REASONS FOR LOW PART-TIME EMPLOYMENT IN EASTERN EUROPE – ANY ROLE FOR LOW WAGES?

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Abstract

Many Eastern European countries are characterized by high wage inequalities and a relatively low proportion of labour force being employed on a part-time basis, yet there seem not be so far made any studies on the part time pay penalty. In this article we analyse whether there are any differences in the average wages of part-time and full-time employed in Estonia, a small Eastern European catching up economy. We use Estonian Labour Force Survey data from years 1997-2007; the part time wage gap is estimated by using Oaxaca-Blinder wage decompositions and propensity score matching. The results are quite different for males and females. For females the raw wage gap is in favour of part-timers. After taking into account various worker characteristics, the wage gap becomes even larger. For males the full-time raw premium exists, but it is to a large extent explained by the different labour market characteristics.

Keywords: part-time work, pay-gap, Eastern Europe

1. Introduction

The incidence of part-time work has considerably increased in most developed countries in the past decades. There are several supply-side factors that have contributed to this tendency, most importantly the increase of the labour market participation of the females and the lengthening of the studying period of the youth. However, from the demand side, the structural changes that have occurred – most importantly the growth of the service sector - have favoured the triumph of the part-time work. Despite the increase in part-time work, in most developed countries part-time workers earn less than full-time employed.

It is *expressis verbis* declared in the Republic of Estonia Employment Contracts Act that part-time workers shall not be treated in a less favourable manner in an employment relationship than comparable full-time workers[2] unless different

[2] Comparable full-time worker means an employee working for the same employer, who is engaged in the same or a similar work, due regard being given to other considerations which

treatment is justified on objective grounds arising from the law or collective agreement[3]. Moreover, an employer shall notify the representatives of the employees and a full-time worker in good time of the opportunity for part-time work and a part-time worker of the opportunity to work for full-time, considering the qualification and skills of the worker. To conclude, institutional framework in Estonia is fully in accordance with European Council Directive 97/81/EC of 15th December, 1997 concerning the Framework Agreement on part-time work concluded by UNICE, CEEP and ETUC ("Part-Time Directive") which is aimed to remove all forms of discrimination against part-time workers and facilitate the development of part-time and other flexible working arrangements. The aim of this study is to explore whether part-time workers are in unfavourable labour market position compared to full-time employed despite the equal treatment provisions stipulated in law and which demand and supply side factors explain the differences.

Our study contributes to the existing literature in several directions. Firstly, although in developed countries full-time/part-time wage differences is a deeply surveyed topic, in Central and Eastern Europe (hereinafter also CEE) countries there exist to our knowledge no similar studies. It is interesting to analyze Estonia for various reasons. Estonia, as well as other Baltic States, is characterized by one of the highest wage inequalities among the European Union countries, in 2002 the value of the 9th to 1st decile exceeded 4.5, while in most EU countries that was from 3 to 3.5 (Employment in Europe 2005). That is in part caused by the institutional setting of the labour market like low minimum wages, low density of unions, low coverage of collective agreements. In such conditions, also the wage gaps between particular labour market groups (e.g. part-timers and full-timers) can be considerable. The earlier studies have, for instance, documented in the Estonian labour market large gender wage gap (see Rõõm and Kallaste 2005) and gap between the earnings of Estonians and Russians (Leping and Toomet 2008).

We use for our analysis the data from the Estonian Labour Force Surveys from years 1997-2007. The dataset is of fairly high quality and has been used in several internationally published studies. The data enables us to use both individual and firm specific information as explanatory variables. Moreover, the long time period covered – 1997-2007 – enables us to analyze the developments in time. Although the Estonian results are not one-to-one transferable to other CEE countries, this is a first attempt to map the situation in those countries.

We use different econometric methods to analyze the wage gap between part-time and full-time employed. As it is the tradition in this literature, the wage gap is decomposed using the Oaxaca-Blinder decompositions into the part explained by the differences in various labour market characteristics of part-time and full-time

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may include qualification and skills of the employee. Where there is no comparable full-time worker employed at the same employer, the comparison shall be made by reference to the applicable collective agreement.
[3] Where there is no collective agreement, a worker engaged in the same or similar work in the same region shall be deemed to be a comparable full-time worker.

employees, and the unexplained part. In addition to more traditional quantitative approaches the propensity score matching is employed. The comparison of the results of the different methods enables us to do more complex implications about the question in hand.

The rest of the paper is structured as follows. Section 2 gives a short overview of the existing literature on part-time/full-time wage gap and the possible explanations grounding wage differences. Section 3 presents the data and section 4 methods used. In section 5 we present the results of the empirical analysis. The last section concludes.

2. Literature Review

In many countries the raw pay gap between part-time and full-time employed is substantial. On adjusted basis (i.e. when taking into account *ceteris paribus* condition) the differences are usually much more modest and in some cases do not exist (Aaronson, French (2004) for women in US; Rodgers (2004) for both men and women in Australia; Hardoy, Schone (2006) for women in Norway) or part-time wage premium is observed (Booth, Wood (2006) for Australia; O'Dorchai *et al.* (2007) for Denmark). However, when comparing the scope of the adjusted part-time/full-time wage gap in different countries, one should be cautious because differences in the definition of the part-time workers, variables used in analysis, group taken under observation (for example only married women) may make the comparison of results of the studies inadequate.

There are several explanations provided in the literature that explain the wage penalty of part-time workers. To conclude, as summarized by Hirsch (2005), three most important factors determining an equilibrium part-time/full-time wage gap are heterogeneous skills, worker differences in preferred hours and employer preferences in working hours.

Dual labour market theory. According to the dual labour market theory, "good" jobs which are characterized by high wages and bonuses are converged to the primary labour market while jobs in the secondary labour market jobs are low paid and provide few opportunities of self-development. The wage gap exists because part-time jobs are disproportionally more converged to the secondary and full-time jobs to the primary labour market, i.e. the full-time jobs are (compared to part-time jobs) proportionally more often found in the sectors, occupations, geographic areas, etc where higher wages and non-wage benefits are paid (it is so-called "objective" gap).

However, on the adjusted basis several objective reasons may ground the existence of the part-time pay gap. From the employers' side quasi-fixed costs and differences in productivity and accumulated human capital are often emphasized.

Existence of quasi-fixed costs. From the employers' view, the reason for the part-time wage penalty is often grounded by the existence of the quasi-fixed costs, i.e. costs that are proportional to the number of employed rather than hours worked (for

example hiring costs, training costs, administrative costs, monitoring costs, coordinating costs, etc). As in the "good" jobs (i.e. the jobs where wage and bonuses are higher) the hiring and training costs are higher, employers prefer to employ full-time rather than part-time person to the position to get the maximum benefit from the investments made (Montgomery 1988). According to Rosen (1976), in case the position is filled with part-time worker, the fixed costs would entail lower hourly wage *ceteris paribus*.

Lower productivity of the part-time workers. According to Barzel (1973), the productivity of the worker fluctuates during the working day: in the beginning of the day, the productivity is lower than daily average, and then starts to increase gradually. In the last hour of the working day the productivity of the full-time worker is higher than average. Therefore, if the length of the working day is shorter, the wage should be lower.

