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UNOBSERVED HUMAN CAPITAL AND FIRM-SIZE PREMIUM

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ABSTRACT: This paper examines wage compensations and worker mobility in firms with different size using linked employer-employee Finnish data over the period 1989-1996. We show that the unobserved human capital component of wages is increasing in firm size and explains a substantial share of the higher wages in large firms. We suggest alternative explanations for this. To begin with, high wages lead directly to larger firm size through lower job search of employers. In addition, large firms can build reputation wages as they have a longer employment history. Both explanations are consistent in our finding that the payments on unobserved human capital lower excess worker reallocation. High-wage earners in large firms can also be risky workers with an option value on good performance. In contrast to previous explanations, this increases job and worker turnover. We also claim that large firms substitute high wages for large monitoring costs. Small firms have more information on the worker effort of their employees and can monitor employees better than large firms.

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TIIVISTELMÄ: Tutkimus tarkastelee palkanmuodostusta ja työvoiman liikkuvuutta erikokoisissa yrityksissä Suomessa yhdistetyssä yritys-työntekijä aineistossa ajanjaksolla 1989-1996. Ei-havaittava inhimillinen pääoma kasvaa yrityskoon mukaan ja on merkittävin selittäjä suurten yritysten korkeammille palkoille. Suurilla yrityksillä on parempi tunnettuvuus ja maine. Tämä ja korkeat palkat sinänsä vähentävät työntekijöiden hakeutumista muualle töihin. Suurissa yrityksissä henkilöstön valvonta on vaikeampaa, mitä kompensoidaan korkeammilla palkoilla. Samalla suuret yritykset maksavat vähemmän kannustimiin tai voitonjakoon perustuvia palkkoja. Korkeat palkat ovat paremmin seurausta siitä, että yritykset rekrytoivat uusia työntekijöitä korkealla palkalla ja huonosti menestyvät työntekijät irtisanotaan tai he hakeutuvat muualle töihin.

Theme: Compensation policy

Keywords: wages, compensation policy, productivity, industry differentials

JEL Classification numbers: J21, J31, J50, C22

Yhteenveto

Isot yritykset maksavat korkeampia palkkoja. Suomessa suurten yritysten palkat ovat 25 prosenttia korkeammat kuin pienten yritysten, mikä vastaa 30 000 markan eroa vuosipalkoissa. Samaan aikaan suurissa yrityksissä palkkojen vaihtelu työntekijöiden välillä on pienempi. USA:ssa pienten ja suurten yritysten palkat eroavat vielä enemmän, 60 prosenttia. Tutkimus tarkastelee sitä mikä selittää kansainvälistä havaintoa, että suurten yritysten palkat ovat korkeampia ja palkkahajonta yritysten sisällä pienempi. Tutkimuksessa perustuu yhdistettyyn työntekijä- ja yritysaineistoon. Tällöin voidaan palkanmuodostuksessa tarkastella erikseen yrityskohtaisia palkkoja ja yksilökohtaista palkkausta mm. suhteessa inhimillisen pääoman, koulutuksen ja työkokemuksen korvauksiin.

On selvää, että suurten yritysten pääomavaltaisuus selittää osan palkkaeroista pienten ja suurten yritysten välillä. Palkkaero on kuitenkin silmiinpistävä myös vertailtaessa 20 hengen yrityksiä ja 100 hengen yrityksiä, jotka eivät pääomavaltaisuudessa poikkea suuresti toisistaan. Myös pääoman tuotto, kannattavuus ja velkaisuusaste ovat hyvin samaa tasoa. Tällöin selitystä on syytä hakea erilaisesta palkkapolitiikasta. Kompensaatiot ei-havaittavasta työntekijän inhimillisestä pääomasta kasvaa yrityskoon mukaan ja on merkittävin selittäjä suurten yritysten korkeammille palkoille. Tutkimuksen perusteella voidaan tähän liittyen löytää neljä perustavaa syytä korkeammille palkoille. Ensinnäkin isojen yritysten korkeat palkat vähentävät työnhakua. Yritys kasvaa, kun työntekijöitä lähtee vähemmän muiden yritysten palvelukseen. Korkeammat palkat myös lisäävät työn tehokkuutta yli sen mitä voitollisuuden pysyminen ennallaan edellyttää. Toinen korkeiden palkkojen selitys on se, että suuret yrityksen ovat tunnetumpia ja voivat uskottavasti maksaa korkeita palkkoja. Pienissä yrityksissä työpaikan pysyvyys on epävarmempaa ja korkeat palkat eivät vähennä työnhakua.

