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Wage Growth and Mobility Between and Within Firms by Gender and Education*

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TIIVISTELMÄ

Tässä tutkimuksessa tarkastellaan sukupuolten välisiä eroja liikkuvuuden palkkavaikutuksissa Suomen teollisuudessa ajanjaksolla 1997–2006 hyödyntämällä ns. Propensity Score Matching – menetelmää yhdessä Difference-in-Differences – estimoinnin kanssa. Tarkastelun kohteena ovat nuoret teollisuuden toimihenkilöt. Tutkimus täydentää aikaisempaa kirjallisuutta tarkastelemalla liikkuvuutta erikseen yritysten välillä ja yrityksen sisällä. Liikkuvuuden palkkavaikutuksia tutkitaan lisäksi myös koulutustasoittain. Liikkuvuuden yksityiskohtaisempi tarkastelu osoittautuu tärkeäksi. Tulostemme mukaan sekä työnantajan vaihdokset että siirtyminen uusiin tehtäviin saman yrityksen palveluksessa parantavat henkilön palkka-asemaa verrattuna tilanteeseen, jossa työntekijä pysyisi samassa tehtävässä samassa yrityksessä. Liikkuvuustyyppien välillä on kuitenkin eroja palkkavaikutuksissa: työnantajan vaihdokset kasvattavat palkkaa keskimäärin enemmän kuin tehtävän vaihdot yrityksen sisällä. Myös sukupuolten väliset erot liikkuvuuden tuotoissa vaihtelevat liikkuvuustyypin mukaan. Naiset hyötyvät keskimäärin yhtä paljon kuin miehet tehtävän vaihdoksista yrityksen sisällä. Sen sijaan miesten palkat kasvavat keskimäärin 1,2 prosenttiyksikköä enemmän vaihdettaessa työnantajaa kuin naisten palkat. Myös koulutustaustan suhteen havaittiin eroja liikkuvuuden tuotoissa. Alhaisesti koulutetut naiset hyötyvät liikkuvuudesta keskimäärin vähemmän kuin korkeasti koulutetut naiset. Näin on varsinkin työnantajan vaihdoksissa. Miehillä ei sen sijaan havaita vastaavaa vaihtelua liikkuvuuden palkkavaikutuksissa koulutustasoittain.

ABSTRACT

Using propensity score matching combined with the differences-in-differences method this paper investigates gender differences in the wage effects of job mobility among young white-collar workers in the Finnish manufacturing sector over the period 1997-2006. A novel feature of our paper is that besides distinguishing between intrafirm and interfirm job changes we also investigate mobility and wage growth by educational level. These refinements prove to be important. Our results indicate that both kinds of mobility boost wage growth, but the positive effects are much higher for interfirm mobility. Also the gender gap in the returns to job changes varies with the type of mobility, the gap being 1.2 percentage points with interfirm mobility and non-existent when job changes within firms are considered. Furthermore, we find that there are differences in the returns to mobility between educational levels. The low-educated women benefit less from mobility than the high-educated women, especially with employer changes. For men, on the other hand, no such variation in the wage effects of mobility across educational levels is observed.

JEL codes: J31, J62

Key words: Job Mobility, Wage Growth, Gender, Education, Propensity Score Matching and

1. INTRODUCTION

Standard models of mobility suggest that mobility between firms and jobs is an important way for moving up in the wage distribution, especially for young workers (e.g. Burdett, 1978; Jovanovic, 1979a, 1979b). Topel and Ward (1992) find that as much as one third of early-career wage growth among US men is attributable to job mobility. There is, however, also evidence that not all groups of workers benefit from mobility equally. For example, young women have been found to receive lower returns to mobility than young men (e.g. Light and Ureta, 1992; Loprest, 1992; Simpson, 1990). Several explanations have been offered for the gender gap in returns to mobility, all of which are typically in one way or the other related to the fact that due to unequal division of labour within the family, men and women experience different trade-offs between pecuniary and non-pecuniary aspects of jobs. Due to family responsibilities, women might, for instance, face constraints in terms of how much time they can use on travelling to work or how many hours they can spend working. Indeed, there is evidence suggesting that non-pecuniary features of jobs are often more important for women, which explains at least part of the observed gender gap in returns to mobility (Abbott and Beach, 1994; Keith and McWilliams, 1997, 1999; Manning, 2003, ch7; Sicherman, 1996).

Studying gender differences in mobility is important not least because it helps us to understand the factors behind the gender wage gap. Many papers have shown that there is a substantial increase in the gender wage gap during the first 10 years of working life and that gender differences in both the degree of mobility and the returns to job changes contribute to this widening of wage differentials immediately after labour market entry (Manning and Swaffield, 2008; Loprest, 1992; Napari, 2009). Our paper adds to this literature by analyzing the mobility behaviour of young men and women in the Finnish manufacturing sector over the period 1997-2006. The data show that there is a significant gender gap in the average early-career wage growth, men's annual wage growth being 0.7 percentage point higher than women's. However, the size of the gap varies considerably with mobility status. The gender gap in wage growth is 0.4 percentage points with job changes within firms whereas the gap is a staggering 2.0 percentage points when employer changes are considered. It is this gap in the early-career wage growth between male and female white-collar workers and its variation with mobility status that this paper focuses on.

Hence, a novel feature of our paper is that it differentiates between firm-to-firm mobility and job changes within firms using a large matched employer-employee data set. Due to lack of suitable data, only a few earlier studies have distinguished between external and internal job mobility and examined their impact on wage growth.[1] However, there are theoretical reasons for why it might be important to

[1] Felmlee (1982), Gottschalk (2001), le Grand and Tåhlin (2002) and Pavlopoulos et al. (2007) form an exception. However, of these papers only Gottschalk focuses on gender differences in the wage effects of different types of mobility.

pay attention also to the type of mobility, not only to overall separation rates. For example, the theory of internal labour markets suggests that the processes involved in job changes within a firm are very different from those associated with job switches between firms. One distinctive feature of internal labour markets is well-defined career paths within firms with wages being strongly tied to the jobs rather than to the characteristics of the employees (Baker et al., 1994; Baker and Holmstrom, 1995). Furthermore, the rules governing wage setting within firms might shield workers from changes in external labour markets. Job switches between firms are, on the other hand, typically much more open to competition. The few existing studies that have disaggregated mobility into job changes within firms and job changes between employers conclude that by distinguishing between different types of job switches we can improve our understanding of the factors affecting job mobility and the importance of mobility as a determinant of wage growth. For example, Booth and Francesconi (2000) point out that papers focusing only on the overall separation rate, and hence ignoring within-firm mobility, might give an incomplete and even a false picture of workers' career development.

Besides distinguishing between job changes within and between firms, we also investigate gender differences in mobility and wage growth between educational levels. There are both theoretical and empirical justifications for this. Starting with the theoretical reasons, several models emphasize interactions between education and job mobility. The job-shopping model by Johnson (1979) and the matching model by Jovanovic (1979a) both predict a positive relation between education and job mobility. One reason for this is that education increases outside opportunities for workers, and thus the option value related to mobility. On the empirical side, the findings of the effects of education on job mobility are ambiguous. Blau and Kahn (1981) and Viscusi (1980) find support for the predictions of the job-shopping and matching models by observing a positive relationship between women's quit rates and education. However, several other studies have found negative effects of education on mobility rates (e.g. Light and Ureta, 1992; Mincer and Jovanovic, 1981). While these early studies made no distinction between different types of mobility, Royalty (1998) suggests that understanding the relation between education and mobility might require such a distinction, especially when exploring job changes by gender. Royalty finds that more educated women are very similar to men in terms of labour market mobility; it is the less-educated women that differ in mobility behaviour from both men and the highly-educated women. Women with a high school degree or less face higher job-to-unemployment turnover than other women or men. Furthermore, Royalty shows that low-educated women are also less likely to move between jobs.

Various estimation strategies have been suggested for tackling possible endogeneity of job mobility in the wage growth equation (see e.g. Altonji and Shakotko, 1987; Antel, 1991; Flinn, 1986; Lillard, 1999; Topel, 1991). Our paper contributes to this literature by applying a differences-in-differences propensity score matching method. To our knowledge, only one earlier study on gender differences in the effects of mobility on wage growth has applied a similar approach (Davia, 2006). As we will

discuss below, matching combined with a difference-in-differences technique provides a way to deal with both the problem of unobserved heterogeneity and the endogeneity of job mobility caused by the simultaneity of mobility and wage growth.

The main findings of the paper can be summarized as follows. Aggregating intrafirm and interfirm job changes hide important information on gender differences in mobility and its effects on wage growth. Also, investigating mobility by educational level proved to be insightful. Our estimation results indicate that both types of job mobility boost wage growth, but the positive effects are much greater for interfirm mobility. Also the gender gap in wage growth with job changes varies by the type of mobility. Men experience 1.2 percentage points higher wage growth than women when changing an employer whereas the gender gap is non-existent with job changes within firms. Exploring mobility and wage growth further by educational level reveals that the low-educated women receive considerably lower returns to mobility than other workers. The high-educated women experience roughly the same returns to mobility than men. For men, on the other hand, variation in the wage effects of mobility by education level is small.