Lower accumulation of the on-the-job human capital. If the productivity of the worker is determined mainly by the on-the-job experience rather than working experience in general, the lower wages of the part-time workers are well grounded because with the same tenure in years of the particular job they acquire less human capital (and are therefore less productive) than full-time employed (Hirsch 2005; Blank 1998; Manning, Robinson 2004). Russo and Hassink (2008) have found the empirical rationale to the statement using the Dutch data: according to the results of the study, among youth the wages of the part-time and full-time employed are equal; however, for the elderly the substantial part-time wage gap exists.

Lower level of human capital. According to classical human capital theory, the level of individual's human capital is positively correlated with the potential wage; in turn, as individual's wage increases, he/she will increase the desired number of working hours in the labour market (presuming that leisure time is normal good).

The most important supply-side determinant causing part-time penalty pointed out in most studies is *segmentation of the labour market*. According to this theory there are several segments in the labour market that prefer part-time jobs to full-time jobs. Three groups most often found to have strong preferences toward part-time participation are women, youth and elderly. For women (especially if they have small children) the part-time working provides a good possibility to reconcile the work and family responsibilities. Youth prefer part-time work because it enables them to flexibly combine participation in the labour market with studying. Elderly prefer part-time jobs due to the health conditions: while it may be too strenuous for the elderly to work full-time, they do not want to entirely exit the labour market and part-time working gives them an opportunity to optimally adjust their needs with the constraints stemming from the bad health condition. As the aforementioned individuals have clear preferences regarding the timing of working, employers are in a better bargaining position when determining their wages and may therefore offer those segments lower wages *pro rata*.

Another supply-side factor emphasized is the *geographic segmentation*. According to Ermish and Wright (1993), the supply of part-time workers may have a geographic dimension because part-time workers are disproportionately less than full-time employed willing to pay commuting costs. Moreover, their labour supply is less elastic than full-time employed because for them it is much more convenient to combine the family responsibilities and participation in the labour market when employer is easily accessible from their home. In case the employer exercises the monopsony power in the local labour market, the profit maximization requires paying the part-timers a lower wage than full-timers as their bargaining position is more unfavourable.

There are also explanations provided to explain the part-time wage premium observed in several studies; one of these concerns *fluctuations in workload*. On the contrary to the compensation theory, when employers have preferences concerning the working time, employees are in the better bargaining position and may therefore demand higher wages *pro rata*. Therefore in sectors where certain fluctuations in demand (for example during the working day or seasonally) exist and employers hire additional part-time workers to better meet the needs of demand, part-time workers may have enough bargaining power to demand a higher hourly wages than full-time employed. To conclude, in the sectors where the timing of the workload is fluctuating (ie primarily certain service sector jobs, for example sales workers, tellers, etc) part-time employed are more productive because they do not spend some time of the working day idle. Therefore, their wage should be higher.

3. Data, variables and raw pay gap

The extent of the part-time employment has been relatively stable in Estonia in recent years. While it is comparable to the average of new member states (EU10), fluctuating between 6.5-8%, the figure is much lower than in EU15 (see Figure 1).
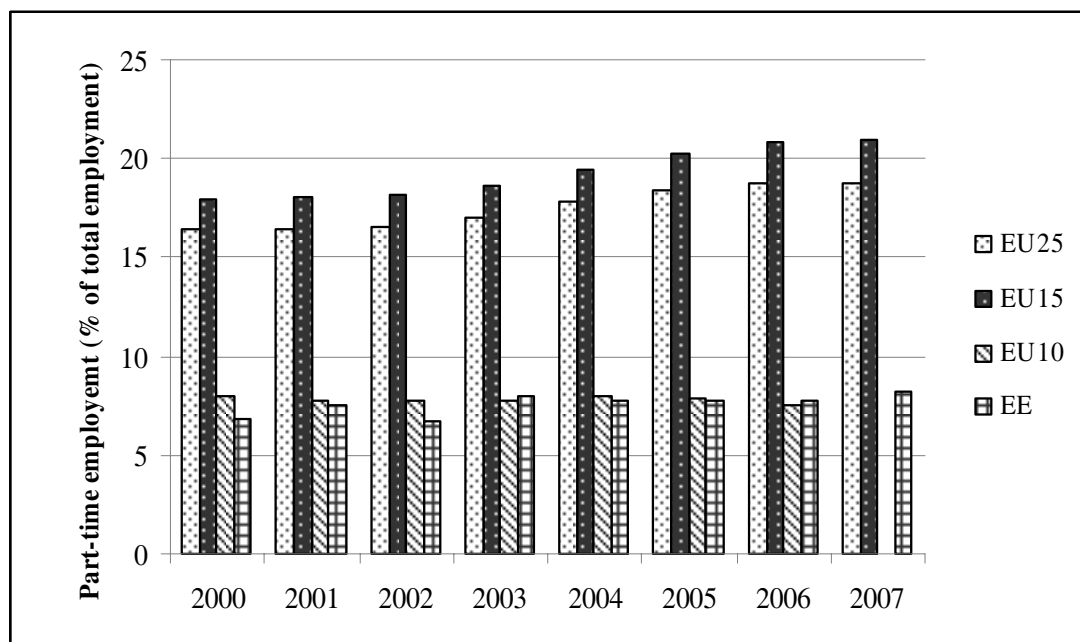

Figure 1. The extent of part-time employment in European Union. (Eurostat)

The general national standard for working time of employees is eight hours per day or forty hours per week in Estonia. According to Estonian Working and Rest Time Act, part-time working time is working time determined by an employer which is shorter than the established standard for working time and which is applied by agreement between an employee and the employer. Statistics Estonia defines part-time worker as employed person whose usual working time is lower than the comparable full-time employed. As the aforementioned definitions are too general and do not give any information how much shorter the working time should be, we follow the specification used by Statistics Estonia in Labour Force Survey (hereinafter *ELFS*) methodology: a part-time employee is an employed person whose usual working time per week is less than 35 hours.

However, there are several occupations provided in Working and Rest Time Act, whose full-time working hours are less than national standard:
- employees who perform underground work, work that poses a health hazard or work of a special nature - seven hours per day or thirty-five hours per week;
- teachers and educators working in schools and other child care institutions, and other persons working in the area of education, and psychologists and speech therapists working on the basis of employment contracts entered into with a provider of health care services - seven hours per day or thirty-five hours per week.

Our analysis is based on the Estonian Labour Force Survey (hereinafter also ELFS) data, which is a nationally representative random-sample panel survey of individuals. ELFS is appropriate for analysing the problem at hand as it contains information about working hours and pay in the main job as well as a rich set of other individual and job specific controls that are likely to affect wages. The first wave in 1995 was based on the 1989 census database and the later waves on the data from the population register. 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. Until 2000 the survey included also the retrospective data (questions on the past labour market experience) in addition to the data of the survey week.

