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Non-technical summary

In the ongoing debate concerning the tightened job competition among the highly educated in Europe, the question of the effects on wages of the increased supply of highly educated workers has been raised. This study uses register-based longitudinal data from Finland from the period 1997-2004 and examines how the increased job search among the highly educated affects their wages in regional labour markets.

Any relationship between the unemployment rate and wages is not found either for the graduates or for the post-graduates in the private sector. Among the graduates in the municipality sector, the increased unemployed job search even has a positive effect on wages, indicating that the municipalities pay compensating wage differentials for the higher risk of unemployment in their regions. In addition, the results imply that the bargaining power of the municipality sector employees over their wages is lower in those labour markets where it is easier for the employers to find employees who are willing to leave their current jobs or are forced to do so due to, e.g., temporary contracts. In the private sector, the employed job search does not create pressure for the wages to decrease; if there is any effect, it is a tendency for the graduates' wages to increase. Therefore, the dynamics of the market apparent in the increased employed job search seems to creating more job opportunities for the graduates in the private sector, while declining the opportunities of both the graduates and the post-graduates in the municipality sector.

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Abstract

The study examines how the job competition among the highly educated affects their wages in regional labour markets. We estimate individual-level wage curves separately for graduates and post-graduates and divide the job competition in unemployed and employed job search by level of education. The study does not find a wage curve for the highly educated in Finland. The results indicate that the dynamics of the market apparent in the increased employed job search creates more job opportunities for the graduates in the private sector, while declining the opportunities of both the graduates and the post-graduates in the municipality sector.

Keywords: wage curve, job search, highly educated, regional labour markets

JEL classification: J30, J31, R23

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1. Introduction

In the ongoing debate concerning the tightened job competition among the highly educated, the question of the effects on wages of the increased supply of highly educated workers has been raised. The empirical evidence of the deterioration of the position of university graduates in the labour market is, however, weak and not straightforward (e.g., Sicherman, 1991; van Ours and Ridder, 1995; Battu et al., 1999; Gautier et al., 2002; Chevalier, 2003; Cardoso, 2007; Gottschalk and Hansen, 2003; Grazier et al., 2008). This study takes part in the debate by concentrating on the dependence between the wages of the highly educated and the intensity of the job competition among them; i.e., we examine how the increased job search among the highly educated affects their wages in regional labour markets.

The study contributes to the wage curve literature. Blanchflower and Oswald (1990; 1994; 2005) presented the "empirical law" of the negative dependence between the level of job competition and the level of wages in regional labour markets. According to that empirical law, the unemployment elasticity of wages will be around -0.1. The highly educated are a special group of wage earners since they are more prone to relocation than the rest of the population; however, they are more likely to migrate from remote regions to centres of economic activity than vice versa (Ritsilä and Ovaskainen, 2001).

We examine the relevance of the wage curve for the highly educated wages in Finland and allow for the job competition to include both the unemployed and the employed job searches separated by the education level. We concentrate on the salaries of those who have either a graduate or a post-graduate degree and who are working in the private or municipality sectors. The study period runs from 1997 to 2004. Since the data are collected from three levels - years, individuals and regions - we apply multi-level modelling in order to control for the grouped data bias (Johnes, 2007). In addition, we estimate the fixed effects models as well as test for the endogeneity of the search rates.

The theoretical explanation for the negative relation between wages and unemployment can be found in the union bargaining model (De Menil, 1971), the labour contract model (Blanchflower and Oswald, 1994), the efficiency wage hypothesis (Shapiro and Stiglitz, 1984) or the labour turnover costs model (Campbell and Orszag, 1998). Excepting the labour contract model, the unemployment rate in all of the models is interpreted as an indicator of the outside option of the laid-off worker: the higher the unemployment rate, the more difficult it is to find a new job with a given asking wage.

In the union bargaining model, the outside option is one of the determinants of the negotiated wage. The wage curve occurs because the outside option is lower if the unemployment rate is higher and correspondingly higher with lower unemployment rates. According to the efficiency wage hypothesis, the more difficult it is for the worker to find a new job, the less compensation is needed to keep her working efficiently. The model for the labour turnover costs complements the efficiency wage hypothesis by taking a view of the employer: how expensive it is to hire a new worker. Losing a worker is less expensive if the unemployment rate is high, leading firms to pay lower wages in conditions of the high unemployment and economising the labour turnover costs by paying higher wages in good employment conditions.

The labour contract model deviates from the others by assuming that the outside options are equal across the regions but blaming the different stocks of amenities in the regions for causing differences in wages and unemployment between regions. Workers in the less attractive regions are compensated for the lack of amenities, which results in both higher wages and higher employment in the less attractive regions.

Card (1995) and, more recently, Nijkamp and Poot (2005) provide a comprehensive review of the existing empirical wage curve literature. Empirical evidence of the wage curve is not straightforward and depends on the data used in the analyses. The use of individual wages instead of regional averages as well as disaggregation of the unemployment rates by groups according to, for example, the education level have significant effects on the results (Kennedy and Borland, 2000; Pannenberg and Schwarze, 1998;

Longhi, 2007b; Longhi and Brynin, 2007). A majority of the wage curve literature ignores the employed job search as a part of job competition, although, e.g., in the UK, half of those who are actively looking for a new job are employed (Longhi, 2007a).

The empirical work in the 1970s and 1980s supported Harris and Todaro's (1970) model of the positive rather than the negative dependence between unemployment and wages (Hall, 1970, 1972; Reza, 1978; Adams, 1985; Marston, 1985). Harris and Todaro's model indicates that, in the long term, identical workers would be indifferent to where they live and higher wages would be paid as a compensating differential for a risk of being unemployed, hence leading to a positive relation between regional unemployment and wages. Later work after Blanchflower and Oswald (1990) started to confirm the robustness of their findings on the inverse relationship (e.g., Bratsberg and Turunen, 1996; Baltagi and Blien, 1998; Baltagi et al., 2000; Kennedy and Borland, 2000; Bellman and Blien, 2001; Pekkarinen, 2001 in Finland; Longhi and Brynin, 2007).

Opposite or imprecise findings still also occur. Papps (2001) compared long-run equilibria and established empirical evidence of a positive relationship between the long-run local wage and estimates of the local rate of long-run unemployment in New Zealand. Bell et al. (2002) found positive long-run relationship between average regional wages and unemployment in the UK but negative relationship between individual wages and unemployment. Albaek et al. (2003) used micro-data to analyze wage formation in the Nordic countries at the regional level. They did not find a significant negative long-run relationship between unemployment and real wages at the regional level once regional fixed effects were accounted for. Johnes (2007) used multi-level modelling with the individual wages in the UK and found the elasticity of wages with respect to regional unemployment rates to be volatile across specifications and imprecisely determined in some of the cases.