The structure of the paper is as follows. Section 2 gives a short description of the Finnish institutional settings. Section 3 introduces the data and provides descriptive evidence of wage growth and mobility in the Finnish manufacturing. Section 4 presents the estimation approach used in the paper and Section 5 reports the results. Finally, Section 6 summarizes and discusses the main findings of the paper.

2. THE FINNISH INSTITUTIONAL SETTING

This section gives a brief description of the Finnish institutional framework. The focus is on those aspects of labour market institutions that are most relevant with respect to the questions of our paper, i.e. institutions such as the Finnish wage bargaining system, employment protection and gender equality policies, that might affect job mobility, economic returns to mobility and gender differences in these respects.

The Finnish model of wage bargaining can be described as being highly centralized.[2,3] Both employees and employers are comprehensively organized, and the right of association is stated in the

[2] Recently there has been a tendency towards more decentralized wage setting in Finland. However, during our investigation period centralized wage agreements played a very important role in wage formation in the Finnish labour market.

[3] The description of the Finnish wage bargaining system draws heavily from the papers by Asplund (2007), Kangasniemi (2003) and Vartiainen (1998).

Constitution. The wage bargaining procedure itself comprises of several stages. At the first stage the central organizations of employers and employees, typically together with government officials, negotiate a framework agreement which provides the basis for industry specific agreements. These agreements guide the use of labour within industries. For example, they set minimum wages at different levels of job-complexity and education. At the next stage, individual employer and employee associations negotiate agreements for specific branches of the public and private sectors using the framework agreement as a guideline. The resulting sectoral agreements set the *minimum standards* for branches.[4] At the final stage of the process, individual workers and firms agree upon the terms of employment.

The coverage of the collective wage agreements has traditionally been high in Finland: typically over 90 per cent of employee-employer relationships are covered by these agreements. The actual unionization rate is, however, somewhat lower. The difference between unionization rate and the coverage of agreements is due to the Finnish labour law which defines that the minimum conditions of agreements are extended beyond the contracting parties if the collective agreement is considered being sufficiently representative.

Centralized wage setting system might affect gender differences in wages and mobility in many ways. For example, labour markets with centralized wage setting tend to have lower wage dispersion than countries with more decentralized wage bargaining system (e.g. Blau and Kahn, 1996). Therefore, penalties from lower levels of human capital might not be as high in countries like Finland as they are in labour markets with less compressed wage distributions, like the U.S. Given that women typically invest less in human capital than men[5], lower wage dispersion is likely to be associated with narrower gender wage gaps. There is also empirical support for this hypothesis (e.g. Blau and Kahn, 1996). Furthermore, because of lower inter-firm wage differentials, centralized systems might also decrease workers' incentives to search for better paying jobs and change employers. Teulings and Hartog (1998) for example found that the level of labour mobility is lower in countries with centralized wage setting than in labour markets with more decentralized systems

As regards employment protection, in the overall strictness ranking of 28 OECD countries Finland is around the average and clearly below two of the Nordic countries, Sweden and Norway (OECD, 2004). According to the Finnish labour law, employment contracts can either be of fixed term or have indefinite duration (permanent contract). The use of fixed-term contracts needs to be justified by the employer, and without well-grounded reason, several sequential fixed-term contracts are regarded as a permanent contract. As to the rules for dismissals, ending a fixed-term contract is not permitted

[4] Therefore, firms are allowed, for example, to pay higher wages than the negotiated wage.

[5] In Finland, this is not necessarily the case. Finnish women are, for example, on average more educated than Finnish men.

during the contract period. In the case of an indefinite employment contract, dismissals require advance notice. The notice period varies between one to six months, depending on the length of tenure. There must always be well-founded economic reasons for dismissals, and it is prohibited by law to dismiss a worker for example due to pregnancy, parental leave or because of military service.

Employment protection is likely to decrease labour market mobility for two main reasons. First, because employment protection policies raise the costs of dismissals, they discourage job destruction. Second, by raising labour costs employment protection is also likely to have negative effects on hiring. Indeed, several studies have shown that stricter employment protection is associated with lower levels of labour turnover (e.g. Gangl, 2003; Gregg and Manning, 1997).

Other important institutions with respect to gender wage differentials are gender equality policies. Similar to other developed countries, also in Finland the prevailing anti-discrimination legislation prohibits discrimination in hiring, promotions or pay on the basis of gender or other characteristics irrelevant to the productivity of the worker. Besides anti-discrimination legislation, one particularly important gender equality policy is parental leave legislation. The Finnish family leave system gives mothers (and fathers alike) the opportunity to stay at home to take care of the children for a substantial time period. For instance, the maternity leave is 105 weekdays in Finland. During this time mothers receive maternity allowance the amount of which is based on earnings preceding the leave. After maternity leave, mothers may take parental leave for 158 weekdays during which they get earnings-tested allowance. After parental leave, parents are entitled to care leave until the child is three years old. Care leave is unpaid, but it is possible to receive a child home care allowance.

The Finnish family leave system is thus rather generous both in duration and compensation levels. There are studies showing that generosity of the family leave system prolongs the child-related career breaks (e.g. Pylkkänen and Smith, 2004). This might have significant negative effects on mothers' wages as they tend to be outside the labour market during the stage of the career when workers typically change jobs frequently and experience strong wage growth.[6]

[6] Evidence of the motherhood wage penalty from the Finnish labour market, see Napari (2007).

3. THE DATA AND DESCRIPTIVE EVIDENCE OF WAGE GROWTH AND MOBILITY

3.1 The Data

This paper uses large linked employer-employee data on white-collar workers employed in the Finnish manufacturing sector over the period 1997-2006. The data set can be considered highly reliable as it comes directly from the administrative records of the member firms of the Confederation of Finnish Industries (EK). The Finnish labour market is highly unionized with comprehensive collective wage agreements and EK is the main organization of employers. Since it is compulsory for the firms affiliated with EK to provide the required information, the non-response bias is practically non-existing. The member firms account for over two thirds of the value added of the Finnish manufacturing and a clear majority of employees in this sector work in the member firms of EK.

As mentioned in the introduction, our paper focuses on young workers. Therefore, we exclude white-collar workers who are over 30 years old when they appear in the data for the first time. Furthermore, we focus on those white-collar workers that have at least two years of data. This is because identification of job changes requires data from more than one year. The resulting data contain over 16,000 white-collar workers per year of which on average 33.6 per cent are women. Summary statistics of the main variables are shown in Table A1 in appendix.

One of the advantages of our data set is that it allows us to distinguish between interfirm and intrafirm job mobility. Every white-collar worker in the data is attached to a firm identifier and job title[7]. Comparing these between years we can identify both within-firm and between-firms job changes.[8] Another advantage of our data set is that it is fairly rich: it contains information on many commonly used employee and employer characteristics like gender, age, tenure, the level and field of education, occupation, firm size and field of industry. Perhaps the most unfortunate aspect of the data with respect to the focus of our paper is the lack of information on marital status and dependent children. Therefore, we cannot identify the potential impact of maternity leave spells on job mobility and wage growth.[9]

[7] The data contain 75 different job titles that are comparable across firms.

[8] EK collects information from the member firms once in a year. This means that we can observe at most one employer and job change per white-collar worker each year. Our mobility variable is thus likely to understate true mobility to the extent that white-collar workers may change employers and jobs several times during a year. No information is available for Finland in this respect.

[9] Maternity leave spells show up as breaks in the data. We are not able to differentiate between maternity leaves and other types of employment breaks.

Most of the variables used in the analysis are conventionally defined, and therefore they do not demand much discussion. Some words concerning the definitions of the mobility variables, the wage growth measure and the educational groups are, however, needed. As mentioned, we identify job changes by comparing job titles attached to white-collar workers between consecutive years.[10] Job changes within and between firms are respectively distinguished by comparing firm identifiers across years. However, due to business reorganizations like mergers, there are some cases where firm identifiers change even though workers do not actually move between employers. To exclude these cases we set further conditions for an employer change. Besides a change in the firm identifier, we require that over 40 per cent of the present co-workers must have changed and the current employment relationship cannot have started before the last year's survey month.

Wage growth is defined as a difference in average monthly wages between years t-1 and t. Monthly wages include shift work compensations, but they exclude for example overtime pay, fringe benefits and bonuses. Our wage measure thus refers to monthly earnings that remain more of less fixed from one month to another.

We also distinguish between low-educated and high-educated white-collar workers. Low-educated group includes white-collar workers with no higher than lowest tertiary education. High-educated group on the other hand consists of those with higher than lowest tertiary education.