ELFS contains a question "Why are you employed part-time". Those employed who report that in their job less than 35-hour working week is considered to be full-time employment, are defined as full-time rather than part-time employed in our study. As Figure 2 indicates, the proportions of the full-time and part-time according to our data and Eurostat overlap almost one-to-one, indicating that there are no major errors.
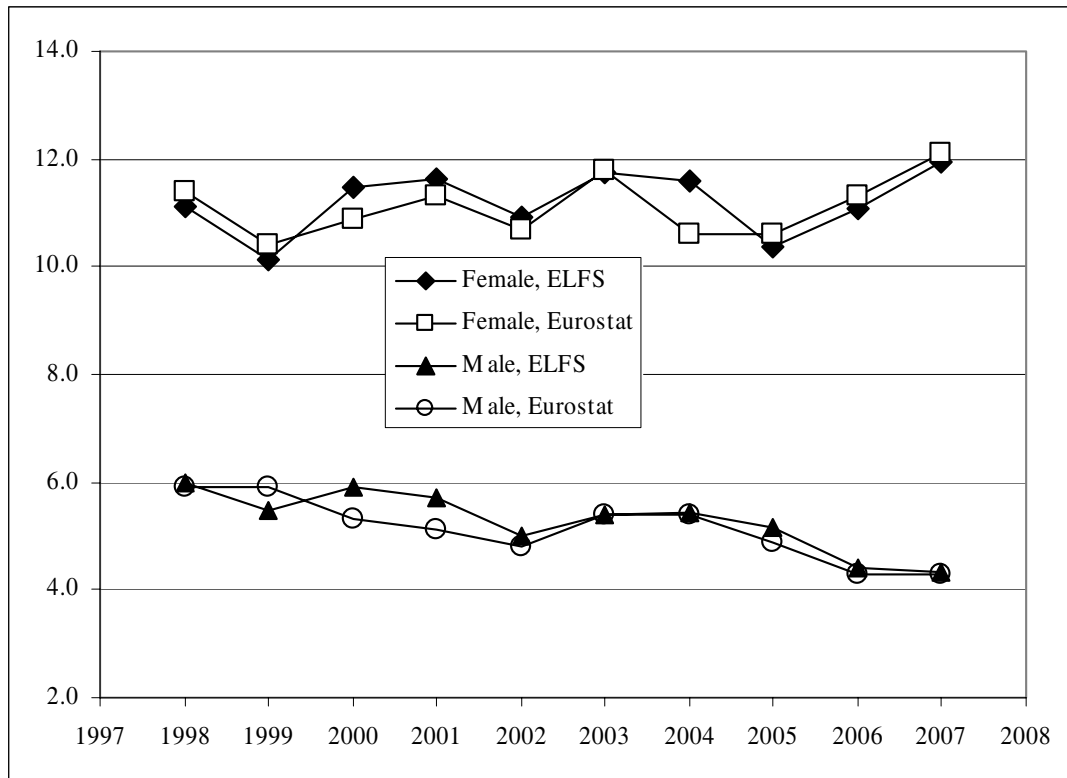
Figure 2. The proportion of part-time workers in Estonia according to ELFS and Eurostat data. (Own calculations based on Estonian LFS data and Eurostat)

The analysis covers the long time period: 1997-2007. In total there are 264,303 observations in the database, 12,585 part-time and 129,101 full-time employed. We estimate all models separately by gender as it is inappropriate to pool them given that the reasons for part-time employment differ between males and females. In our analysis we have used only the data on the survey week as only for the survey week it is possible to calculate the part-time status in the way that we have specified it above. As explanatory variables, we use different individual-specific and job-related characteristics.

The data describing the incidence of part-time employment indicates that the trends in Estonia are in line with the results of the other countries. Part-time work is much more popular among youth and elderly (when compared to middle-aged), in primary and tertiary sector (compared to secondary) and for those engaged with studies (compared to non-students). The number of small kids in the household motivates females to work part-time (especially in recent years) and males to work full-time. For the older children the effect is somewhat more modest for both genders. Unlike the results of the several studies, the comparison of the raw data does not strongly support the hypothesis that the marital status affects the females' decision to work part-time. However, cohabiting men tend to work full-time rather than part-time which indicates that in Estonia the men breadwinner tendency may hold. Somewhat interestingly, both men and women with primary and higher education tend to work part-time, while secondary educated are more frequently employed full-time.

The analysis of the raw wage gap indicates that for females there is on the hourly basis a part-time premium observable for the whole period in Estonia (see Figure 3). However, the scale of the wage gap has not been constant. In the beginning and in the end of the period under observation, the wages of the part-time and full-time employed females are almost equal, while in the middle of the period remarkable differences are observable. The part-time premium peaked in 2000 when the unemployment was at the highest levels due to structural changes in Estonian economy induced by Russian crisis.
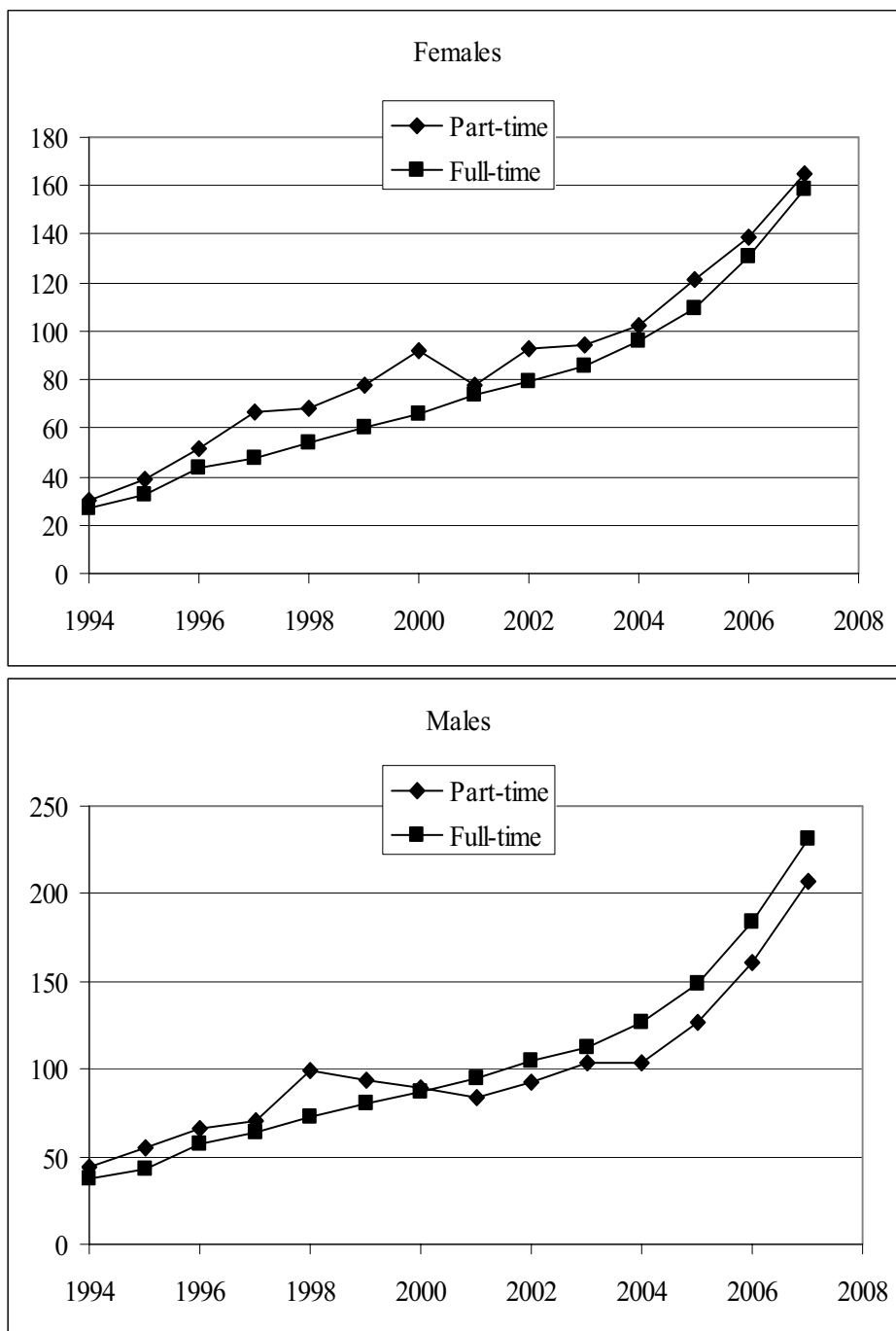