In the remainder of this paper we introduce the model and the multi-level estimation of the empirical wage curve in Section 2. Section 3 discusses the data issues and describes

the data set, Section 4 reports the results and Section 5 concludes. According to the results, the unemployed and employed job searches are not correlated in the regional labour markets, hence exhibiting different aspects of job competition and the labour market conditions. The wage curve is not found for the graduates or for the post-graduates. Instead, the unemployed job search among the graduates exhibits a positive, and the employed job search among both the graduates and the post-graduates a negative connection to the wages in the municipality sector. In the private sector, a weak positive effect of the employed job search on the wages of graduates is found. Therefore, the increased employed job search in a region seems to benefit the employers of both the graduates and the post-graduates in the municipality sector while benefiting the graduate-level employees in the private sector.

2. Multi-level model for the individual wage curves

Individual-level wage equations are defined in a Mincerian setting complemented by several variables capturing the wage effects of individual characteristics, industry, sector and regional factors. We are not, however, estimating returns to education since all of our individuals have graduated from higher education. Our data are unbalanced panel data including 94,059 wage observations from 22,759 highly educated individuals from 15 regions over a period of 8 years. The wage curves are estimated separately for the graduates and the post-graduates, and the search rates in the wage curve specifications are specific to these education levels.

The wage curve takes the following form:

$$\ln w_{irt} = \alpha + \beta_1 \ln u_{rt} + \beta_2 \ln emp_{rt} + \gamma X_{irt} + dt + v_i + \varepsilon_{irt} \qquad (1)$$

where w_{irt} denotes the monthly wage obtained by individual i working in region r in year t. α is a constant, u_{rt} is the education-specific job search rate for unemployed workers in region r at time t, emp_{rt} is the education-specific search rate for employed workers, and X_{irt} is a vector of individual characteristics. dt denotes the fixed effect of years, ν_i denotes the random effect associated with individuals, and ε_{it} is a random error term.

The data are from three different levels. Therefore, the analysis is sensitive to the grouped data bias, which is not taken into account in the model specified in Formula (1). The conventional panel data model neglects the fact that wages obtained within the same region r could have something in common. In order to control for the grouped data bias simultaneously with the unobserved heterogeneity across the individuals, we apply multi-level modelling where the hierarchical structure of the data is concerned (e.g., Rabe-Hesketh and Skrondal, 2008). The question is not, however, about a standard multi-level model with a nested hierarchical structure since the individuals can migrate from one region to another. For that reason, the model takes a cross-classified structure.

The estimable model, following Johnes (2007), is a two-level model in which the first level denotes occasions (years) and the second level is a cross-classification between individuals and regions. The wage equation for an individual i in region r in year t takes the form

$$\ln w_{irt} = \alpha + \beta_1 \ln u_{rt} + \beta_2 \ln emp_{rt} + \gamma X_{irt} + dt + \nu_i + f_r + \varepsilon_{irt}, \quad (2)$$

where $f_r \sim N(0,\sigma_f{}^2); \nu_i \sim N(0,\sigma_\nu{}^2); \varepsilon_{irt} \sim N(0,\sigma_\varepsilon{}^2)$, f_r and ν_i denote the random effects associated with regions and individuals, respectively, and dt denotes the fixed effects for years, i.e., occasions or measurements points in the multi-level literature. Other terms follow the definitions described above.

In the multi-level formula (2), it is assumed that the random effect for region r, f_r, is systematic to that region and common to all individuals inside the region, causing a region-specific shift to the wage curve. ν_i, in turn, is the individual-specific random term causing an individual-specific shift to the wage curve. We fit the model by considering all the data as individual panel data and treating f_r and ν_i as a series of crossed random coefficients on indicator variables for the regions and the individuals. In addition, we estimate the model by GMM in order to control for the possible endogeneity of the search rates and with the individual-specific fixed effects in order to control for the possible correlation between the individual effects and explanatory variables.

3. Data issues

The data are a regionally representative 7% random sample of the Finnish population aged between 16 and 70 years drawn from the Finnish census in 2001. These people are followed backwards and forwards; the time span of the study runs from 1997 to 2004. Information from labour, taxation, and social security registers as well as municipal and regional statistics is combined with the census data. These data contain variables on workers' economic situation, place and characteristics of residence, family, education and work.

We included in our analysis only those wages that were observed for the wage earners after completing the ISCED 5A level of education; i.e., all wages in the wage curve estimations are either the wages of graduates (including graduates from the polytechnics) or the wages of post-graduates. We end up with 11,068 different individuals with graduate-level and 11,691 individuals with post-graduate-level education. In our raw data, we have a variable for the yearly wage income as well as the number of working months in a year. The wage income that we use is thus the average monthly wage in a year, and we only consider those periods when an individual is defined as a wage earner in the taxation reg-

isters. The monthly wages are deflated to the prices of 2004 by using the living costs index.

Search rates from 15 TE-Centre regions (according to the location of a job) were combined with the micro data. The search rates are based on the Labour Force Survey of Statistics Finland. The stock of the searching population includes those who reported searching for a new job in the last four weeks. The LFS classifies job searchers according to their education level and divides job searchers separately into groups of employed and unemployed searchers[1]. Dividing the graduate and post-graduate job search into the employed and unemployed search and scaling them by the size of the active population[2] at those levels of education yields variables for the relative volume of the different types of job search among the highly educated. The active population in a certain education group includes all people aged 15-64[3] having a degree of that education level and currently living in the region. For the sake of consistency with the wage variable (yearly wage income divided by working months), we also use averages of the monthly search rates per year.

3.1 Regional wages and search rates

The stability of wage differences between regions is an issue related to the wage curve. If the wage differences disappear over time, the wage curve is only a short run phenomenon towards the equalisation of wages between regions in the long run. Figures 1 and 2 summarise the stability of the ranking of the regions according to average wages. The research period is divided into two parts, 1997-2000 and 2001-2004, and the dependence between the regional rankings according to the average wages in these periods is shown in the figures. Wage rankings show stability both for the graduates and for the post-graduates, with a stronger dependence for the graduates. The Spearman rank correlation coefficient is 0.89 for the graduates and 0.61 for the post-graduates.

[1] The definition of unemployment in LFS follows that of ILO. The person is unemployed if he a) is not employed, b) has been searching for jobs in the last four weeks and c) is ready to accept a job offer in about two weeks.

[3] The age of 65 was an official retirement age in Finland in the research period.

[Figure 1 about here.]

[Figure 2 about here.]

The employed job search, in the context of the wage curve literature, measures the job competition from a different perspective than the unemployed job search. It is clear according to many previous studies that when recruiting new employees, employers prefer the employed over the unemployed candidates (e.g., Burgess, 1993; Broersma, 1997; Mumford and Smith, 1999; Burgess and Turon, 2003). The employed job search is, however, a pro-cyclical, while the unemployed job search is a counter-cyclical phenomenon. In upturns, employed workers find it more profitable to spend time searching for new jobs if they are not satisfied with their current ones, while in downturns the opposite holds (Anderson and Burgess, 2000). In the context of the wage curve, the increased job search among the employed labour force might hence indicate improved outside options rather than a decline in outside options, which would be the case with the increased unemployed job search.