One might be concerned about our decision to investigate mobility and wage growth between consecutive years as this approach has the potential disadvantage to under-sample women due to their higher probability to experience career breaks. However, this does not seem to be a particularly big problem in our case: the share of female observations is 35.3 per cent before the restriction compared to 33.5 per cent once we focus on those who have wage observations from consecutive years.[11]

3.2 Mobility Between and Within Firms

Table 1 shows that mobility rates are very similar for men and women. The average annual firm change rate is 2.2 per cent for men and 2.1 per cent for women. Men are also slightly more likely to change jobs within firms, the intrafirm mobility rate being 13.8 per cent for men and 13.4 per cent for women. However, the gender gap in wage growth is more pronounced and it varies greatly with

[10] This definition implies that job changes can include promotions, horizontal job changes, as well as demotions.

[11] We also investigated in more detail those who exit from the data. It turned out that these individuals are for example somewhat lower educated and work in less demanding jobs than those who stay in the data. However, there no notable gender differences in background characteristics among white-collar workers who exit the data. Therefore, the possible bias due to attrition with respect to our conclusion about gender differences in mobility and returns to job changes is likely to be small.

mobility status. The gap is only 0.4 percentage point with job changes within firms whereas there is a considerable gap of 2.0 percentage points with employer changes.

Table 2 distinguishes between the low-educated and the high-educated white-collar workers. The results show that aggregating across educational levels hides important information on wage growth and mobility during the early career. High-educated workers are both more mobile and experience stronger wage growth than their less educated colleagues. This is particularly evident for women. It follows that the gender differences in outcomes apparent in Table 1 are mostly driven by the low-educated white-collar workers. The size of the gender gap in average annual wage growth is 1.1 percentage points among the low-educated white-collar workers whereas the high-educated women experience only 0.4 percentage point lower annual wage growth than their male colleagues. Similar to Table 1, the gender gap in wage growth is highest with employer changes, the gap being a staggering 3.6 percentage points for the low-educated white-collar workers and insignificant for the high-educated white-collar workers. The low-educated women are also somewhat less mobile than the low-educated men whereas the high-educated women change both employers and jobs within firms more often than the high-educated men.

Table 1. Wage growth by gender and mobility status.

	Men	**Women**	**Difference**
Average annual wage growth	0.060	0.053	0.007***
Average annual wage growth with firm changes	0.129	0.109	0.02***
Average interfirm mobility rate (%)	2.2	2.1	0.1
Average annual wage growth within same firm with no job changes	0.055	0.048	0.007***
Average nonmover share (%)	84.0	84.5	-0.5***
Average annual wage growth within same firm with job changes	0.081	0.076	0.004***
Average intrafirm mobility rate (%)	13.8	13.4	0.4**

Notes: 1. ***: difference significant at 1 % level, **: difference significant at 5 % level.
2. Mobility rate as a share of observations.

Table 2. Wage growth by gender, mobility status and education level.

	Low-educated			High-educated		
	Men	**Women**	**Difference**	**Men**	**Women**	**Difference**
Average annual wage growth	0.060	0.049	0.011***	0.061	0.057	0.004***
Average annual wage growth with firm changes	0.127	0.091	0.036***	0.129	0.121	0.008
Average interfirm mobility rate (%)	1.65	1.69	-0.04	2.46	2.51	-0.05
Average annual wage growth within same firm with no job changes	0.054	0.045	0.009***	0.056	0.052	0.004***
Average nonmover share (%)	85.2	86.8	-1.6***	83.4	82.0	1.4***
Average annual wage growth within same firm with job changes	0.084	0.075	0.009***	0.079	0.078	0.001
Average intrafirm mobility rate (%)	13.1	11.4	1.7***	14.1	15.4	-1.3***

Notes: 1. ***: difference significant at 1 % level.
2. Mobility rate as a share of observations.

To conclude, Tables 1 and 2 emphasize the importance of distinguishing between different types of job changes and exploring mobility by educational levels.

4. ESTIMATION FRAMEWORK

The comparisons in Section 3.2 do not take into account the possible selection of workers to those who move between firms or within firms and to those who remain in their current jobs. This selection is likely to be non-random and, therefore, it probably accounts at least part of the observed wage effects of mobility. In order to tackle this possible endogeneity problem, we apply a propensity score matching differences-in-differences method. We are interested in the causal effects of mobility between and within firms on wages. Using the terminology familiar from the evaluation literature, there are thus two "treatments" in our analysis: one is mobility between firms, and the other is job mobility within a firm. The outcome we are interested in is the impact of mobility on wages, i.e. we want to compare the development of wages of a white-collar worker who moves from one firm to another (Y_1) (or from one job to another within a firm) with his wages in the case he did not move (Y_0). The average treatment effect on the treated (ATT) is then given by:

$$ATT = E(Y_1|D=1) - E(Y_0|D=1), \quad (1)$$

where D is an indicator taking a value of one if a white-collar worker changes employer between years t and t-1 (or a job change within a firm) and zero if a worker do not move (neither between firms nor between jobs within a firm).

The obvious problem with this evaluation framework is that we cannot observe the same person in both states at the same time. Therefore we have to find some other way to estimate the wages of movers in the case they had stayed in their current job. Here it is important to notice that in observational studies selection of subjects to different states is not in general random causing bias to the estimation of the effect of treatment.

To overcome this selection bias and to construct a valid control group we employ propensity score matching (PSM) techniques. These are based on the simple idea that the potential selection bias is reduced when we compare the outcomes of groups who are as similar as possible. To make the matching feasible[12], Rosenbaum and Rubin (1983) propose the use of propensity score which summarizes the pre-treatment characteristics of groups into a single variable. The propensity score may be defined as follows:

$$p(X) \equiv \Pr\{D=1|X\}=E\{D|X\}, \quad (2)$$

where $D=\{0, 1\}$ is the indicator of treatment, X is the vector of pre-treatment characteristics, and $p(X)$ is the probability of treatment given X (Rosenbaum and Rubin, 1983). In our framework, $p(X)$ refers to the conditional probability of changing a firm (or a job within a firm). Since the extent to which the propensity score matching estimators decrease the potential selection bias depends on the similarity of treatment and control groups, it is important to have rich and high quality data at hand. Fortunately, our data allow us to control for a fairly large set of variables likely to affect mobility. We include age, the level and field of education, employment status (permanent vs. temporary), position, tenure (under one year, 1-3 years, over 3 years) and firm size in the vector X.[13]

Identification of the causal effect of mobility on wages by applying propensity score matching is essentially based on two assumptions. The first one is the Conditional Independence Assumption

[12] There is a "curse of dimensionality" problem related to matching: as the number of variables included in the matching increases and/or as the range of values these variables may take gets larger, the probability to find a match decreases.

[13] For employment status, position, tenure, and firm size we use lagged values (t-1). We also experimented with some other set of variables, but the results were not particularly sensitive in this respect.

(CIA). Under this assumption, selection into treatment is based completely on observable variables, and once we condition on these variables the selection can be considered to be random. More specifically, using the above notation CIA can be expressed with propensity scores as follows: $(Y_0, Y_1) \perp D \mid p(X)$. The second requirement is the common support condition. This assumption states that persons with the same observable characteristics have a positive probability of being both in the treated group and in the non-treated group. In other words, $0 < P(D=1|X) < 1$. This guarantees that the required counterpart really exists.

There are several ways to match treatment and control groups on the basis of propensity score. The most often applied methods are nearest neighbour matching, radius matching, kernel matching and stratification matching. Here we employ the nearest neighbour matching in which the treated person i is matched to that non-treated person j with the closest propensity score.[14] It is possible that one control unit can be the best match for more than one treated person. Therefore, the nearest neighbour matching is often applied with replacement. We also follow this approach. Once the matching is done, the ATT is obtained simply by averaging the difference in outcomes between the treated and control units.

One obvious shortcoming of the matching approach is that it relies exclusively on observable variables. It is possible, however, that the decisions to move between firms (or within a firm) are not only determined by characteristics observable to the econometrician but also by unobservable factors such as motivation and ability. Therefore, to overcome this potential bias caused by selection on time-invariant unobservables, we combine matching approach with the differences-in-differences approach (a propensity score matching differences-in-differences, abbreviated PSM-DID). The PSM-DID matching estimator compares the difference in the outcome before and after the treatment of the treated units with the difference in the outcome of the non-treated units in the same period. In the general form, matching differences-in-differences estimator can be expressed as follows:

$$\alpha_{MDID} = \sum_{i \in T} \left\{ \left[Y_{it1} - Y_{it0} \right] - \sum_{j \in C} W_{ij} \left[Y_{jt1} - Y_{jt0} \right] \right\} w_i \,, \tag{3}$$

where T and C refers to the treatment and comparison groups respectively, W_{ij} is the weight placed on observation j forming comparison with treated individual i, w_i is the re-weighting term for the treated, and t0 and t1 account for the period before and after the treatment, respectively (Blundell and Costa Dias, 2002). In our case, weight W_{ij} is determined by the nearest neighbour matching.