Figure 3. Average wages of part-time and full-time employed by gender in Estonia 1994-2007. (Own calculations based on Estonian LFS data)

On the contrary to females, for males the trend has turned over. In the beginning of the period, on the hourly basis only a modest part-time premium was observable. During the Russian crisis in the late nineties, a more substantial part-time premium appeared. The difference was the highest in 1998, when the extensive changes occurred in Estonian labour market. In 1999 the differences remained, but decreased to some extent. Year 2000, when the hourly wages of full-time and part-time employed males were almout identical, can be considered as a turning point. Since 2001 the males employed part-time have earned in absolute terms less than full-time employed. It is interesting to analyze whether the differences remain when we take into account *ceteris paribus* effect.

The information about wage gap by selected worker categories and gender are provided in Table 1. On unadjusted basis, for women in all education categories the substantial part-time premium occurs. For men, however, part-time premium is observable only for tertiary educated. The situation is similar when the comparison between different sectors is made: whereas for women in all sectors the gap exists and is especially large in tertiary sector, for men the same holds only for secondary sector, where the proportion of employed working part-time is the lowest. For white-collar females, the raw part-time premium is almost twice as high as for blue-collar workers. On the contrary, for white-collar males the part-time wage penalty is double of the level of the blue-collar workers. While the wages of the Estonians are higher than for non-Estonians, the part-time premium for the latter is much higher than for Estonians.

From demand-side indicators, we used in our analysis the size and ownership status of the enterprise. There appears to be two company categories (50-199 employed and more than 500 employed) where the substantial part-time premium is observable for both males and females. In other groups the premium is somewhat modest for females and part-time pay gap occurs for males.

In state-owned enterprises on the hourly basis both part-time working men and women are remunerated higher than full-time employed; for females, however, the effect is much more substantial than for males. For females, in private companies the part-time premium is smaller than in state-owned enterprises; for males in private-owned companies a part-time wage penalty occurs. The same results apply when wages by ownership status (domestic *versus* foreign-owned) are considered: for females part-time premium occurs in both categories; for foreign-owned enterprises the effect is smaller than in domestic companies. For males, in domestic companies the wages of the part-time and full-time employed are equal; in foreign-owned companies, however, a substantial part-time wage gap is observable.

Table 1. The wage gap by different worker categories (1997-2007, averages)

Variable	Females			Males		
	Proportion of part-timers	Wage gap	Wage of full-timers	Proportion of part-timers	Wage gap	Wage of full-timers
Basic education	15.0%	-18.9	53.4	7.3%	0.6	78.2
Secondary education	9.6%	-17.8	72.8	4.5%	-3.0	107.5
Higher education	12.6%	-16.9	118.4	6.2%	12.9	159.4
Primary sector	12.7%	-3.6	60.2	7.9%	8.0	71.4
Secondary sector	4.7%	-13.3	74.8	3.2%	-11.2	98.3
Service sector	12.9%	-17.7	81.7	6.0%	6.1	116.2
Legislators, senior officials and managers	4.6%	-13.6	114.9	2.4%	11.8	164.6
Professionals	14.5%	-29.5	109.9	12.5%	-7.5	140.9
Technicians and associate professionals	11.2%	-16.5	84.9	7.9%	9.9	120.7
Clerks	10.7%	-9.9	72.1	6.8%	14.3	113.7
Service workers and shop and market sales workers	9.9%	-27.6	60.0	6.4%	-4.6	85.8
Skilled agricultural and fishery workers	11.5%	-27.2	56.2	7.7%	4.8	73.1
Craft and related trade workers	5.2%	-5.2	62.4	4.1%	-13.3	100.7
Plant and machine operators and assemblers	2.3%	-19.1	75.2	3.5%	12.0	91.4
Elementary occupations	20.5%	-16.4	53.1	11.0%	1.9	68.7
Blue-collar	11.2%	-11.3	60.9	5.3%	3.9	91.1
White-collar	11.1%	-21.4	96.2	6.2%	7.6	144.3

Variable	Females			Males		
	Proportion of part-timers	Wage gap	Wage of full-timers	Proportion of part-timers	Wage gap	Wage of full-timers
Estonian	12.1%	-13.0	83.2	6.1%	4.5	109.8
Non-Estonian	8.3%	-34.9	67.6	4.0%	-1.4	97.1
Northern Estonia	11.3%	-24.2	99.9	4.9%	2.9	137.0
Central Estonia	10.5%	-15.5	72.0	5.2%	-26.9	88.9
North-Eastern Estonia	7.5%	-23.2	60.3	4.5%	-38.3	85.4
Western Estonia	11.4%	-13.1	72.1	6.1%	20.4	93.6
Southern Estonia	12.7%	-13.2	73.8	6.6%	6.6	91.0
Trade union	9.5%	-45.3	95.6	3.8%	-18.0	119.8
1-10	16.2%	-19.5	70.6	9.5%	6.8	94.5
11-49	11.1%	-18.0	79.8	4.5%	8.0	106.8
50-199	8.3%	-25.5	84.0	3.5%	-20.8	105.3
200-499	5.4%	-7.7	80.5	3.1%	1.9	111.9
More than 500	5.2%	-24.2	79.9	4.1%	-22.8	111.2
State firm	12.5%	-20.7	80.2	7.9%	-8.3	101.2
Private firm	10.4%	-15.8	78.1	4.9%	7.5	107.7
Domestic private firm	11.2%	-20.2	72.3	5.4%	0.9	98.4
Foreign firm	5.6%	-15.9	107.0	1.7%	17.7	162.5
All observations	11.1%	-18.5	78.9	5.5%	2.6	106.3

4. Econometric methods

To estimate the wage differences between part-time and full-time employed we use two econometric approaches: direct method and propensity score matching. According to direct method, separate wage equations are estimated for part-time and full-time employed (Bardasi and Gornick 2000):

(1) $\qquad \log\left(w_{pt}\right) = X'_{pt}\beta_{pt} + \varepsilon_{pt}$,

(2) $\qquad \log\left(w_{ft}\right) = X'_{ft}\beta_{ft} + \varepsilon_{ft}$,

where w_{pt} ja w_{ft} are (gross) wages of the part-time and full-time employed, respectively; X_{pt} ja X_{ft} are vectors of explanatory variables in the regression equations for the part-time and full-time persons, respectively; β_{pt} ja β_{ft} are vectors of the estimated parameters of the part-time and full-time wage equations, respectively; ε_{pt} ja ε_{ft} are the error terms of the part-time and full-time wage equations, respectively (normally distributed, with mean zero and standard deviations σ_{pt} and σ_{ft}).