The active job search among the employed labour force might also be an indication of the kind of restructuring of the labour market that does not lead to increased unemployment, but rather to temporary or otherwise unstable contracts. According to Ilmakunnas et al. (2008), job flows in Finnish firms are at quite a high level; some 10% of jobs are destroyed every year, with the share remaining stable since 1997. On the other hand, an even larger number of new jobs are created every year, resulting in positive net job creation. Interestingly, the worker flows are more than 100% larger than what the job flows would require. This phenomenon is apparent in the employed job search rate[4].

Figures 3 and 4 describe the changes in the search rates in the 1997-2004 period. There seem to be positive trends in job search activity both among the graduates and the postgraduates, but only with respect to the employed job search (Figure 2). The unemployed

[4] The increased employed job search might also indicate a decrease in job satisfaction (e.g., Delfgaauw, 2007). Ilmakunnas et al. do not, however, find a relationship between working conditions and job flows in Finland.

search does not show any tendency to increase. The unemployment rate of the graduates is at a higher level than the unemployment rate of the post-graduates over the whole period (Figure 1), indicating continuously better employment opportunities for post-graduate level workers. The descriptive statistics on the search rates by region are given in Table 1. The distribution of the unemployment rate is wider than the distribution of the employed job search rate, ranging from 3.6% for the graduates in Uusimaa to 9% in Lapland, and from 2% for the post-graduates in Southeast Finland to 5.4% in Southwest Finland. The employed job search rate for the graduates only varies between 6% in Lapland and 9.7% in Southern Ostrobothnia and from 5.3% for the post-graduates in Kainuu to 8.4% in Uusimaa.

[Figure 3 about here.]

[Figure 4 about here.]

Table 2 gives the correlation coefficients between all of the search rates in the TE-Centre regions over time. The correlations are weak. Two measures are a bit stronger than the others: the unemployed search of post-graduates and the unemployed search of graduates are negatively correlated with a coefficient of -0.23, and the employed job searches of the graduates and the post-graduates are positively correlated with a coefficient of 0.21.

[Table 1 about here.]

With respect to the theoretical background of the wage curve, it is important to note that the unemployed and the employed job searches within the education groups are not correlated. Hence, the high unemployment and the high employed job search rates do not occur simultaneously and systematically in the same regional labour market. There is also no systematic negative dependence between them. Therefore, the employed job search and unemployment rates also reflect different aspects of the regional labour market conditions in the wage curves.

[Table 2 about here.]

3.2 Explanatory variables

The set of explanatory variables for the individuals consists of variables for potential work experience in years (the observation year – the year of graduation), gender, marital status and cohabitation; whether the individual is Swedish speaking, is an immigrant, has children under 7 years of age, was unemployed, entrepreneur, student, on maternity or parental leave or not a wage earner for other reasons before the observed wage earnings (variable "After other position"), whether the individual changed jobs during the observation year, and his or her field of education. There are eight classes for the fields of education, which follow the ISCED classification[5].

A detailed description of the variables is given in the Appendix. A special feature of the Finnish labour market, compared to, e.g., the UK (Booth and Bryan, 2004), is that there is no union-membership wage premium in the labour market. Union membership (on average 75%) is so common that the agreements are generalised to also cover those who are not union members. For this reason we do not separate the union members from the non-union members[6].

The variables concerning the job characteristics include dummies for the industry and sector of the job. Industries are classified into 16 groups by the SIC classification[7]. From sectors we only concentrate on the private and the municipality sectors. The state sector

[5] 1) education, 2) humanities and arts, 3) social sciences, business and law, 4) science, 5) engineering, manufacturing and construction, 6) agriculture, 7) health and welfare, and 8) services.

[6] The wages in Finland have traditionally been set in collective bargains at the centralised level, but the compensation system has moved toward the part of the wages negotiated at the firm level (Heikkilä, 2004). The framework for the wage offers is still negotiated at the centralised or at the union level, but there is a wide range within which individual wages can vary. Particularly for the highly educated, there is latitude for the wages to vary according to, e.g., the effort exerted.

[7] A-B) agriculture, hunting, forestry, and fishing, C) mining and quarrying, D) manufacturing, E) electricity, gas and water supply, F) construction, G) wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods, H) hotels and restaurants, I) transport, storage and communication, J) financial intermediation, K) real estate, renting and business activities, L) public administration and defence; compulsory social security, M) education, N) health and social work, O) other community, social and personal activities, P) private households employing domestic staff and undifferentiated production activities of households for own use, and Q) extra-territorial organizations and bodies.

is left out of the analysis due to strictly structured wage setting during the research period[8].

The location of the job is described by dummies indicating whether or not the area is a metropolitan or a university area. These location variables describe smaller areas (NUTS 4 level) than the basic TE-Centre Region unit (which is somewhat comparable to the classification of NUTS 3 level regions). The metropolitan area of Helsinki is located in the TE-Centre Region of Uusimaa. In addition, there are seven university areas in Finland.

Table 3 presents the descriptive statistics, which show substantial differences between the education groups as well as between the sectors. Employees in the municipality sector are on average slightly older, have slightly more potential experience, and earn less than the employees in the private sector. The gender-based segregation is clearly seen in the shares of male employees in the sectors. In the private sector, 71% of the graduates and 62.4% of the post-graduates are men, while the proportions in the municipality sector are only 31.3% and 33.5%, respectively. In the municipality sector, 10.1% of the wage observations for the graduates and 7.6 % of the observations for the post-graduates follow unemployment spells, while the shares in the private sector are only 4% and 3.9%.

Job changes are also much more common in the municipality sector, indicating that temporary contracts are more common there than in the private sector. In the municipality sector, 67% of the wage observations for the graduates and 62.9% for the post-graduates followed a job change, while the shares in the private sector were only 19% and 22.3%. The concentration of human capital in the metropolitan and university areas is clear. In the private sector, 69.2% of the wage observations for the graduates are from these areas, as well as 55.3% of the observations in the municipality sector. For the post-graduates in the private sector, 81% of the observations are from metropolitan or university areas, in addition to 56.3% of the observations in the municipality sector.

[8] Wages in the state sector were heavily based on the occupation and seniority, with no variation according to the performance of the worker. In addition, the regions were divided into two classes according to the cost of living in them and the wages were based on this classification, which further stiffened the wage structure in the state sector.