[14] To show that our conclusions are not sensitive to the chosen matching method, Section 5.4 presents results with alternative matching algorithm.

To our knowledge, of the earlier mobility studies only Davia (2006) has used matching combined with differences-in-differences approach. The more standard approach to tackle the endogeneity and unobserved heterogeneity problem is the instrumental variables estimation (see e.g. Altonji and Shakotko, 1987; Dustman and Pereira, 2008; Topel, 2001). The difficulty with this method is that it is a very challenging task to come up with a valid instrument. In particular, our data set does not include any variables that could be argued to be correlated with wages only through their effect on mobility, and as such could be considered as a suitable instrument.

5. RESULTS

5.1 Propensity Score Estimation Results and Matching Quality

We estimate the propensity score by applying a probit model. In Table 2A the dependent variable is the probability of changing a firm while Table 3A explains within firm job changes (see Appendix). In both models the explanatory variables include a dummy indicating whether or not a worker is under 30 years old, a dummy for the level of education (no higher than lowest tertiary education), indicator for the field of education (eight categories) and for the position in the firm's organizational hierarchy (four categories), a dummy for employment status (permanent vs. temporary), tenure (three categories), and firm size.[15]

The results for firm changes are pretty well in line with the predictions of standard models of job mobility. First, the probability of firm changes increases with the level of education. Second, employer changes are negatively correlated with tenure and positively associated with the current level of hierarchical position. Also those in temporary employment are more likely to change employer. These findings apply for both men and women.

Also the probability of within-firm mobility increases with education and decreases with tenure (Table 3A). Temporary employment is positively related to within-firm job changes mobility, as was the case with interfirm mobility. As expected, white-collar workers at the lowest hierarchical level are more mobile than other white-collar employees. This reflects the fact that there is more room for mobility for workers lower in the organizational hierarchy. Again, there are no notable gender differences in the effects of background characteristics.

Tables 4A and 5A repeat the probit estimations separately for the low-educated and high-educated white-collar workers. Although the size of the effects of background characteristics on mobility varies

[15] See footnote 13.

somewhat between education groups, decomposing the sample into the low-educated and high-educated white-collar workers keeps the signs of the parameter estimates mostly unchanged.

As discussed in Section 4, the success of matching method to decrease the potential endogeneity bias depends crucially on the similarity of treatment and control groups. Therefore, one cannot stress enough the importance of the matching quality. Tables 6A to 11A in appendix provide information on the differences in the background characteristics between treatment and control groups after matching has taken place. Generally, matching seems to work well since for most variables the mean values do not differ between the groups at the conventional significance levels. However, two remarks should be made. First, the matching quality is better for interfirm mobility where the difference in mean values is insignificant for all variables at the 5 % level. This holds irrespective of gender or education level. Second, the relatively weaker matching quality for intrafirm mobility is more of an issue for the high-educated white-collar workers. But also here one should notice that the matching quality is reasonable good: for the high-educated men, there are only two variables where the difference in mean values is significant at the 5 % level while for the high-educated women, there are three such variables.

5.2 Wage Effects of Interfirm Mobility

Table 3 presents the PSM-DID estimation results for interfirm mobility. The first two columns show that male white-collar workers benefit more from employer changes than their female colleagues. For men, the estimated wage premium to employer changes is 6.3 per cent meaning that men's wage growth is 6.3 per cent higher with a firm change compared to the case they had stayed in the same job and in the same firm. The corresponding figure for women is 5.1 per cent.

The descriptive analysis in Section 3.2 suggests that there are significant differences in the wage effects of mobility between educational levels, especially for women. Columns 3-6 in Table 3 provide further evidence of the importance of accounting for this across educational level variation in the returns to mobility when analyzing gender differences in the wage effects of mobility. As can be seen, the low-educated women benefit considerably less from interfirm mobility than the high-educated women or men. The wage premium to firm changes is 3.7 per cent for the low-educated women compared to 6.4 per cent for the high-educated women who benefit similarly to the high-educated men while there is a staggering 2.3 percentage points gender gap in the premium among the low-educated white-collar workers.

Although a detailed investigation of the factors contributing to the lower returns to firm changes for the low-educated women is beyond the scope of our paper, the issue nevertheless deserves some discussion. One potential explanation is that the reasons for firm changes differ between the low-educated women and other workers. Some studies have found evidence that women are in general

more likely than men to quit for family-related reasons and that these differences in the causes of mobility explain at least part of the gender gap in the returns to mobility (e.g. Keith and McWilliams, 1997). It might well be that it is the low-educated women in particular who differ from the other workers in motives for firm changes. Perhaps these women are less career-oriented and put less weight on the pecuniary aspects of jobs while the high-educated women are more similar to men in terms of factors behind employer changes.

Table 3. The wage effects of interfirm mobility by gender and educational level.

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
PSM-DID	0.051	0.063	0.037	0.064	0.060	0.063
estimate	(0.0047)	(0.003)	(0.007)	(0.0068)	(0.008)	(0.004)
N	49565	97769	25925	23640	32541	65225

Notes: 1. The results are based on a propensity score matching difference-in-differences method.
2. Bootstrapped standard errors are in parenthesis.
3. About the controlled variables, see e.g. Table 2A in appendix.

Our estimates of the returns to interfirm mobility seem to somewhat lower than what is typically found in the literature. For example, several studies from the US and the UK document that employer changes result in around ten per cent increase in wages (e.g. Keith and McWilliams, 1999; Campbell, 2001). There are undoubtedly many factors influencing to these differences in the returns to mobility between Finland and the Anglo-Saxon countries, but one potentially important issue is the different institutional set-ups discussed in Section 2. In particular, the history of centralized wage setting has contributed to lower interfirm wage differentials in Finland compared the US and the UK decreasing the potential gains from employer changes in the Finnish labour market.

5.3 Wage Effects of Intrafirm Mobility

Table 4 shows the corresponding results for intrafirm mobility. Job changes seem to be beneficial to white-collar workers also when mobility takes place within a firm although the returns are smaller than the gains from interfirm mobility. Furthermore, unlike in employer changes, there is no gender gap in returns to within-firm mobility (columns 1 and 2). Both men and women experience on average 2.8 per cent higher wage growth when they change jobs within a firm compared to the case they had stayed in their current jobs.

Similar to employer changes, also here distinguishing between the low-educated and the high-educated white-collar workers provides additional information on gender differences in returns to

mobility, although the variation in the premiums to job changes between educational levels is smaller with intrafirm mobility than with employer changes. The low-educated women experience 0.6 percentage points lower return to within-firm job changes than the low-educated men while among the high-educated white-collar workers women benefit more from mobility than men.

Table 4. The wage effects of intrafirm mobility by gender and educational level.

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
PSM-DID	0.0278	0.0280	0.023	0.027	0.029	0.024
estimate	(0.002)	(0.002)	(0.0025)	(0.0068)	(0.003)	(0.002)
N	56037	110941	28779	27258	36849	74089

Notes: 1. The results are based on a propensity score matching difference-in-differences method.
2. Bootstrapped standard errors are in parenthesis.
3. About the controlled variables, see e.g. Table 2A in appendix.

Also our estimates of the returns to internal mobility are somewhat lower compared to many of the earlier studies who find significant wage premiums for within firm job changes, the estimates ranging from 5 per cent to 15 per cent or even higher (Baker et al., 1994; McCue, 1996; Pergamit and Veum, 1999). Again, at least part of this difference in the estimated returns to mobility between our paper and the earlier studies might be due to country differences in the institutional frameworks. Another explaining factor is the differences in the types of job changes investigated. Most of the earlier studies focus exclusively on promotions. Our measure of the within firm job changes on the other hand includes also demotions and lateral movements in the firm's organizational structure.

5.4 Robustness Checks

This section focuses on the sensitivity of our results with respect to the matching and estimation methods used. As discussed in Section 4, we apply the nearest neighbour matching to match treatment and control groups. This method guarantees a large number of matched pairs since all the treated units are forced to find at least one match. However, the obvious drawback with the nearest neighbour matching is that it may result in poor matches in some cases. One solution to overcome this problem is to use Kernel matching instead. Kernel matching uses weighted averages of *all* individuals in the control group to form matches with the treated. The weights are inversely proportional to the gap in the propensity scores between the treated and controls, i.e. matches with better quality get higher weights.

Tables 12A and 13A show the Kernel matching results for interfirm mobility and intrafirm job changes, respectively. When compared to the nearest neighbour matching results presented in Tables 3 and 4, one can see that they are very similar. The Kernel matching produces somewhat larger estimates of the returns to mobility, but all the main conclusions concerning the variation of wage premium to mobility by gender, education and type of mobility remain the same. We thus conclude that our findings are not driven by the choice of matching method.