Usually ordinary least squares method with White (1980) standard error correction is used to estimate the parameters of the equations (1) and (2). However, due to the research problem it is quite likely that there exists the problem of selection (because people select into part-time/full-time employment status non-randomly). Therefore, is several studies (for example Hardoy, Schone 2006) Heckman (1979) two-step estimation strategy is used to estimate the parameters of the wage equations (1) and (2) (but not in this article). After estimating the parameters, Oaxaca (1973) and Blinder (1973) methods can be employed to decompose the wage differentials into price effects and characteristics effects (for further details, see O'Dorchai *et al.* 2007). In particular, the wage gap can be decomposed into two parts:

(3) $\qquad \overline{\log\left(w_{ft}\right)} - \overline{\log\left(w_{pt}\right)} = \left(\overline{X_{ft}} - \overline{X_{pt}}\right)\beta_{ft} + \overline{X_{pt}}\left(\beta_{ft} - \beta_{pt}\right)$,

where $\overline{\log(w)}$ is the average log hourly gross wage and $\overline{X}$ is the vector of the mean values of explanatory variables. The first part in the right hand side of the regression equation describes the explained part of the wage gap, i.e. the part of the wage gap that is due to the differences in observable characteristics between part-timers and full-timers; that is also called "endowment effect". The second term is the part of the wage gap that is caused by the differences in returns to observable characteristics; the term is often referred to as the price effect. Although it is often considered as the discrimination component, it also includes all potential effects in differences due to unobserved variables (Jann 2008). One decision to be made in case of the wage decomposition is the choice of the reference category (the category for which no discrimination occurs, Jann 2008). Though sometimes the full-time category is used in this place, in principle the part-time pay gap can be both positive and negative as we discussed earlier, so other options would be more appropriate, like using the coefficients from pooled regressions over both groups with the part-time. In our calculations we used the Oaxaca command for Stata developed by Jann

(2008); at the place of the reference coefficients the coefficients from the pooled model over both samples were used with pooled model containing a group membership indicator (i.e. the part-time dummy). In the explained part, also the contribution of each regression variable to the wage gap can be distinguished.

In addition to traditional econometric methods, we also use propensity score matching to estimate the wage gap between part-time and full-time employed. While initially used mainly in medicine to evaluate the treatment effects of the drugs, the scope of the application of propensity score matching (developed by Rosenbaum and Rubin, 1983) has widened substantially in past decade in economic studies, too. The general idea of the propensity score matching is to evaluate the treatment effects (in our case the "treatement" is the employment status: part-time *versus* full-time). Although according to the information available to authors, the method has not been used for analyzing part-time/full-time wage differentials so far, it has been employed to analyze gender wage differentials (Frölich 2007) and union-nonunion wage gap (Eren 2007).

In propensity score matching, it is assumed that following equation (known as conditional independence assumption, *CIA*) applies:

(4) $E\left(Y_0 \middle| D = 1, X\right) = E\left(Y_0 \middle| D = 0, X\right)$, i.e. $Y_0 \perp D \middle| X$,

where Y_0 denotes the outcome variable, X is the vector of the observable variables, D is the treatment (1 if part-time, 0 if full-time employed).

The main advantage of the propensity score matching lies in the fact that the method enables to correct the selection bias while not making any strict assumptions about the functional form between outcome and explanatory variables. However, like any other matching procedures, propensity score matching has a certain limitations that should be kept in mind when making conclusions. Most importantly, like any other matching methods, PSM cannot match unmeasured contextual variables that may be important when determining the selection into treatment and control group (i.e. remaining hidden bias may be substantial, especially in cases when the treatment and control group do not have a substantial overlap).

There are several matching algorithms available (for more detailed overview, please refer to Caliendo and Kopeinig 2005). Basically in applying each of them involves a trade-off between bias and variance. In nearest neighborhood (NN) matching, the matching partner for each treatment group member from the comparison group is chosen to have the most similar propensity score. There are several NN matching methods developed, e.g.
- 1-to-1 NN matching (in this case only one matching partner with closest propensity score is chosen for each treated) and 1-to-n NN matching (N matching partners are chosen for each treated, the distance is calculated as an average);
- with replacement (each control group member can be used more than once as a match) and without replacement (each untreated can be used as a match only once).

In addition to NN matching, in the current study we also employ non-parametric kernel-based matching approach. Unlike the most of other PSM methods, kernel matching use weighed averages of all control group individuals when constructing the counterfactual outcome. The main advantage of the method is the lower variance due to the larger amount of information used. The major possible drawback is the scope of the bias caused by the bad matches. For the implementation of the propensity score matching we used the program psmatch2 developed by Leuven and Sianesi (2003).

5. Part-time/full-time wage gap estimates
5.1. Direct method and Oaxaca-Blinder decompositions

We start the review of the econometric modeling results with Oaxaca-Blinder decomposition results. Naturally, all estimations have been made separately for men and women. The decompositions were made separately for different years as well as by taking different years together into 3 periods (1997-2000, 2001-2004, 2005-2007). This option was used also, because due to the relatively low frequency of part-time employment in Estonia there are not many part-timers in certain worker categories in a given year (e.g. among small firms, certain occupation, narrowly defined industry, etc.), thus parameter estimates could be become unstable and insignificant. Four different models were estimated, firstly only with constant term and year dummies (model 1), then with human capital variables (education, tenure at current job, model 2), additional controls like location, firm size, ownership dummies (model 3), and finally including also 9 occupational dummies (model 4). The list of control variables is based on earlier studies and is fairly standard. Due to the large number of different regressions estimated, we do not present the coefficients of all of these, but only for the model with the full set of control variables estimated on the sample where different years have been taken together (the parameters are not presented in the article, but are available from authors upon request). The parameters are mostly significant and with expected values, e.g. wages are higher in case of higher education, longer tenure, in capital area, larger firms, foreign owner firms, certain occupations. Differences between the parameters for full-timers and part-timers will be described below. For instance, previous evidence has shown that during part-time employment the accumulation of human capital is lower (i.e. there are very low returns to tenure). Although the returns to tenure are lower also among part-timers in our data, in Estonia especially in the beginning of transition tenure used to be relatively less important determinant of wages.