4. Wage curve with individual wages and the factors behind wage differences

4.1 Wage curve with individual wages

The wage observations in the analysis are from the same time period as the search rates. It is therefore possible that the search rates are endogenous and determined simultaneously with the wages. If this was the case, there would be feedback effects from the wage formation process to the search activity in a region. In order to test for the endogeneity of the search rates, we estimated the wage curves with instrumented values of both the unemployment and employed job search rates. Lagged values of both variables are used as instruments. The results from the GMM estimations are reported in Specification 1 in Tables 4a and b. According to the GMM C-statistics, however, none of the search rates either for the graduates or for the post-graduates are endogenous, indicating that there are not any feedback effects from individual wages to regional-level job search conditions; this has also been observed to be the case in previous studies (Nijkamp and Poot, 2005). We therefore interpret the search rates as affecting wages and not vice versa and base our analysis on this direction of causality.

[Table 4a about here]
[Table 4b about here]

Since the instrumenting proved not to be significant, we estimate the multi-level models assuming the search rates to be exogenous. Specification (2) in Tables 4a and b first reports the results of the multi-level models with no interactions between the sectors and the search rates, assuming the effect of the search rates to be equal in both sectors. Specification (3) reports the results with the sector interactions and with the interactions between the municipality dummy and the metropolitan and university area dummies, hence allowing for wage variations between the different types of areas within the sector as well as between the sectors within the areas. Specification (4) also allows for the different ef-

fect of potential experience on males and females. In the multi-level models, the estimates for the between-region variances are low and statistically insignificant both for the graduates and for the post-graduates (see the bottom lines of Tables 4a and b), hence not indicating any region-specific random components in the wages[9]. The between-individual variance, however, is highly significant in all of the specifications. Specifications (5) and (6) are the individual fixed effects models without and with the sector interactions, respectively.

The results differ according to the level of education as well as by the sector of the job. Neither for the graduates nor for the post-graduates are the dependencies between the unemployed job search and the wages found in the private sector. For the post-graduates in the municipality sector, again, no dependence can be found. For the graduates in the municipality sector, however, the effect of the increased unemployed job search is positive, varying between 0.007 and 0.010 depending on the specification. This result supports the Harris and Todaro (1970) model of the compensating wage differentials for the increased risk of unemployment rather than the implications of the wage curve.

The sectors also differ in the effect of the employed job search. In the municipality sector, both among the graduates and the post-graduates, the increased employed job search negatively affects wages. For the graduates, the coefficient varies between -0.002 and -0.004, and for the post-graduates between -0.008 and -0.009. This indicates that the bargaining power of the employees over wages in the municipality sector is somewhat lower in those labour markets where it is easier for the employers to find workers who are willing to leave their current jobs or who are forced to find a new job due to, e.g., temporary contracts. Unlike the municipality sector, there are signs of a positive dependence between the wages of the graduates and the employed job search among them in the private sector (Specifications (3) and (6) in Table 4a), indicating that an active employed job search in a region means improved job opportunities for its private sector graduate employees rather than declined opportunities.

[9] We also ran the models with the region-specific fixed effects instead of random effects, keeping the individual effects random, but this did not change the results.

4.2 Factors behind the wage differences

As usual in the Mincerian wage equations, wages increase with potential experience, but the relationship is concave. Potential experience increases the wages of females with a notably slower speed than it does the wages of males. The direct effect of one additional year is 1.1% for the female graduates, while it is 3.4% for the males. The corresponding effect is 2.2% for the female post-graduates and 4.3% for the males (Tables 4a and b, Specification (4)). The gaps are partly explained by the fact that the potential experience is nearer the actual experience for males since females tend to spend more time outside the labour force during their careers.

Partnership status matters: wages are higher for married and cohabitant males than for single males, both among graduates and post-graduates (Tables 5a and b, Specification (4)). The wage gap between males and females in a partnership is also clear: 6% for the married graduates and 9.8% for the married post-graduates. Children younger than 7 years negatively affect the wages of graduates, but for the male post-graduates the effect is positive. When interpreting these results, the possibility of selection bias must be taken into account. Those men who are selected to partnership might be those who would in any case earn more. The same holds with the selection to parenthood. In the fixed effects model, which controls for the selection but cannot estimate separate effects for the genders, the effect of young children is negative for the post-graduates but not significant for the graduates.

[Table 4a about here]

[Table 4b about here]

As expected, the movements to a wage earner from other labour market statuses (studentship, unemployment, entrepreneurship, maternity or parental leave, homemaking, other position) produce lower wages than continuously remaining as a wage earner (Tables 5a and b). Job-to-job movements produce lower wages than staying at the same job, indicat-

ing that the reasons for job changes are not promotions, but rather movements from one temporary contract to another.

[Table 5a about here]
[Table 5b about here]

The metropolitan wage premium (in relation to the non-university areas) in the private sector for graduates is 8.3% according to the multi-level model but 5.8% according to the fixed effects model (Specifications (4) and (6), Tables 5a and b). The multi-level model indicates the lower premium in the municipality sector, but this does not hold in the fixed effects model. For the post-graduates in the private sector, the multi-level model indicates the negative metropolitan premium but this does not hold with the fixed effects. For the municipality sector, both types of models indicate the negative premium, -10.9% and -6.3%. In the university areas, instead, the wage premium for the post-graduates in both sectors is 3.8% according to the multi-level and 4.5% according to the fixed effects model. For the graduates, the university areas do not provide any wage premium.

5. Conclusions

This study examines how the job competition among the highly educated affects their wages in regional labour markets. We estimated the wage curves separately for graduate and post-graduate level employees by controlling for the education-specific unemployed and employed job search, the sector of the job and the individual-level factors affecting wages. The unemployment and employed job search rates are not correlated, indicating that they control for different aspects of the job search as well as of the labour market conditions in regions.

Any relationship between the unemployed job search and wages is not found either for the graduates or for the post-graduates in the private sector. Among the graduates in the municipality sector, the increased unemployed job search even has a positive effect on

wages with an elasticity of about 0.01, indicating that the municipalities pay compensating wage differentials for the higher risk of unemployment in their regions. In addition, the study finds a negative relationship between the wages and the employed job search in the municipality sector both for the graduates and for the post-graduates and signs of a positive effect of the employed job search on the wages of the graduates in the private sector.

The results imply that the bargaining power of the municipality sector employees over their wages is lower in those labour markets where it is easier for the employers to find employees who are willing to leave their current jobs or are forced to do so due to, e.g., temporary contracts. From the point of view of employers, this is in line with the theories behind the wage curve. Employees in the municipality sector, instead, are willing to accept lower wage offers without the increased risk of unemployment, which is not in line with the theories behind the wage curve. In the private sector, the employed job search does not create pressure for the wages to decrease; if there is any effect, it is a tendency for the graduates' wages to increase. Therefore, the employed job search differently affects wage setting of the sectors. It benefits the employers of both graduates and post-graduates in the municipality sector, while benefiting the graduate-level employees in the private sector. Thus, the dynamics of the market apparent in the increased employed job search seems to creating more job opportunities for the graduates in the private sector, while declining the opportunities of both the graduates and the post-graduates in the municipality sector.