Tables 14A and 15A show the OLS and fixed effects estimation results. As can be seen, also these more conventional estimation methods support the main findings from the PSM-DID estimations.

6. CONCLUSIONS

This paper investigates gender differences in the returns to mobility using a large linked employer-employee data on white-collar workers employed in the Finnish manufacturing over the period 1997-2006. A novel feature of our paper is that it distinguishes between job changes within firms and mobility between firms. We also differ from the earlier literature by investigating mobility and wage growth by the level of education. The wage premiums to mobility are estimated using a propensity score matching combined with the differences-in-differences method. This technique provides a way to deal with both the unobserved heterogeneity problem and the endogeneity of mobility caused by the simultaneity of job changes and wage growth.

Our results show that in order to understand gender differences in the returns to mobility, it is important to give a closer look at the different types of job changes instead of investigating only the overall separation rates. First, we observe that both kinds of mobility boost wage growth, but the wage premium is much higher for interfirm mobility than for job changes taking place within a firm. Also the gender gap in the returns to mobility varies considerable with the type of job changes, the gap being 1.2 percentage points with mobility between firms and non-existent when mobility within firms is considered. The returns to mobility differ also between educational levels. The low-educated women benefit in general less from mobility than the high-educated women. This gap in returns is particularly evident in firm changes. The low-educated men, on the other hand, benefit roughly the same from mobility than the high-educated men.

REFERENCES

Abbott, Michael G., and Charles M. Beach (1994): "Wage Changes and Job Changes of Canadian Women: Evidence from the 1986-87 Labour Market Activity Survey", *Journal of Human Resources*, Vol. 29(2), pp. 429-60.

Altonji, Joseph G., and Robert A. Shakotko (1987): "Do Wages Rise with Job Seniority?", *Review of Economic Studies*, Vol. 54(3), pp. 437-59.

Antel, John J. (1991): "The Wage Effects of Voluntary Labor Mobility with and without Intervening Unemployment", *Industrial and Labor Relations Review*, Vol. 44(2), pp. 299-306.

Asplund, Rita (2007): "Finland: Decentralisation Tendencies within a Collective Wage Bargaining System", ETLA Discussion papers No. 1077.

Baker, George, Michael Gibbs, and Bengt Holmstrom (1994): "The Internal Economics of the Firm: Evidence from Personnel Data", *Quarterly Journal of Economics*, Vol. 109(4), pp. 881-919.

Baker, George, and Bengt Holmstrom (1995): "Internal Labor Markets: Too many Theories, Too Few Facts", *American Economic Review*, Vol. 85(2), pp. 255-59.

Becker, Sascha O., and Andrea Ichino (2002): "Estimation of Average Treatment Effects Based on Propensity Scores", *The Stata Journal*, Vol. 2(4), pp. 358-7.

Blau, Francine D., and Lawrence M. Kahn (1981): "Race and Sex Differences in Quits by Young Workers", *Industrial and Labor Relations Review*, Vol. 34(4), pp. 563-77.

Blau, Francine, and Lawrence Kahn (1996): "Wage Structure and Gender Earnings Differentials: An International Comparison", *Economica*, Vol. 63(250), pp. S29-S62.

Blundell, Richard, and Monica Costa Dias (2002): "Alternative Approaches to Evaluation in Empirical Microeconomics", cemmap working paper CWP10/02.

Booth, Alison L., and Marco Francesconi (2000): "Job Mobility in 1990s Britain: Does Gender Matter?", *Research in Labor Economics*, Vol. 19, pp. 173-89.

Burdett, Kenneth (1978): "A Theory of Employee Job Search and Quit Rates", *American Economic Review*, Vol. 68(1), pp. 212-20.

Campbell, David (2001): "Estimating the Wage Effects of Job Mobility in Britain", University of Kent, Studies in Economics series, No. 0117.

Davia, Maria A. (2006): "Studying the Impact of Job Mobility on Wage Growth at the Beginning of the Employment Career in Spain", unpublished working paper.

Dustmann, Christian, and Sonia C. Pereira (2008): "Wage Growth and Job Mobility in the United Kingdom and Germany", Industrial and Labor Relations Review, Vol. 61(3), pp. 374-393.

Felmlee, Diana H. (1982): "Women's Job Mobility Processes Within and Between Employers", American Sociological Review, Vol. 47(1), pp. 142-51.

Flinn, Christopher J. (1986): "Wages and Job Mobility of Young Workers", Journal of Political Economy, Vol. 94(3), pp. S88-S110.

Gangl, Markus (2003): "The Only Way is Up? Employment Protection and Job Mobility among Recent Entrants to European Labour Markets", European Sociological Review, Vol. 19(5), pp. 429-49.

Gottschalk, Peter (2002): "Wage Mobility Within and Between Jobs", Boston College Working Papers in Economics, No. 486.

le Grand, Carl, and Michael Tåhlin (2002): "Job Mobility and Earnings Growth", European Sociological Review, Vol. 18(4), pp. 381-400.

Gregg, Paul, and Alan Manning (1997): "Labour Market Regulation and Unemployment", in Snower D.J., and G. de la Dehesa (eds) Unemployment Policy, Cambridge: Cambridge University Press, pp. 395-419.

Johnson, William R. (1978): "A Theory of Job Shopping", Quarterly Journal of Economics, Vol. 92(2), pp. 261-78.

Jovanovic, Boyan (1979a): "Job Matching and the Theory of Turnover", Journal of Political Economy, Vol. 87(5), pp. 972-90.

Jovanovic, Boyan (1979b): "Firm-Specific Capital and Turnover", *Journal of Political Economy*, Vol. 87(6), pp. 1246-59.

Kangasniemi, Mari (2003): "Essays on Job Tenure, Wages, Worker Mobility and Occupation in Finnish Manufacturing: Do Institutions Matter?", PhD-thesis, University of Essex.

Keith, Kirsten, and Abigail McWilliams (1997): "Job Mobility and Gender-Based Wage Growth Differentials", Economic Inquiry, Vol. 35(2), pp. 320-33.

Keith, Kirsten, and Abigail McWilliams (1999): "The Returns to Mobility and Job Search by Gender", *Industrial and Labor Relations Review*, Vol. 52(3), pp. 460-77.

Light, Audrey, and Manuelita Ureta (1992): "Panel Estimates of Male and Female Job Turnover Behavior: Can Female Nonquitters Be Identied?", Journal of Labor Economics, Vol. 10(2), pp. 156-81.

Lillard, Lee A. (1999): "Job Turnover Heterogeneity and Person-Job-Specific Time-Series Wages", Annales d'Economie et de Statistique, iss. 55-56, pp. 183-210.

Loprest, Pamela J. (1992): "Gender Differences in Wage Growth and Job Mobility", American Economic Review, Vol. 82(2), pp. 526-32.

Manning, Alan (2003): "Monopsony in Motion: Imperfect Competition in Labor Markets", Princeton: Princeton University Press.

Manning, Alan, and Joanna Swaffield (2008): "The Gender Gap in Early-Career Wage Growth", Economic Journal, Vol. 118(530), pp. 983-1024.

McCue, Kristin (1996): "Promotions and Wage Growth", Journal of Labor Economics, Vol. 14(2), pp. 175-209.

Mincer, Jacob, and Boyan Jovanovic (1981): "Labor Mobility and Wages", in Studies in Labor Markets, edited by Sherwin Rosen, Chicago: University of Chicago Press.

Napari, Sami (2007): "Is There a Motherhood Wage Penalty in the Finnish Private Sector?", ETLA Discussion papers No. 1107.

Napari, Sami (2009): "Gender Differences in Early-Career Wage Growth", Labour Economics, Vol. 16(2), pp. 140-58.

OECD (2004): "OECD Employment Outlook 2004", Paris: OECD.

Pavlopoulos, Dimitris, Didier Fouarge, Ruud Muffels, and Jeroen K. Vermunt (2007: "Job Mobility and Wage Mobility of High- and Low-Paid Workers", Journal of Applied Social Science Studies, Vol. 127(1), pp. 47-58.

Pergamit, Michael, and Jonathan R. Veum (1999): "What is a Promotion?", Industrial and Labor Relations Review, Vol. 52(4), pp. 581-601.

Pylkkänen, Elina, and Nina Smith (2004): 'The Impact of Family-Friendly Policies in Denmark and Sweden on Mothers' Career Interruptions due to Childbirth', IZA Discussion Paper No. 1050.

Rosenbaum, P.R., and D.B. Rubin (1983): "The Central Role of Propensity Score in Observational Studies for Causal Effects", *Biometrika*, Vol. 70(1), pp. 41-55.

Royalty, Anne Beeson (1998): "Job-to-Job and Job-to-Nonemployment Turnover by Gender and Education Level", *Journal of Labor Economics*, Vol. 16(2), pp. 392-443.