For females, the Figure 4 presents the decomposition results over years, while in Table 2 years have been aggregated into 3 periods. The results show that in all of the years and periods the observed wage-gap is negative, i.e. part-time employees earn more than the full-time employees; however, the wage gap is decreasing over time. The size of the gap varies from 20% to less than 5%. Part of the story could be either improved macroeconomic conditions that created labour shortage, thus the firms agree to higher part-time workers at relatively higher wages. Yet another explanation could be related to the introduction of the parental compensation since 2002 allowing one of the parents (usually, however, mothers use it) to stay at home for 15

months at the previous wage earned before parental leave, that may decrease labour supply at part-time positions during parental leave, however that would rather increase wage gap in favour of part-timers.
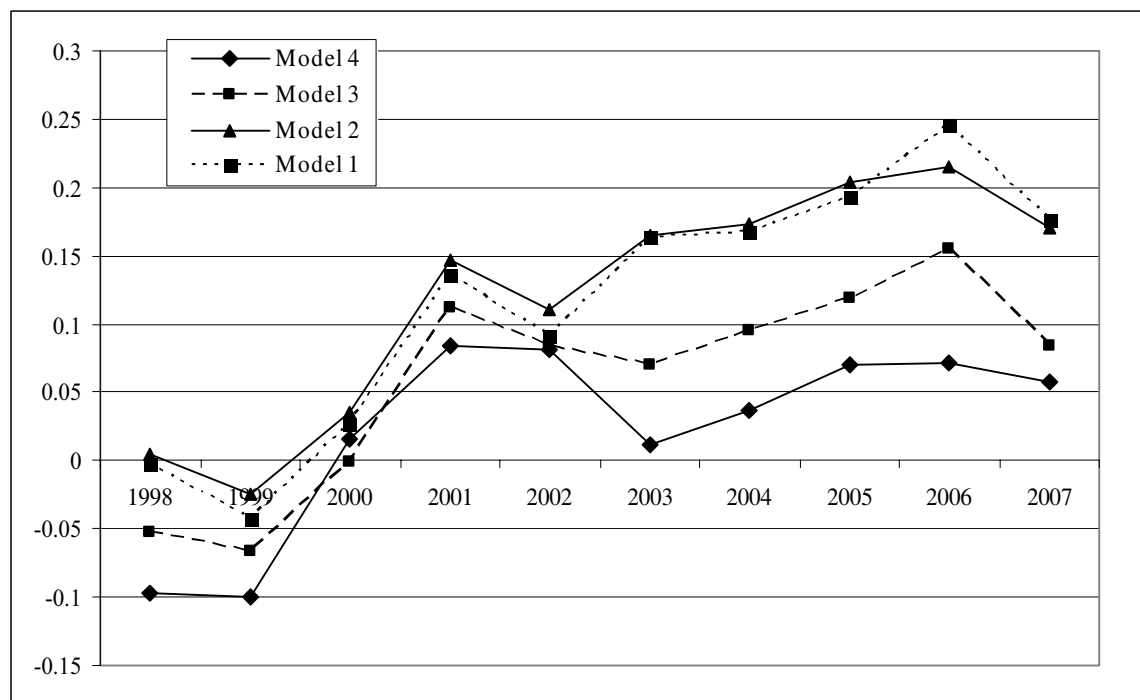
Note. The estimates are based on the Oaxaca-Blinder decompositions.
Figure 4. Unexplained wage gap in favour of full-time employees in case of females in Estonia.

As we can see, including more variables in the regression equation widens the wage gap, i.e. the unexplained wage gap is even larger when we control for various characteristics. Thus, part-timers are worse endowed regarding the characteristics controlled in the regressions, than the full-timers. For instance, relatively many of them have only basic education, or the proportion of part-timers is highest among the lowest-paying occupational group, elementary occupations. If we control for that worse endowment of part-timers, the wage gap thus increases.

The contribution of different factors to explaining the part-time wag gap is quite different, as we can see from Table 4. The most important ones are firm ownership, firm size and especially occupation, human capital variables are relatively unimportant. For instance as we saw, the percentage of part-timers is rather low in foreign owned firms, however these firms have on the average much higher wages. The wage-gap in favour of part-timers comes also from the occupational group "professionals" (that has the 2nd highest proportion of part-timers and in each period wage gap in favour of part-timers). Quite important indicator is the firm size – the proportion of part-timers is much higher among small firms (especially those with less than 50 employees) that have lower pay among full-timers. However, these are also the groups that have higher wages among part-timers while among the large firms the difference is much smaller. From here it is clear why controlling for firm-size has widened the gap in favour of part-timers – especially in conditions where

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full-time employees have lower pay part-timers earn relatively more. The explanations for the lower pay among smaller firms is explained e.g. by the costs of employee monitoring, capital-skill complementarity and the complementarity between labour skills and advanced technology capital (Troske 1994). Concerning different sectors, part-timers are more often employed in the following industries: education, real estate, renting and business activities (i.e. part of business services), and other industries. Among these three, the positive wage gap in favour of part-timers is the largest in education.

Table 2. Estimated wage gaps and Oaxaca-Blinder decomposition, by periods, female

Year	Variable	Model 1	Model 2	Model 3	Model 4
Years together	Full-time	4.39	4.39	4.39	4.39
	Part-time	4.43	4.43	4.43	4.43
	Wage gap	-0.04	-0.04	-0.05	-0.05
	Explained	0	0.01	0.02***	0.05***
	Unexplained	-0.04***	-0.05***	-0.07***	-0.1***
19972000	Full-time	3.9	3.9	3.91	3.91
	Part-time	3.95	3.95	3.95	3.95
	Wage gap	-0.05	-0.05	-0.05	-0.05
	Explained	0	-0.01	0	0.05***
	Unexplained	-0.05**	-0.04	-0.05**	-0.1***
20002004	Full-time	4.21	4.21	4.21	4.21
	Part-time	4.28	4.28	4.28	4.28
	Wage gap	-0.07	-0.07	-0.07	-0.07
	Explained	0	0	0.01	0.03***
	Unexplained	-0.08***	-0.07***	-0.08***	-0.1***
20032007	Full-time	4.73	4.73	4.73	4.73
	Part-time	4.75	4.75	4.76	4.76
	Wage gap	-0.02	-0.02	-0.03	-0.03
	Explained	-0.01	0.01*	0.03***	0.06***
	Unexplained	-0.01	-0.03***	-0.06***	-0.1***
Year dummies		X	X	X	X
Human capital			X	X	X
Other controls				X	X
Occupation					X

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

For males the picture is rather different (see Table 3 and Figure 5). In case of males, the wage gap is negative till 2000, and positive thereafter (meaning that full-time employees earn more); the magnitude of the gap is up to 25 percent (in 2006). Some pro-cyclical pattern can be noticed in the wage gap – the wage gap was growing during 2004-2006, the period of strong macroeconomic growth, while much smaller

in 1999 (the time of the economic downturn caused by the Russian crises) and decreased also in 2007, when the economic growth started to decelerate. The explanation could be that during the times of strong growth there was a labour shortage, so employers rather may have preferred to employ workers on the full time basis. On the other hand, concerning economic downturns, there is some anecdotal evidence that people previously working full-time and being moved to part-time basis start earning somewhat higher hourly wages.