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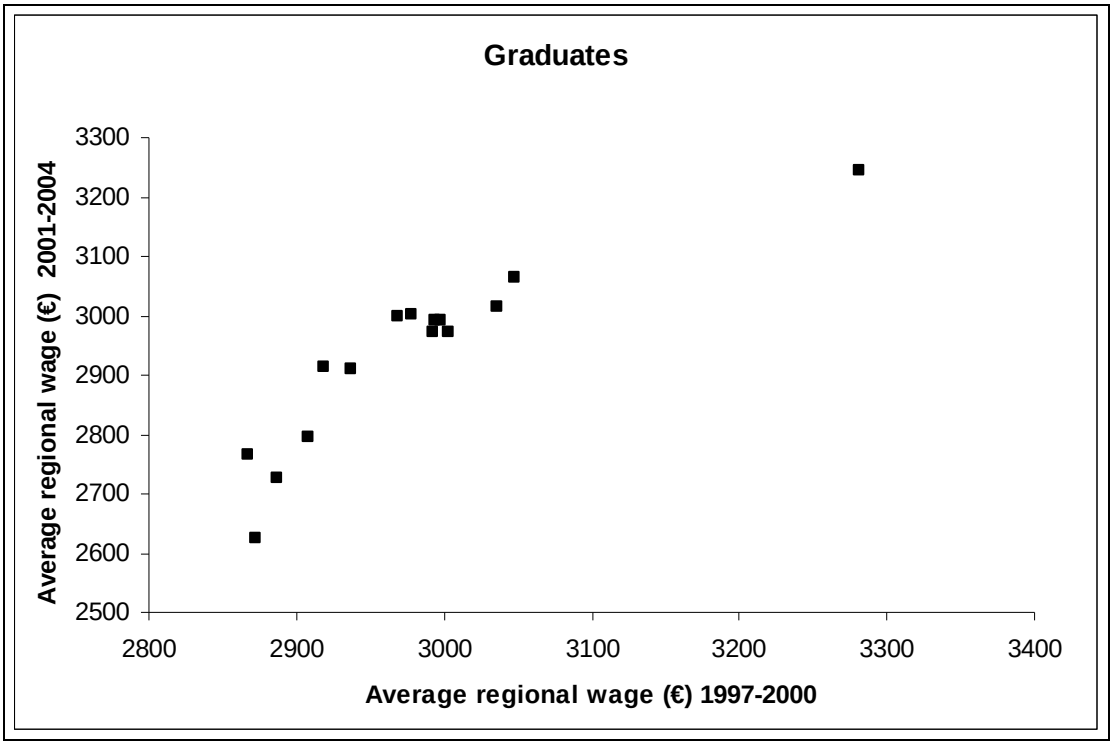
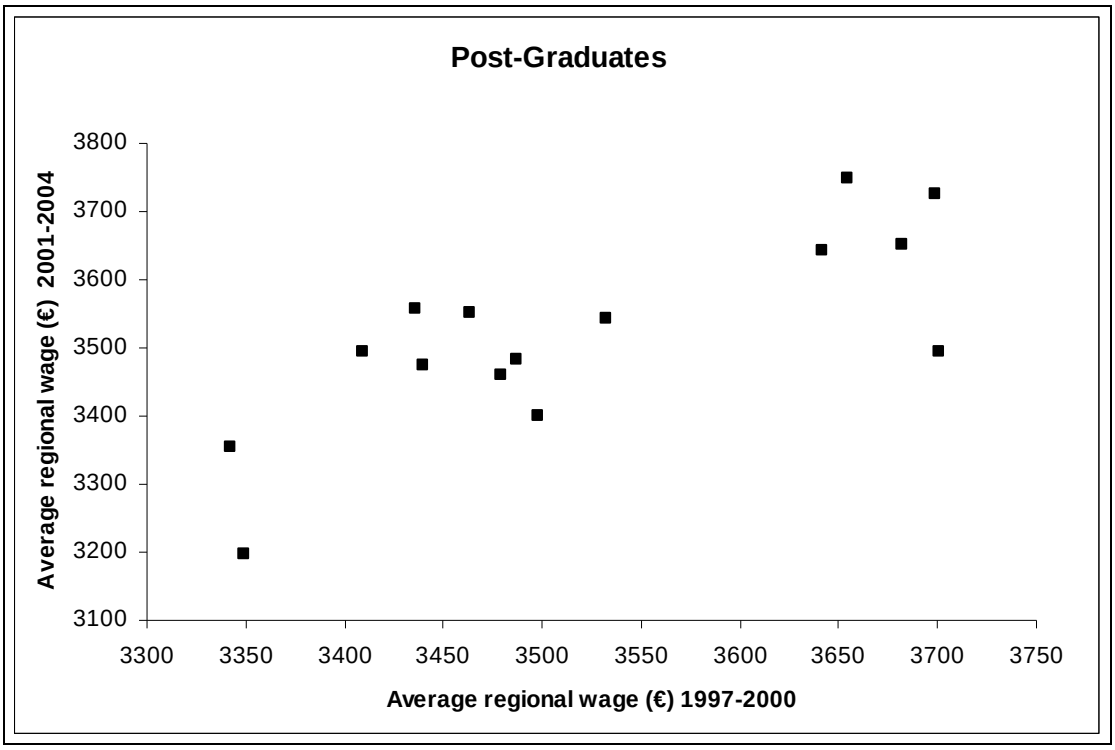
Figures and tables



Note. Spearman rank correlation 0.89 with statistical significance at the 0.1% level.

Figure 1. Stability of the ranking of regions according to average wages of the graduates



Note. Spearman rank correlation 0.61 with statistical significance at the 5% level.

Figure 2. Stability of the ranking of regions according to average wages of the post-graduates