Sicherman, Nachum (1996): "Gender Differences in Departures from a Large Firm", *Industrial and Labor Relations Review*, Vol. 49(3), pp. 484-505.

Simpson, Wayne (1990): "Starting Even? Job Mobility and the Wage Gap Between Young Single Males and Females", Applied Economics, Vol. 22(6), pp. 723-37.

Teulings, Coen, and Joop Hartog (1998): "Corporatism or Competition? Labour Contracts, Institutions and Wage Structures in International Comparison", Cambridge: Cambridge University Press.

Topel, Robert H. (1991): "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority", Journal of Political Economy, Vol. 99(1), pp. 145-76.

Topel, Robert H., and Michael P. Ward (1992): "Job Mobility and the Careers of Young Men", Quarterly Journal of Economics, Vol. 107(2), pp. 439-79.

Vartiainen, Juhana (1998): "The Labour Market in Finland: Institutions and Outcomes", Prime Minister's Office, Publications Series 1998/2.

Viscusi, W. Kip (1980): "Sex Differences in Worker Quitting", *Review of Economics and Statistics*, Vol. 62(3), pp. 388-98.

APPENDIX

Table 1A. Summary statistics by gender and mobility status.

	Women				Men			
	Non-movers	**Intra firm movers**	**Inter firm movers**	**Total**	**Non-movers**	**Intra firm movers**	**Inter firm movers**	**Total**
under 30 years old	42.5	42.8	54.4	42.8	37.6	37.0	45.6	37.7
30 years or older	57.5	57.2	45.6	57.2	62.4	63.0	54.4	62.3
low-educated	52.6	43.7	41.4	51.1	33.5	31.5	24.9	33.0
high-educated	47.4	56.3	58.6	48.9	66.5	68.5	75.1	67.0
general education	6.4	7.5	6.6	6.5	6.6	7.7	6.4	6.7
educational science	0.7	0.9	0.7	0.7	0.1	0.1	0.1	0.1
humanities and arts	3.6	3.9	2.3	3.6	0.4	0.5	0.2	0.4
social sciences	46.6	49.7	52.4	47.1	8.6	9.8	10.1	8.8
natural sciences	6.3	5.8	5.8	6.2	7.5	6.9	8.0	7.4
technology	27.2	24.6	27.0	26.9	71.6	69.1	72.5	71.3
agriculture	1.6	1.3	1.3	1.5	0.9	0.6	0.9	0.9
health and welfare	2.4	1.7	1.1	2.3	0.3	0.2	0.1	0.3
services	2.3	1.5	1.3	2.2	0.5	0.5	0.2	0.5
management	1.8	5.4	5.3	2.3	3.3	11.2	8.0	4.5
specialised experts	17.3	31.6	21.9	19.3	27.2	44.3	30.6	29.6
experts	44.2	43.6	46.5	44.2	57.5	38.5	53.5	54.8
routine work	36.8	19.5	26.2	34.2	12.0	5.9	7.8	11.1
lag (tenure under a year)	16.1	17.1	29.7	16.5	15.2	13.6	22.8	15.2
lag (tenure 1-3 years)	41.6	46.4	46.0	42.4	44.6	48.3	52.0	45.3
lag (tenure over 3 years)	42.3	36.4	24.4	41.1	40.2	38.1	25.2	39.6
temporary	5.9	13.1	5.6	6.0	2.1	4.1	1.7	2.1
firm size	5067.9	9299.2	2334.5	5578.3	6920.6	10800.8	2410.7	7357.9

Table 2A. Probit estimation results for interfirm mobility.

	Men	Women
under 30 years old	-0.047	0.011
	(0.020)	(0.028)
low education	-0.235***	-0.193***
	(0.024)	(0.03)
field of education:		
general	0.11	0.098
	(0.074)	(0.109)
education	0.177	-0.093
	(0.287)	(0.186)
humanities and arts	-0.182	-0.182
	(0.180)	(0.126)
social sciences	0.080	0.126
	(0.072)	(0.099)
science	0.001	-0.007
	(0.074)	(0.111)
technology	0.019	0.019
	(0.101)	(0.101)
agriculture	0.031	-0.203
	(0.0688)	(0.144)
health and welfare	-0.142	-0.352
	(0.114)	(0.146)
services	-0.125	-0.125
	(0.140)	(0.140)
hierarchical level:		
specialised expert•	-0.149***	-0.161***
	(0.045)	(0.08)
expert•	-0.126***	-0.216***
	(0.043)	(0.077)
mainly routine work•	-0.222***	-0.328 ***
	(0.079)	(0.079)
tenure under a year•	0.220***	0.347***
	(0.028)	(0.039)
tenure 1 to 3 years•	0.223***	0.232***
	(0.022)	(0.032)
temporary work•	0.341***	0.308***
	(0.033)	(0.033)
firm size•	-0.00004***	-0.00004***
	(1.83e-06)	(3.05e-06)

Notes: 1. Standard errors are in parenthesis.
2. ***: difference significant at 1 % level.
3. •: one year lag.

Table 3A. Probit estimation results for intrafirm mobility.

	Men	Women
under 30 years old	-0.039***	0.008
	(0.011)	(0.015)
low education	-0.144***	-0.177***
	(0.012)	(0.016)
field of education:		
general	0.026	0.219***
	(0.029)	(0.047)
education	-0.274	0.069
	(0.205)	(0.087)
humanities and arts	-0.174***	-0.066
	(0.076)	(0.054)
social sciences	-0.029	0.065
	(0.029)	(0.041)
science	-0.152***	-0.082*
	(0.031)	(0.049)
technology	-0.148***	-0.051
	(0.026)	(0.043)
agriculture	-0.208***	0.015
	(0.062)	(0.070)
health and welfare	-0.157	-0.037
	(0.096)	(0.063)
services	-0.104	-0.105
	(0.072)	(0.064)
hierarchical level:		
specialised expert•	-0.245***	-0.145***
	(0.026)	(0.051)
expert•	-0.159***	-0.091*
	(0.026)	(0.05)
mainly routine work•	0.282***	0.025
	(0.029)	(0.05)
tenure under a year•	0.019	0.07***
	(0.016)	(0.022)
tenure 1 to 3 years•	0.062***	0.045***
	(0.011)	(0.016)
temporary•	0.265***	0.191***
	(0.023)	(0.023)
firm size•	0.00003***	0.00003***
	(5.72e-07)	(8.56e-07)

Notes: 1. Standard errors are in parenthesis.
2. ***: difference significant at 1 % level, *: difference significant at 10 % level.
3. •: one year lag.

Table 4A. Probit estimation results for interfirm mobility by educational level.

	Low-educated		High-educated	
	Men	**Women**	**Men**	**Women**
under 30 years old	0.020 (0.038)	0.004 (0.042)	-0.015 (0.024)	0.021 (0.038)
field of education:				
general	0.112 (0.075)	0.217 (0.047)	-	-
education	-	0.073 (0.086)	0.368 (0.504)	0.124 (0.272)
humanities and arts	-0.055 (0.291)	-0.06 (0.054)	-0.059 (0.466)	0.024 (0.235)
social sciences	0.014 (0.083)	0.063 (0.041)	0.291 (0.419)	0.301 (0.222)
science	0.065 (0.095)	-0.079 (0.049)	0.155 (0.419)	0.103 (0.229)
technology	0.062 (0.071)	-0.049 (0.043)	0.195 (0.418)	0.224 (0.223)
agriculture	-0.048 (0.182)	0.024 (0.070)	-0.018 (0.432)	-0.008 (0.108)
health and welfare	-0.445 (0.349)	-0.026 (0.063)	-0.011 (0.507)	-0.108 (0.254)
services	-0.420* (0.215)	-0.102 (0.064)	0.188 (0.532)	
organizational hierarchical level:				
specialised expert•	-0.264** (0.105)	-0.472*** (0.165)	-0.121** (0.050)	-0.078 (0.091)
expert•	-0.272*** (0.097)	-0.425*** (0.154)	-0.089* (0.048)	-0.156* (0.089)
mainly routine work•	-0.387*** (0.029)	-0.546*** (0.153)	-0.159*** (0.061)	-0.248*** (0.094)
tenure under a year•	0.265*** (0.052)	0.432*** (0.057)	0.197*** (0.033)	0.270*** (0.054)
tenure 1 to 3 years•	0.209*** (0.041)	0.261*** (0.047)	0.223*** (0.026)	0.192*** (0.046)
temporary•	0.315*** (0.054)	0.302*** (0.052)	0.353*** (0.042)	0.312*** (0.048)
firm size•	-0.00004*** (3.97e-06)	-0.00004*** (5.59e-06)	-0.00004*** (2.07e-06)	-0.00004*** (3.66e-06)

Notes: 1. Standard errors are in parenthesis.
2. ***: difference significant at 1 % level, **: difference significant at 5 % level, *: difference significant at 10 % level.
3. *: one year lag.