Table 3. Estimated wage gaps and Oaxaca-Blinder decomposition, by periods, males

Year	Wage variable	Model 1	Model 2	Model 3	Model 4
Years together	Full-time	4.65	4.65	4.63	4.63
	Part-time	4.42	4.42	4.42	4.42
	Wage gap	0.23	0.23	0.21	0.21
	Explained	0.05***	0.07***	0.09***	0.14***
	Unexplained	0.17***	0.16***	0.11***	0.07***
19972000	Full-time	4.16	4.16	4.16	4.16
	Part-time	4.06	4.06	4.06	4.06
	Wage gap	0.1	0.1	0.1	0.1
	Explained	0	0	0.04*	0.09***
	Unexplained	0.1**	0.1**	0.06)	0.01
20002004	Full-time	4.44	4.44	4.43	4.43
	Part-time	4.26	4.26	4.26	4.26
	Wage gap	0.18	0.18	0.17	0.17
	Explained	0.01	0.03***	0.05***	0.08***
	Unexplained	0.17***	0.15***	0.12***	0.09***
20032007	Full-time	5.03	5.03	5.01	5.01
	Part-time	4.8	4.8	4.81	4.81
	Wage gap	0.23	0.23	0.2	0.2
	Explained	0.01	0.03**	0.05***	0.12***
	Unexplained	0.22***	0.2***	0.15***	0.08***
Year dummies		X	X	X	X
Human capital			X	X	X
Other controls				X	X
Occupation					X
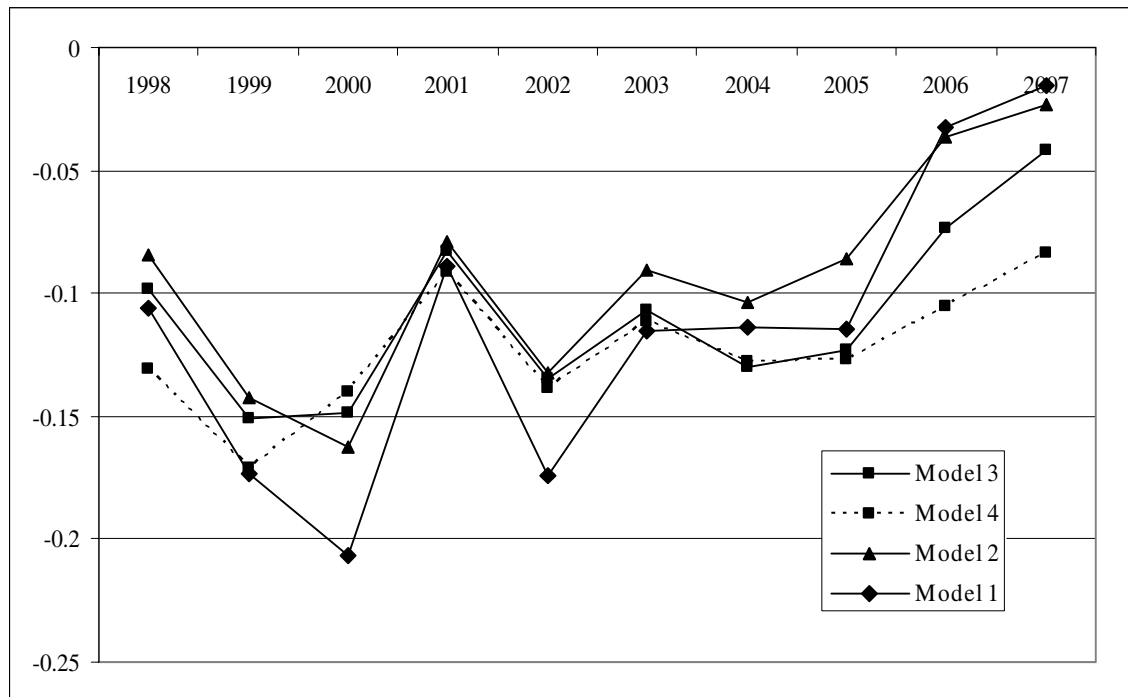
Note. The estimates are based on the Oaxaca-Blinder decompositions.
Figure 5. Unexplained wage gap in favour of full-time employees for males in Estonia.

Concerning the importance of different factors (see Table 4), as we can see, human capital variables explain almost nothing of the part-time pay gap. One reason could be that as we saw also from the descriptive tables, among part-timers there are a relatively higher proportion of people with either primary or higher education, while among full-time employees there are a higher proportion of people with secondary education. When the model is extended with other controls, the explained part of the wage gap increases to about 70% of the total gap that is more similar to earlier studies. In align with earlier studies, occupation is rather important – adding the dummies for 9 occupational categories increases the explained share of wage gap almost twice (up to 60-70%). Concerning different years, the wage gap was negative until 2000 (i.e. part-time employees earned more till that time), and positive thereafter. The story then seems to be that male working part-time are occupied in positions with generally lower pay; differently, the within occupational group wage gap is significantly smaller than the overall wage gap. The descriptive data shows that the proportion of part-timers is only slightly higher at white-collar occupations relative to blue-collar occupations (during 2004-2006 6% versus 4.5%); however, closer look reveals that they are quite overrepresented among elementary occupations, that have the lowest wage in the white-collar group. In terms of firm size, part-timers are more frequently employed in smaller firms that have lower pay among full-timers. Concerning industries, the most frequent industries are somewhat different, these are education, hotels and restaurants and other. The results on the detailed decomposition results indicate that the factors most important for explaining the part-time wage gap are similar to those observed in case of females, namely firm

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size, firm ownership, occupation, reflecting that part-timers work more often in smaller firms, domestic firms and occupations like, where pay is usually lower.

Table 4. The importance of different factors in accounting for part-time pay penalty or premium as percentage of the explained wage gap

Year	Variable	Model 4, females	Model 4, males
Years together	Explained	0.1	0.1
	Education	-2.2	5
	Tenure	9.7	4.5
	Sector	0.3	-2.1
	Region	-10.5	1.7
	Firm size	**36.9**	**20.7**
	Firm owner	**26.7**	**15.1**
	Occupation	**51.1**	**31.3**
	Nationality	-16.7	-9.1
	Union membership	0.7	0.9
	Year dummies	4.1	31.9

What could be the reasons for the part-time wage penalty being positive in case of men and negative in case of female? Russo and Hassink (2008) explained that in case of Netherlands with either men being more permanently earned on part-time basis and women switching between part-time and full time employment, and secondly, by the part-time employment being used more often in case of men as a screening device (e.g. to decide about promotions).

5.2. Propensity Score Matching

When applying the propensity score matching to analyse part-time/full-time wage gap in Estonia, following approach was used for each year and males/females separately. Firstly, the propensity score for each person was found using the probit model. Due to the small sample size, it is highly likely that the results are sensitive to the matching procedure applied. Therefore three different matching algorithms were used: gaussian kernel, epanechnikov kernel (default in psmatch2 command for Stata with kernel matching) and nearest neighbourhood matching (5 nearest neighbours from the control group were used as matching partners).