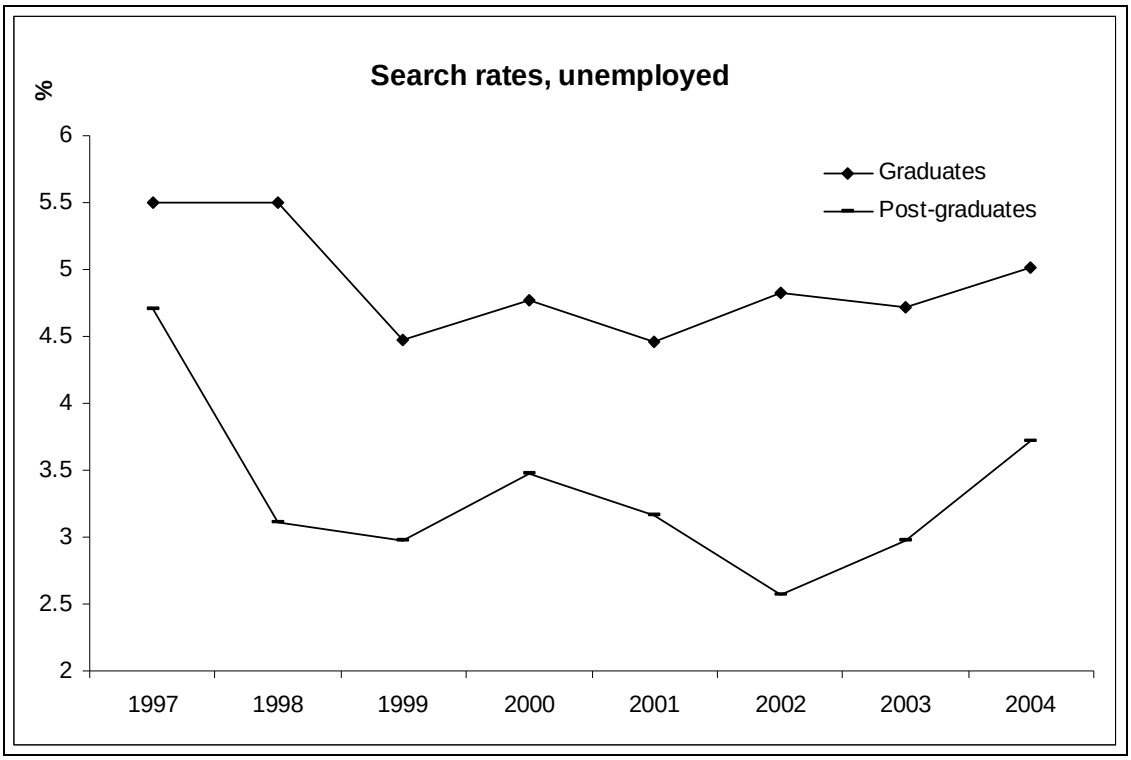


Figure 3. Unemployed job search from 1997 to 2004

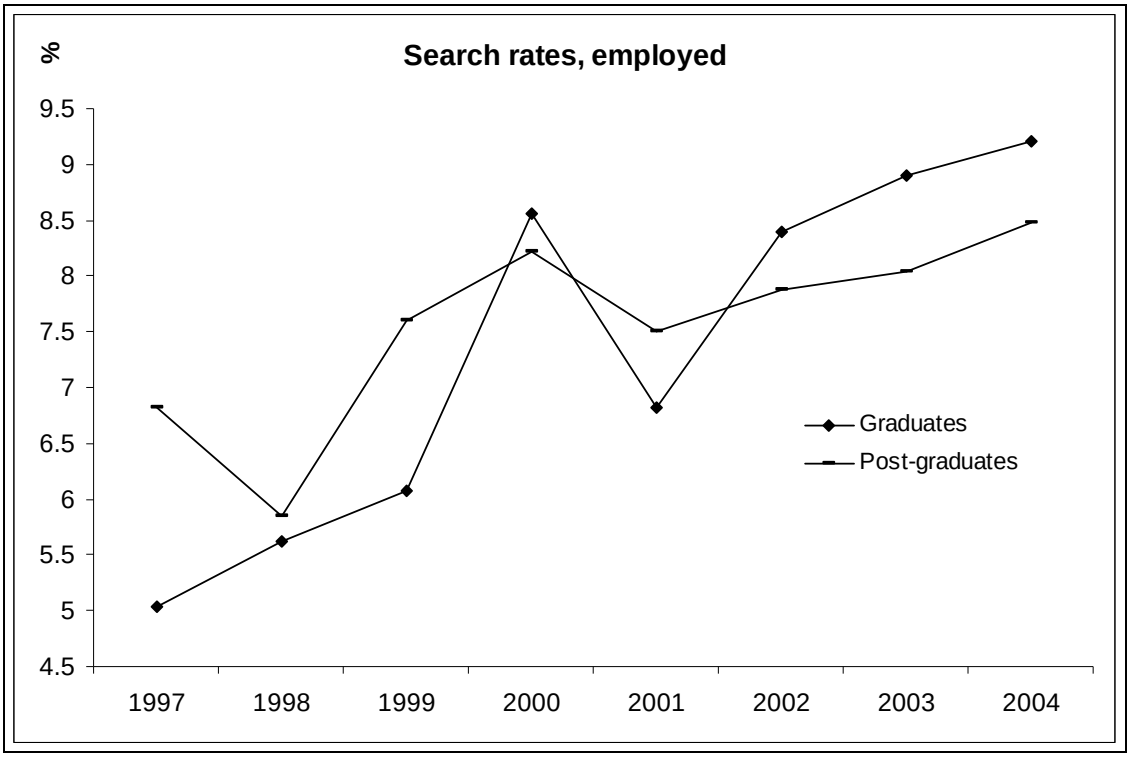


Figure 4. Employed job search from 1997 to 2004

Table 1. Search rates by region

Mean (Std. Dev.)	Unemployment rate		Employed job search rate	
Region	Graduates	Post-graduates	Graduates	Post-graduates
1 Uusimaa	3.6 (0.50)	2.8 (0.74)	7.7 (1.47)	8.4 (1.27)
2 Southwest Finland	4.4 (1.57)	5.4 (1.55)	7.0 (2.12)	7.6 (1.19)
3 Satakunta	6.4 (2.20)	3.1 (1.81)	8.4 (3.40)	6.1 (2.21)
4 Häme	4.6 (1.39)	3.2 (1.51)	7.0 (1.34)	6.6 (1.78)
5 Pirkanmaa	5.3 (1.50)	4.5 (0.76)	6.8 (1.88)	6.9 (1.14)
6 Southeast Finland	6.6 (1.59)	2.0 (0.58)	7.5 (2.19)	6.9 (1.09)
7 Southern Savo	6.4 (2.06)	2.9 (1.59)	9.6 (3.54)	8.1 (1.84)
8 Northern Savo	5.7 (1.90)	2.2 (0.85)	6.7 (2.76)	6.3 (1.46)
9 Northern Karelia	6.0 (1.64)	4.1 (1.52)	7.7 (3.19)	7.8 (2.07)
10 Central Finland	5.0 (2.46)	5.0 (1.30)	6.9 (1.90)	6.7 (1.12)
11 Southern Ostrobothnia	5.6 (2.19)	2.1 (1.43)	9.7 (2.24	6.3 (1.79)
12 Ostrobothnia	4.2 (1.65)	2.2 (0.95)	7.0 (2.70)	6.1 (1.94)
13 Northern Ostrobothnia	5.9 (1.30)	4.3 (1.25)	6.3 (1.92)	7.1 (1.29)
14 Kainuu	7.8 (1.53)	3.7 (2.11)	7.5 (4.07)	5.3 (2.71)
15 Lapland	9.0 (3.12)	2.9 (1.48)	6.0 (3.29)	5.8 (2.32)
All	4.9 (0.38)	3.3 (0.61)	7.4 (1.36)	7.6 (0.80)

Table 2. Correlations between different types of search rates

	Unemployment rate, graduates	Employed job search rate, graduates	Unemployment rate, post-graduates
Employed job search rate, graduates	-0.12		
Unemployment rate, post-graduates	0.06	-0.23*	
Employed job search rate, post-graduates	-0.14	0.21*	-0.01

Note. 120 observations, * denotes statistical significance at the 5% level.