Table 5A. Probit estimation results for intrafirm mobility by educational level.

	Low-educated		High-educated	
	Men	**Women**	**Men**	**Women**
under 30 years old	-0.0048 (0.019)	0.064*** (0.022)	-0.054*** (0.013)	-0.047** (0.021)
field of education:				
general	0.075 (0.030)	0.217 (0.047)	-	-
education	-	0.073 (0.086)	-0.137 (0.239)	0.195 (0.141)
humanities and arts	0.038 (0.060)	-0.06 (0.054)	-0.043 (0.147)	0.025 (0.124)
social sciences	0.066 (0.035)	0.063 (0.041)	0.090 (0.124)	0.139 (0.119)
science	-0.117 (0.045)	-0.079 (0.049)	-0.021 (0.124)	0.002 (0.123)
technology	-0.039 (0.028)	-0.049 (0.043)	-0.031 (0.1228)	0.107 (0.120)
agriculture	-0.178 (0.108)	0.024 (0.070)	-0.080 (0.140)	0.120 (0.133)
health and welfare	-0.056 (0.124)	-0.026 (0.063)	-0.041 (0.189)	-0.032 (0.137)
services	0.070 (0.077)	-0.102 (0.064)	-	-
hierarchical level:				
specialised expert•	-0.231*** (0.062)	-0.270** (0.107)	-0.252*** (0.029)	-0.109* (0.059)
expert•	-0.258*** (0.059)	-0.304*** (0.103)	-0.138*** (0.028)	-0.025 (0.058)
mainly routine work•	0.038 (0.060)	-0.263** (0.102)	0.488 (0.033)	0.241*** (0.060)
tenure under a year•	0.061** (0.028)	0.090*** (0.032)	-0.027 (0.020)	0.032 (0.031)
tenure 1 to 3 years•	0.063*** (0.019)	0.004*** (0.023)	0.042*** (0.013)	0.055** (0.022)
temporary•	0.324*** (0.034)	0.195*** (0.033)	0.228*** (0.032)	0.185*** (0.034)
firm size•	0.00004*** (1.07e-06)	-0.00004*** (1.38e-06)	0.00002*** (6.79e-07)	-0.00003*** (1.11e-06)

Notes: 1. Standard errors are in parenthesis.
2. ***: difference significant at 1 % level, **: difference significant at 5 % level, *: difference significant at 10 % level.
3. *: one year lag.

Table 6A. Matching quality: interfirm mobility.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years old	0.454	0.456	-0.3	0.910
low education	0.248	0.2402	1.8	0.511
field of education:				
general	0.0635	0.0651	-0.7	0.818
education	0.0012	0.008	1.3	0.655
humanities and arts	0.0024	0.004	-2.8	0.317
social sciences	0.1007	0.0995	0.4	0.888
science	0.0795	0.0667	4.8	0.082
technology	0.7258	0.7394	-3.0	0.278
agriculture	0.0879	0.0679	2.1	0.422
health and welfare	0.0012	0.004	1.7	0.317
services	0.002	0.0012	1.3	0.479
hierarchical level:				
specialised expert	0.2398	0.2366	1.3	0.791
expert	0.6035	0.6075	-1.1	0.772
mainly routine work	0.1059	0.1011	3.2	0.578
tenure under a year	0.2270	0.2234	-1.3	0.761
tenure 1 to 3 years	0.5203	0.5199	-1.7	0.977
temporary	0.1123	0.1103	0.8	0.822
firm size	1891.2	1943	-0.8	0.651
Women:				
under 30 years old	0.5439	0.5588	-3.0	0.461
low education	0.4145	0.4220	-1.5	0.710
field of education:				
general	0.0655	0.0696	-1.7	0.685
education	0.0066	0.0041	3.1	0.404
humanities and arts	0.0232	0.0223	0.5	0.892
social sciences	0.5240	0.5439	-4.0	0.327
science	0.0588	0.0530	2.4	0.535
technology	0.2703	0.2595	2.4	0.549
agriculture	0.0132	0.0116	1.4	0.713
health and welfare	0.0107	0.0074	2.5	0.392
services	0.0132	0.0141	-0.6	0.861
hierarchical level:				
specialised expert	0.1915	0.1865	1.3	0.755
expert	0.4568	0.4552	0.3	0.935
mainly routine work	0.3159	0.3233	-1.6	0.694
tenure under a year	0.2985	0.3151	-4.0	0.377
tenure 1 to 3 years	0.4593	0.4519	1.5	0.713
temporary	0.2354	0.2371	-0.5	0.924
firm size	1535.9	1686.6	-2.7	0.281

Notes: 1. t-test tests the hypothesis that the mean value of each variable is the same in the treatment group and the control-group.

Table 7A. Matching quality: intrafirm mobility.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years of age	0.370	0.365	0.9	0.406
low education	0.314	0.321	-1.5	0.178
field of education:				
general	0.0768	0.0736	1.4	0.222
education	0.0005	0.00045	0.3	0.796
humanities and arts	0.00459	0.00421	0.6	0.609
social sciences	0.0978	0.102	-1.4	0.221
science	0.0694	0.0694	0.0	1.000
engineering	0.6907	0.6877	0.7	0.558
agriculture	0.058	0.049	1.0	0.316
health and welfare	0.0024	0.00185	1.1	0.271
services	0.00459	0.00274	2.6	0.007
hierarchical level:				
specialised expert	0.247	0.241	1.4	0.222
expert	0.520	0.529	-1.9	0.101
mainly routine work	0.191	0.1901	0.4	0.752
tenure under a year	0.1357	0.1332	0.7	0.519
tenure 1 to 3 years	0.4828	0.4858	-0.6	0.595
temporary	0.0538	0.0468	3.3	0.004
firm size	10321	10389	-0.8	0.511
Women:				
under 30 years of age	0.4277	0.42876	-0.2	0.986
low education	0.4368	0.4498	-2.6	0.104
field of education:				
general	0.0751	0.0687	2.5	0.126
education	0.0092	0.0086	0.7	0.668
humanities and arts	0.0394	0.0368	1.4	0.400
social sciences	0.4968	0.5251	-5.7	0.000
science	0.0583	0.0563	0.8	0.603
engineering	0.2460	0.2333	2.9	0.067
agriculture	0.0128	0.0086	3.6	0.010
health and welfare	0.0171	0.0174	-0.2	0.902
services	0.0151	0.0139	-1.2	0.490
hierarchical level:				
specialised expert	0.1772	0.1731	1.1	0.470
expert	0.4468	0.4424	-3.9	0.015
mainly routine work	0.3566	0.3446	2.5	0.126
tenure under a year	0.1714	0.1677	1.0	0.547
tenure 1 to 3 years	0.4641	0.4729	-1.8	0.279
temporary	0.1126	0.1044	2.7	0.102
firm size	8873.8	8974.3	-1.2	0.490

Notes: 1. t-test tests the hypothesis that the mean value of each variable is the same in the treatment group and the control-group.

Table 8A. Matching quality: interfirm mobility and the low-educated white-collar workers.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years of age	0.48953	0.5153	-5.2	0.364
field of education:				
general	0.25604	0.26087	-1.2	0.846
humanities and arts	0.00322	0.00322	0.0	1.000
social sciences	0.11433	0.11916	-1.5	0.791
science	0.0628	0.04831	6.1	0.265
engineering	0.48953	0.50725	-3.5	0.533
agriculture	0.00966	0.00483	4.9	0.316
health and welfare	0.00161	0.00322	-2.6	0.564
services	0.00483	0.00322	1.6	0.654
hierarchical level:				
specialised expert	0.12399	0.11916		0.795
expert	0.6248	0.63124	-1.3	0.815
mainly routine work	0.21256	0.21578	-0.8	0.890
tenure under a year	0.25765	0.28019	-5.6	0.371
tenure 1 to 3 years	0.44122	0.41546	5.2	0.359
temporary	0.16747	0.1723	-1.5	0.821
firm size	1586	1633.2	-0.8	0.816
Women:				
under 30 years of age	0.522	0.538	-3.2	0.613
field of education:				
general	0.158	0.162	-1.2	0.863
humanities and arts	0.004	0.008	-4.8	0.413
social sciences	0.582	0.584	-0.4	0.949
science	0.044	0.028	-8.1	0.175
engineering	0.146	0.142	1.1	0.857
agriculture	0.002	0.002	0.0	1.000
health and welfare	0.006	0	5.1	0.083
services	0.024	0.026	-1.1	0.840
hierarchical level:				
specialised expert	0.076	0.054	8.2	0.159
expert	0.42	0.416	0.8	0.898
‘mainly routine work’	0.482	0.5	-3.6	0.570
tenure under a year	0.304	0.31	-1.5	0.837
tenure 1 to 3 years	0.39	0.398	-1.7	0.796
temporary	0.26	0.246	3.7	0.611
firm size	1342.4	1387.1	-0.9	0.785

Notes: 1. t-test tests the hypothesis that the mean value of each variable is the same in the treatment group and the control-group.