For females (see Table 5), in all years similar to raw wage gaps the statistically significant part-time premium is observable on the adjusted basis. The scope of the differences, however, varies according to matching method used. However, the average treatment effects of the different methods are quite similar in most years, results found using epanechnikov kernel and NN matching are very close (except in 2007) and Gaussian kernel gives estimates for the ATT somewhat higher than the results found by applying the other two methods. The scope of the wage differences shows no clear trend; however during the Russian crisis the part-time premium was

higher than for the rest of the period. For most of the years we can see that similarly to the Oaxaca-Blinder decompositions, after considering various factors the wage gap becomes even more extensive.

Table 5. Unmatched and matched wage differences by different propensity score matching methods for females (t-statistics in parentheses)

Year	Unmatched wage difference	ATT for various matching algorithms		
		Kernel (Epanechnikov)	Kernel (Gaussian)	1-to-5 NN
1994	-3.1 (-2.36)	-5.0 (-2.75)	-3.8 (-1.60)	-4.9 (-2.47)
1995	-11.6 (-6.45)	-13.2 (-4.90)	-10.6 (-2.42)	-12.9 (-4.43)
1996	-6.75 (-2.16)	-8.7 (-2.23)	-7.8 (-1.70)	-8.7 (-2.08)
1997	-14.65 (-9.73)	-16.8 (-5.26)	-17.1 (-4.89)	-17.6 (-5.42)
1998	-11.8 (-9.95)	-13.1 (-6.10)	-13.4 (-5.28)	-12.3 (-5.52)
1999	-17.2 (-10.38)	-17.9 (-5.66)	-16.9 (-4.52)	-17.0 (-5.20)
2000	-26.1 (-10.58)	-23.2 (-4.62)	-19.8 (-3.58)	-21.3 (-4.16)
2001	-5.1 (-2.30)	-4.2 (-1.58)	-6.9 (-1.78)	-6.3 (-2.14)
2002	-13.8 (-5.29)	-11.4 (-2.91)	-13.8 (-5.29)	-10.5 (-2.52)
2003	-10.9 (-4.22)	-10.7 (-3.55)	-10.4 (-2.38)	-11.1 (-3.27)
2004	-8.1 (-2.96)	-8.6 (-2.81)	-6.1 (-1.22)	-8.2 (-2.36)
2005	-12.2 (-3.71)	-13.1 (-2.94)	-11.2 (-2.01)	-14.5 (-3.06)
2006	-9.8 (-2.86)	-15.8 (-3.79)	-22.3 (-3.98)	-17.0 (-3.61)
2007	-6.8 (-1.84)	-17.5 (-3.77)	-11.3 (-1.48)	-13.8 (-2.66)

As we can see from Table 6, for the first half of the period, the part-time premium is observable for males in Estonia. The scope of the premium shows no clear trend, fluctuating year to year. On the contrary, since 2001 in most years the part-time penalty is observable. However, the values of the t-statistics indicate that the differences between part-time and full-time working men are in most years not statistically significant, most likely due to the small sample size. In most cases the ATT is smaller than the raw pay gap. That is in accordance with out earlier decomposition results – part time wage gap tends to decrease significantly once the differences in the part-time and full-time employers are taken into account.

However, during the Russian crisis statistically significant part-time premium is observable for males. Possible reason for this tendency may lie in the fact that when due to the deteriorated economic conditions in the companies shortened working time was used (the same tendency is observable at the moment, i.e. 2008), the working hours of the employed were reduce more than the wage.

Table 6. Unmatched and matched wage differences by different propensity score matching methods (males; t-statistics in parentheses)

Year	Unmatched wage difference	ATT for various matching algorithms		
		Kernel (Epanechnikov)	Kernel (Gaussian)	1-to-5 NN
1994	-6.3 (-1.82)	-9.3 (-1.88)	-9.8 (-1.84)	-11.0 (-2.21)
1995	-12.5 (-3.48)	-15.0 (-1.71)	-9.7 (-1.03)	-14.0 (-1.60)
1996	-9.0 (-1.57)	-11.1 (-0.92)	-17.5 (-1.42)	-9.4 (-0.79)
1997	-7.4 (-2.79)	-9.6 (-2.26)	-5.4 (-0.83)	-9.8 (-2.12)
1998	-26.9 (-6.71)	-29.7 (-2.11)	-34.8 (-2.43)	-31.6 (-2.23)
1999	-12.8 (-4.49)	-16.8 (-3.46)	-15.7 (-2.62)	-16.4 (-3.24)
2000	-3.3 (-0.74)	-6.8 (-1.33)	-3.1 (-0.37)	-5.2 (-0.92)
2001	11.7 (2.31)	7.6 (1.43)	6.1 (0.78)	8.8 (1.59)
2002	7.0 (1.31)	9.4 (1.66)	15.4 (1.38)	10.1 (1.50)
2003	3.4 (0.56)	-4.2 (-0.42)	6.1 (0.53)	-7.7 (-0.74)
2004	23.0 (3.57)	13.6 (2.44)	9.0 (1.00)	6.9 (1.04)
2005	24.5 (2.85)	8.3 (0.93)	24.0 (1.90)	12.8 (1.24)
2006	22.7 (2.52)	3.5 (0.26)	-17.9 (-1.06)	-2.23 (-0.16)
2007	12.9 (1.30)	5.0 (0.40)	-1.6 (-0.10)	-6.6 (-0.50)

6. Conclusion

In this paper we studied the wage gap between the pay of part-timers and full-timers by using the Estonian Labour Force Survey data from years 1997-2007. The wage gap was firstly estimated from the wage regressions using Oaxaca-Blinder decompositions and thereafter and propensity score matching technique. As explanatory variables, we used various human capital variables, firm size, regional and occupation dummies et cetera. Given that the reasons for part-time work differ considerable between male and female employees, all regressions and calculations were separately estimated for these two groups.

The results were quite different for males and females. For females the raw wage gap was in favour of part-timers, i.e. the part-time employees earned in different periods about 5-20% more than full-timers. After taking into account various worker characteristics, the difference did not vanish but even enlarged, i.e. part-timers are with less favourable labour market characteristics (i.e. work more often in small firms with low pay), thus the unexplained part of the wage gap is larger than the raw wage gap. In case of men, part-timers earned more than full-timers before year 2000, but since then the pay of full-timers have been larger, and the wage gap grew to 25% in 2006. Differently from women, the part-time wage gap of male was to large extent explained by various variables, most important of which were the dummies for different occupational groups, firm size groups and firms with different owners (similar factors were important also in case of female). Thus, the results that in the

matching estimations only the pay gap of the women turns out to be statistically significant, is not only due to the much smaller frequency about the part-time employment among men, but also because in case of male the gap can be explained by differences in endowments between part-timers and full-timers, while not so in case of the female.

The study needs to be developed in several directions in order to fully understand the nature of part-time gap in our data. Firstly, we need to control for the non-random selection into part-time employment. Secondly, voluntary and non-voluntary part-timers can have rather different pay-gap. The previous evidence has showed that in Estonia among the part-timers relatively more are involuntarily while in Western European countries most part/timers are voluntary (Krillo *et al.* 2007).

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