Table 3. Descriptive statistics by sectors

Mean (Std. Dev.)	Both sectors		Private sector		Municipality sector	
	Graduates	Post-graduates	Graduates	Post-graduates	Graduates	Post-graduates
Monthly wage	3,101 (1,304)	3,672 (1,552)	3,354 (1,390)	3,884 (1,667)	2,637 (972)	3,418 (1,358)
Potential experience	13 (10)	11.6 (9)	13 (10)	11 (9)	14 (10)	12 (10)
Age	41 (10)	40 (9)	41 (10)	39 (9)	43 (10)	42 (10)
Male	0.570	0.493	0.710	0.624	0.313	0.335
Municipality	0.353	0.454				
Immigrant	0.016	0.021	0.017	0.018	0.013	0.023
Swedish speaking	0.072	0.068	0.075	0.086	0.066	0.048
Married	0.608	0.645	0.598	0.637	0.627	0.656
Cohabitant	0.163	0.133	0.177	0.142	0.136	0.121
Children < 7 years	0.207	0.269	0.220	0.286	0.183	0.247
After studies	0.013	0.022	0.011	0.018	0.016	0.027
After unemployment	0.062	0.056	0.040	0.039	0.101	0.076
After entrepreneurship	0.003	0.003	0.003	0.004	0.002	0.003
After parental leave	0.055	0.064	0.059	0.065	0.048	0.063
After homemaking	0.014	0.027	0.009	0.018	0.025	0.039
After other position	0.003	0.003	0.004	0.004	0.001	0.002
Job change	0.360	0.407	0.190	0.223	0.670	0.629
Metropolitan area	0.404	0.475	0.456	0.607	0.309	0.315
University area	0.239	0.224	0.236	0.203	0.244	0.248

Table 4a. Wage curve estimations for the graduates

Dependent variable ln(monthly wage)	(1) GMM	(2) Multi-level	(3) Multi-level	(4) Multi-level	(5) Fixed	(6) Fixed
Graduates						
ln(u)	-0.449	-0.0002	-0.007	-0.007	-0.0001	-0.006
	(1.503)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
ln(emp)	-0.0004	-0.00002	0.003*	0.002	-0.00002	0.003*
	(0.013)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Municipality*ln(u)			0.016**	0.014*		0.016**
			(0.006)	(0.006)		(0.006)
Municipality*ln(emp)			-0.005**	-0.004*		-0.007***
			(0.002)	(0.002)		(0.002)
Potential experience	0.021***	0.024***	0.023***	0.011***	0.013***	0.013***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Potential experience sqr.	-0.0003***	-0.0004***	-0.0004***	-0.0001***	-0.001***	-0.001***
	(0.0001)	(0.0002)	(0.00002)	(0.00003)	(0.0006)	(0.00002)
Male*Potential experience				0.023***		
				(0.001)		
Male*Potential experience sqr.				-0.001***		
				(0.00004)		
Municipality	-0.045	-0.044***	-0.026	-0.026*	-0.042***	-0.044**
	(0.031)	(0.007)	(0.013)	(0.013)	(0.009)	(0.015)
Male	0.141***	0.143***	0.142***	0.023*		
	(0.012)	(0.009)	(0.009)	(0.010)		
Constant	8.303**	7.529***	7.537***	7.630***		
	(2.558)	(0.026)	(0.026)	(0.026)		
Observations	37,811	42,782	42,782	42,782	42,782	42,782
R^2	0.25				0.16	0.16
Log restricted-likelihood		6,629	6,652	6,869		
Between individual variance		0.060***	0.059***	0.059***		
		(0.001)	(0.001)	(0.001)		
Between region variance		0.0002	0.0002	0.0002		
		(0.0001)	(0.0001)	(0.0001)		
Residual variance		0.024***	0.024***	0.024***		
		(0.0002)	(0.0002)	(0.0002)		

Note. All specifications include dummies for years, industries and the fields of education. Specification (5) and (6) include the fixed effects for regions. Specifications (2)-(4) were also estimated using the fixed effects for the regions instead of the random effects but the results did not differ. Conclusions are based on the Specifications (4) and (6).

Table 4b. Wage curve estimations for the post-graduates

Dependent variable ln(monthly wage)	(1) GMM	(2) Multi-level	(3) Multi-level	(4) Multi-level	(5) Fixed	(6) Fixed
Post-graduates						
ln(u)	-0.017	-0.001	0.0003	0.004	-0.001	-0.0004
	(0.011)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln(emp)	0.048*	-0.005**	0.003	0.002	-0.004*	0.005
	(0.023)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
Municipality*ln(u)			-0.002	-0.002		-0.001
			(0.001)	(0.001)		(0.001)
Municipality*ln(emp)			-0.011***	-0.010**		-0.014***
			(0.003)	(0.003)		(0.003)
Potential experience	0.029***	0.032***	0.032***	0.022***	0.014***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Potential experience sqr.	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00003)	(0.00003)
Male*Potential experience				0.021***		
				(0.001)		
Male*Potential experience sqr.				-0.0005***		
				(0.00004)		
Municipality	-0.035***	-0.019**	0.073***	0.075***	0.007	0.062**
	(0.007)	(0.006)	(0.009)	(0.009)	(0.009)	(0.021)
Male	0.086***	0.101***	0.101***	-0.012		
	(0.008)	(0.009)	(0.009)	(0.010)		
Constant	7.671***	7.753***		7.726***	7.764***	
	(0.044)	(0.031)		(0.031)	(0.031)	
Observations	44,813	51,277	51,277	51,277	51,277	51,277
R^2	0.31				0.18	0.18
Log restricted-likelihood		483	539	737		
Between individual variance		0.073***	0.072***	0.072***		
		(0.001)	(0.001)	(0.001)		
Between region variance		0.00002	0.0001	0.0001		
		(0.0001)	(0.0001)	(0.0001)		
Residual variance		0.035***	0.035***	0.034***		
		(0.0002)	(0.0002)	(0.0002)		

Note. All specifications include dummies for years, industries and the fields of education. Specification (5) and (6) include the fixed effects for regions. Specifications (2)-(4) were also estimated using the fixed effects for the regions instead of the random effects but the results did not differ. Conclusions are based on the Specifications (4) and (6).