Table 9A. Matching quality: interfirm mobility and the high-educated white-collar workers.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years of age	0.44338	0.44657	-0.7	0.844
field of education:				
education	0.00159	0.00319	-4.5	0.317
humanities and arts	0.00213	0.00213	0.0	1.000
social sciences	0.09623	0.09144	1.7	0.615
science	0.08506	0.07602	3.2	0.309
engineering	0.80383	0.81925	-4.0	0.227
agriculture	0.00851	0.00532	3.4	0.238
health and welfare	0.00106	0.00053	1.4	0.564
hierarchical level:				
specialised expert	0.27804	0.27698	0.2	0.942
expert	0.59649	0.605	-1.7	0.594
mainly routine work	0.07071	0.06805	1.1	0.748
tenure under a year	0.21691	0.22594	-2.3	0.505
tenure 1 to 3 years	0.54652	0.53907	1.5	0.647
temporary	0.0941	0.09729	-1.3	0.740
firm size	1991.9	2033.8	-0.6	0.758
Women:				
under 30 years of age	0.55949	0.5949	-7.1	0.178
field of education:				
education	0.01133	0.0085	2.6	0.591
humanities and arts	0.03683	0.02691	4.5	0.289
social sciences	0.483	0.517	-6.9	0.202
science	0.06941	0.0864	-6.2	0.234
engineering	0.35836	0.3102	10.0	0.055
agriculture	0.02125	0.02833	-4.6	0.392
health and welfare	0.01416	0.0085	4.1	0.315
hierarchical level:				
specialised expert	0.27337	0.27054	0.6	0.905
expert	0.483	0.5	-3.4	0.523
mainly routine work	0.1983	0.19263	1.4	0.789
tenure under a year	0.29462	0.29887	-1.0	0.861
tenure 1 to 3 years	0.5085	0.5255	-3.4	0.523
temporary	0.21813	0.22238	-1.2	0.847
firm size	1673	1820.8	-2.3	0.473

Notes: 1. t-test tests the hypothesis that the mean value of each variable is the same in the treatment group and the control-group.

Table 10A. Matching quality: intrafirm mobility and the low-educated white-collar workers.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years of age	0.39112	0.38118	2.0	0.311
field of education:				
general	0.24412	0.23601	2.0	0.346
education	0.00243	0.00264	-0.4	0.841
social sciences	0.11415	0.11638	-0.7	0.729
science	0.04542	0.04319	1.0	0.590
engineering	0.42559	0.43917	-2.7	0.173
agriculture	0.00487	0.00162	3.8	0.005
health and welfare	0.00446	0.00264	2.6	0.128
services	0.01237	0.01075	1.4	0.451
hierarchical level:				
specialised expert	0.17336	0.16464	2.4	0.248
expert	0.50284	0 .52251	-4.0	0.051
mainly routine work	0.30109	0.28731	3.1	0.133
tenure under a year	0.15673	0.15004	1.8	0.357
tenure 1 to 3 years	0.44546	0.45337	-1.6	0.430
temporary	0.08556	0.07664	3.4	0.105
firm size	9727.8	9882	-1.9	0.400
Women:				
under 30 years of age	0.4198	0.41473	1.0	0.674
field of education:				
general	0.17203	0.16219	2.8	0.280
education	0.0003	0.0003	0.0	1.000
humanities and arts	0.00805	0.00835	-0.3	0.892
social sciences	0.55098	0.55963	-1.7	0.476
science	0.04085	0.04025	0.3	0.901
engineering	0.11002	0.11181	-0.5	0.816
agriculture	0.00298	0.00298	0.0	1.000
health and welfare	0.01998	0.02236	-1.7	0.497
hierarchical level::				
specialised expert	0.09839	0.08974	3.0	0.225
expert	0.39535	0.39624	-0.2	0.940
mainly routine work	0.4952	0.5059	-2.1	0.379
tenure under a year	0.169	0.161	2.4	0.341
tenure 1 to 3 years	0.3849	0.3855	-0.1	0.960
temporary	0.1267	0.1136	4.1	0.099
firm size	10096	10201	-1.2	0.592

Notes: 1. t-test tests the hypothesis that the mean valua of each variable is the same in the treatment group and the control-group.

Table 11A. Matching quality: intrafirm mobility and the high-educated white-collar workers.

	Mean treated	Mean control	% bias	t-test: p-value
Men:				
under 30 years of age	0.3603	0.3577	0.5	0.691
field of education:				
education	0.0007	0.0015	-2.6	0.102
humanities and arts	0.0055	0.008	-3.46	0.031
social sciences	0.0903	0.0896	0.3	0.849
science	0.0805	0.0817	-0.4	0.745
engineering	0.8124	0.8084	1.0	0.454
agriculture	0.0062	0.0061	0.1	0.931
health and welfare	0.0015	0.0026	-2.8	0.07
hierarchical level:				
specialised expert	0.2813	0.2797	0.3	0.796
expert	0.5284	0.5413	-2.6	0.057
mainly routine work	0.1418	0.1308	3.7	0.019
tenure under a year	0.1261	0.1287	-0.8	0.567
tenure 1 to 3 years	0.4999	0.505	-1.1	0.421
temporary	0.0392	0.0376	0.9	0.567
firm size	10321	10389	-0.8	0.511
Women:				
under 30 years of age	0.43386	0.43802	-0.8	0.696
field of education:				
education	0.0162	0.0132	2.5	0.245
humanities and arts	0.0638	0.0668	-1.2	0.572
social sciences	0.4549	0.4815	-5.4	0.013
science	0.0719	0.0682	1.3	0.500
engineering	0.3515	0.3383	2.7	0.197
agriculture	0.0206	0.0136	4.5	0.013
health and welfare	0.0150	0.0134	1.1	0.525
hierarchical level::				
specialised expert	0.2384	0.2345	0.9	0.667
expert	0.4868	0.5099	-4.6	0.032
‘mainly routine work’	0.2490	0.2319	4.2	0.063
tenure under a year	0.1727	0.1653	1.9	0.359
tenure 1 to 3 years	0.5256	0.5430	-3.5	0.106
temporary	0.1017	0.098	1.3	0.542
firm size	10096	10201	-1.2	0.592

Notes: 1. t-test tests the hypothesis that the mean value of each variable is the same in the treatment group and the control-group.

Table 12A. The wage effects of interfirm mobility by gender and educational level – kernel matching.

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
PSM-DID	0.058	0.0724	0.045	0.067	0.072	0.072
estimate	(0.0038)	(0.0024)	(0.0049)	(0.0044)	(0.0075)	(0.0029)

Notes: 1. The results are based on a propensity score matching difference-in-differences method.
2. Bootstrapped standard errors are in parenthesis.
3. About the controlled variables, see e.g. Table 2A in appendix.

Table 13A. The wage effects of intrafirm mobility by gender and educational level – kernel matching.

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
PSM-DID	0.029	0.027	0.027	0.0286	0.0313	0.0262
estimate	(0.0009)	(0.0006)	(0.0014)	(0.0014)	(0.0014)	(0.0007)

Notes: 1. The results are based on a propensity score matching difference-in-differences method.
2. Bootstrapped standard errors are in parenthesis.
3. About the controlled variables, see e.g. Table 2A in appendix.

Table 14A. The wage effects of interfirm mobility by gender and educational level – OLS and fixed effects results

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
OLS	0.052	0.067	0.0385	0.0620	0.0646	0.0672
	(0.0035)	(0.0027)	(0.0051)	(0.0047)	(0.0062)	(0.0029)
Fixed effects	0.051	0.067	0.0348	0.060	0.058	0.0693
	(0.0039)	(0.0030)	(0.0056)	(0.0053)	(0.0077)	(0.0033)

Notes: 1. About the controlled variables, see e.g. Table 2A in appendix.
2. Robust standard errors with clustering on the individual are in parentheses.

Table 15A. The wage effects of intrafirm mobility by gender and educational level – OLS and fixed effects results

			Women		Men	
	Women	**Men**	**Low education**	**High education**	**Low education**	**High education**
OLS	0.0278	0.0269	0.0266	0.0285	0.0295	0.0253
	(0.0010)	(0.0007)	(0.0015)	(0.0013)	(0.0015)	(0.0008)
Fixed effects	0.0229	0.0222	0.0208	0.0235	0.0219	0.0213
	(0.0011)	(0.0008)	(0.0017)	(0.0015)	(0.0016)	(0.0009)

Notes: 1. About the controlled variables, see e.g. Table 2A in appendix.
2. Robust standard errors with clustering on the individual are in parentheses.