.032	(0.28)	0.353	(10.35)***	-0.107	(-1.86)*	0.129	(6.69)***

Variable	Male, part-time		Male, full-time		Female, part-time		Female, full-time	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
Constant	3.163	(21.54)***	2.995	(63.25)***	3.049	(34.99)***	2.772	(59.80)***
Number of observations	1098.000		25704.000		3104.000		28192.000	
R squared	0.465		0.494		0.560		0.586	

Note. Year dummies are included in all estimations, but are not reported.

KOKKUVÕTE

Osa- ja täisajaga töötajate palgalõhe Kesk- ja Ida-Euroopas Eesti näitel

Erinevalt paljudest Lääne-Euroopa riikidest, USAst, Austraalist ja Kanadast ei ole seni osa- ja täisajaga töötajate palgalõhet Kesk- ja Ida-Euroopa riikides analüüsitud. Samas, võttes arvesse kõrget palkade ebavõrdsuse taset, oleks selline analüüs vajalik ning annaks olulist informatsiooni tööturu toimimise kohta. Käesolevas artiklis uuritakse osa- ja täisajaga töötajate palgalõhet Eestis, tuginedes Eesti tööjõu-uuringute andmetele aastatest 1997-2007 ning kasutades Heckmani selektsioonimudelit ja Oxaca-Blinderi dekomponeerimist.

Kohandamata palgalõhe on soo lõikes erinev. Meestel on palgalõhe tunduvalt protsüklilisem kui naistel. Osaajaga töötavate naiste tunnipalk on kogu vaadeldava perioodi jooksul olnud kõrgem kui täisajaga töötajatel. Suurim oli osaajaga töötamise palgapreemia 2000. aastal, mil töötus oli riigis kõrgeim. Seevastu meestel on osaajaga töötamise preemia täheldatav vaid aastatel 1998-1999, Vene kriisi ajal. Alates 2000. aastast on täiajaga töötavate meeste tunnipalk ületanud osaajaga töötajate palka, kusjuures kiire majanduskasvu perioodil palgalõhe kasvas.

Õkonomeetrilise analüüsi kohaselt tuleneb suur osa meeste palgalõhest erinevustest osa- ja täisajaga hõivatute töökohaspetsiifilistes muutujates ja ametialas. Seevastu inimkapitali erinevused selgitavad palgalõhest vaid tagasihoidliku osa. Naistel, vastupidi, tuleneb täheldatav palgapreemia mittevaadeldavast heterogeensusest, st analüüsis kasutatud andmetele tuginedes peaksid osasaajaga töötavad naised teenima täisealistest vähem, kuna nende inimkapitali tase on madalam, nad töötavad sagedamini madalama kvalifikatsiooniga ametikohtadel ja tööandjate juures, kes maksavad madalamaid palkasid.

Tulemused viitavad selgelt, et osaajaga töötamise vabatahtlikkus on Eestis ka palgadimensioonist lähtudes oluline. Vabatahtlikult

osaajaga töötajad on võrreldes mittevabatahtlikega tööturul märksa soodsamal positsioonil. Kuigi nii vabatahtlikult kui mittevabatahtlikult osaajaga töötavad mehed teenivad tunnipalgana vähem kui täisajaga töötajad, on esimeste palgalõhe märksa madalam (vastavalt 5 ja 16 protsendipunkti). Naistel seevastu erinevad täis- ja osaajaga töötajate palgad vaid vabatahtlikult osaajaga hõivatutel (osaajaga töötamise palgapreemia on 12 protsendipunkti), mittevabatahtlikult osaajaga hõivatute ja täisajaga töötajate palgad on praktiliselt võrdne.