Table 5a. Factors behind the wage differences for the graduates

Dependent variable ln(monthly wage)	(1) GMM	(2) Multi-level	(3) Multi-level	(4) Multi-level	(5) Fixed	(6) Fixed
Graduates						
Immigrant	-0.007	-0.003	-0.002	-0.001		
	(0.030)	(0.020)	(0.020)	(0.020)		
Swedish speaking	-0.065	-0.012	-0.012	-0.009		
	(0.171)	(0.010)	(0.010)	(0.010)		
Married	-0.004	-0.019**	-0.019**	-0.004	0.002	0.002
	(0.029)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
Cohabitant	-0.002	-0.005	-0.005	-0.010	-0.002	-0.002
	(0.008)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Married*Male	0.086**	0.094***	0.094***	0.056***		
	(0.028)	(0.008)	(0.008)	(0.009)		
Cohabitant* Male	0.027	0.022*	0.021*	0.025**		
	(0.016)	(0.008)	(0.008)	(0.008)		
Children < 7 years	-0.007	-0.012*	-0.012*	-0.016**	0.001	0.001
	(0.008)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)
Children < 7 years*Male	-0.002	0.004	0.005	0.013		
	(0.012)	(0.007)	(0.007)	(0.007)		
After studies	-0.032*	-0.043***	-0.043***	-0.045***	-0.038***	-0.038***
	(0.014)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
After unemployment	-0.020***	-0.025***	-0.026***	-0.029***	-0.021***	-0.021***
	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
After entrepreneurship	0.004	-0.038*	-0.037*	-0.041*	-0.056**	-0.056**
	(0.104)	(0.018)	(0.018)	(0.018)	(0.020)	(0.020)
After parental leave	-0.039***	-0.039***	-0.039***	-0.036***	-0.035***	-0.035***
	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
After homemaking	-0.035	-0.027**	-0.027**	-0.025**	-0.033***	-0.033***
	(0.018)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
After other position	-0.141***	-0.155***	-0.154***	-0.147***	-0.175***	-0.174***
	(0.029)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Job change	-0.028	-0.028***	-0.029***	-0.027***	-0.027***	-0.026***
	(0.025)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Metropolitan area	-0.074	0.066***	0.086***	0.083***	0.055**	0.058**
	(0.510)	(0.011)	(0.011)	(0.011)	(0.020)	(0.020)
University area	0.026	0.003	0.012*	0.012	0.001	0.003
	(0.055)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)
Municipality* Metro-politan area			-0.070***	-0.069***		-0.020
			(0.010)	(0.010)		(0.014)
Municipality*University area			-0.023*	-0.023*		-0.006
			(0.009)	(0.009)		(0.013)

Note. All specifications include dummies for years, industries and the fields of education. Specification (5) and (6) include the fixed effects for regions. Specifications (2)-(4) were also estimated using the fixed effects for the regions instead of the random effects but the results did not differ. Conclusions are based on the Specifications (4) and (6).

Table 5b. Factors behind the wage differences for the post-graduates

Dependent variable ln(monthly wage)	(1) GMM	(2) Multi-level	(3) Multi-level	(4) Multi-level	(5) Fixed	(6) Fixed
Post-graduates						
Immigrant	-0.098***	-0.109***	-0.106***	-0.101***		
	(0.014)	(0.019)	(0.019)	(0.019)		
Swedish speaking	-0.004	0.004	0.004	0.002		
	(0.009)	(0.011)	(0.011)	(0.010)		
Married	-0.014*	-0.021***	-0.020***	-0.009	0.013*	0.013*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Cohabitant	-0.019**	-0.016*	-0.015*	-0.019**	-0.008	-0.007
	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Married*Male	0.134***	0.124***	0.124***	0.089***		
	(0.009)	(0.009)	(0.009)	(0.009)		
Cohabitant* Male	0.050***	0.034***	0.033***	0.036***		
	(0.010)	(0.009)	(0.009)	(0.009)		
Children < 7 years	-0.037***	-0.045***	-0.045***	-0.047***	-0.010**	-0.011**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)
Children < 7 years*Male	0.046***	0.063***	0.063***	0.070***		
	(0.007)	(0.007)	(0.007)	(0.007)		
After studies	-0.083***	-0.073***	-0.074***	-0.075***	-0.056***	-0.056***
	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
After unemployment	-0.073***	-0.060***	-0.061***	-0.064***	-0.045***	-0.045***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
After entrepreneurship	-0.219***	-0.188***	-0.188***	-0.188***	-0.178***	-0.179***
	(0.021)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)
After parental leave	-0.076***	-0.076***	-0.076***	-0.074***	-0.072***	-0.072***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
After homemaking	-0.092***	-0.097***	-0.098***	-0.098***	-0.114***	-0.115***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
After other position	-0.152***	-0.168***	-0.172***	-0.167***	-0.180***	-0.181***
	(0.022)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)
Job change	-0.009**	-0.022***	-0.025***	-0.023***	-0.022***	-0.022***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Metropolitan area	0.037***	0.035***	-0.020*	-0.016*	0.040*	-0.015
	(0.007)	(0.007)	(0.008)	(0.008)	(0.020)	(0.010)
University area	-0.020**	-0.024***	0.042***	0.038***	-0.023**	0.045***
	(0.007)	(0.005)	(0.011)	(0.011)	(0.007)	(0.012)
Municipality* Metro-politan area			-0.094***	-0.093***		-0.048***
			(0.009)	(0.009)		(0.012)
Municipality*University area			0.001	-0.001		-0.009
			(0.009)	(0.009)		(0.011)

Note. All specifications include dummies for years, industries and the fields of education. Specification (5) and (6) include the fixed effects for regions. Specifications (2)-(4) were also estimated using the fixed effects for the regions instead of the random effects but the results did not differ. Conclusions are based on the Specifications (4) and (6).

APPENDIX Descriptions of the variables

Variable	Description
ln(monthly wage)	ln(yearly wage income in 2004 prices/working months in a year)
ln(u)	ln(number of unemployed graduates or post-graduates/number of population aged 15-64 with the certain level of education), monthly average in a year by TE-Centre regions, separately for graduates and post-graduates
ln(emp)	ln(number of employed graduates or post-graduates searching for a new job/number of population aged 15-64 with the certain level of education), monthly average in a year by TE-Centre regions, separately for graduates and post-graduates
Potential experience	Potential work experience, (observation year – the year of the graduation)
Male	Male, dummy
Municipality	Job is in the municipality sector, dummy
Immigrant	Birth country not Finland, dummy
Swedish speaking	Mother tongue Swedish, dummy
Married	Married, dummy
Cohabitant	Cohabiting, dummy
Children < 7 years	Children under 7 years, dummy
After studies	Movement to a wage earner from full-time studies, dummy
After unemployment	Movement to a wage earner from unemployment, dummy
After entrepreneurship	Movement to a wage earner from entrepreneurship, dummy
After parental leave	Movement to a wage earner from maternity or parental leave
After homemaking	Movement to a wage earner from caring for under 3-year-old children at home
After other position	Movement to a wage earner after not a wage earner for other reasons, dummy
Job change	Job-to-job movement (or a new contract for the same job) during the observation year, dummy
Metropolitan area	Job is located in the Helsinki metropolitan area, NUTS4-level, dummy
University area	Job is located in a university area, NUTS4-level, dummy