Tämä ei voi kuitenkaan olla lopullinen selitys korkeammille palkoille. Työntekijöiden vaihtuvuus on itse asiassa suurempaa suurissa yrityksissä, etenkin kun otetaan huomioon liikkuminen toimipaikasta toiseen yrityksen sisällä. Myös ylimääräinen työntekijöiden vaihtuvuus lisääntyy toimipaikan koon kasvaessa. Tätä mitataan rekrytointien määrällä silloin kun väki kokonaisuudessaan vähenee tai työntekijöiden lähdöllä toiseen toimipaikkaan silloin kun työntekijöiden lukumäärä kasvaa. Esimerkiksi vuonna 1996 keskisuurissa ja suurissa toimipaikoissa 11 prosenttia ja pienissä toimipaikoissa 8 prosenttia työntekijöistä vaihtuu ilman, että työntekijöiden kokonaislukumäärä muuttuu. Suurta vaihtuvuutta selittää myös laman syvyys ja suurten yritysten voimakas integroituminen ja globalisoituminen 80-luvun lo-

pusta lähtien. Kolmas selitys korkeille palkoille onkin, että suuret yritykset ottavat tietoisemmin riskejä maksaen korkeampia palkkoja. Työntekijästä pääsee halutessaan myöhemmin helpommin eroon kuin pienissä yrityksissä. Pienissä yrityksissä jokainen työntekijä on avainhenkilö ja riski epäonnistuneesta rekrytoinnista on kohtalokkaampi. Suuri yritys voi sen sijaan helpommin palkata henkilön koeajaksi ja jatkaa työsuhdetta jos työntekijä osoittautuu päteväksi. Kuitenkin palkkahajonta suurissa yrityksissä on pienempi. Riski näkyy siten paremminkin työntekijöiden vaihtuvuudessa kuin palkoissa. Suurissa yrityksissä yrityskohtaiset palkanlisät ajoittuvatkin pidemmälle periodille ja palkkaprofiilin ero pieniin yrityksiin on suurin pidemmissä työsuhteissa.

Viimeinen neljäs selitys korkeille palkoille on, että työntekijöitä on vaikeampi monitoroida suurissa yrityksissä. Kun työntekijöiden tehokkuutta ja toimeliaisuutta on vaikea valvoa, tätä korvataan korkeilla palkoilla. Pienissä yrityksissä on sen sijaan tärkeää, että palkkaus vaihtelee yrityksen menestyksen mukaan. Palkat on helpompi sitoa työntekijän aktiivisuuteen erilaisilla kannustinpalkoilla, koska työn tuloksia on helpompi mitata.

Onko korkeat palkat tehokkaita eli ovatko korkeapalkkaisia rekrytoivat yritykset voitollisempia ja tehokkaampia? Tutkimuksen mukaan näin näyttää olevan, koska sekä kokonaistuottavuus että voitollisuus ovat korkeammat. Tämä ei kuitenkaan merkitse sitä, että näissä yrityksissä olisi markkinatasoa korkeammat palkat vaan sitä, että yrityksiin on saatu markkinoilta korkeapalkkaisin kaarti töihin. Työntekijä nauttii korkeaa palkkaa edelleen, vaikka hän siirtyisi muualle töihin, eikä palkka liity välttämättä yritysspesifiin osaamiseen. Palkat eivät ole korkeita ainoastaan koulutustason vaan etenkin ihmillisen pääoman korvausten suhteen. Työntekijöiden korkea koulutus ei siten ole riittävä tae yrityksen voitollisuudesta.

1. INTRODUCTION

This paper considers wage formation in the Finnish labour market during 1989-1996 in firms of different size and its relation to hirings, separations and firm performance using linked employer-employee data. The linked data allow us to separate compensations on unobserved human capital (person effect) and firm-specific payments (firm effect). We explain wage formation first by personal factors conditional on the correlation to firm effects, following Abowd, Kramarz and Margolis' (1999) "the person effects first" approach. This is closest to the small sample solution for simultaneous analysis of person and firm effects in France (Abowd, Kramarz and Margolis, 1999, p. 303). The firm-specific payments explain a higher share of industry effects (25%) than in the alternative order-independent solution (7%) (where the firm effects are estimated without eliminating person effects).[1] The firm-specific payments are divided to a firm intercept, seniority slope, its square and plant-level hirings. The last term allows the study of fixed costs in recruitment. We subsequently explain between-firm variation in excess worker reallocation, employment and firm performance. Excess worker reallocation are separations in excess of job destruction, half of the more familiar churning rate, see Davis, Haltiwanger and Schuh (1996). This is equal to hirings when jobs are lost (separations exceed hirings) and to separations when jobs are created.

It has long been recognised that large firms pay higher wages.[2] It is shown that wages are increasing in firm size in Finland, too. The mean wage differential between plants in the 10^{th} and 90^{th} size classes is about 23,000 (FIM, 1990 prices), which equals 21% of the overall mean wage. The 23,000 wage increase is also explained by observed skills such as education but foremost by unobserved human capital. Our results do not contradict those of Troske (1999) and Davis and Haltiwanger (1996), who find the firm-size premium in the U.S. to be explained by workers with observed skills being concentrated in large firms, and Dunne T., Foster L., Haltiwanger J. and Troske K. (2000) that emphasize the complementarity between worker skill and physical capital. All these studies emphasize that a large part, more than or equal to half, of the firm-size wage premium to be unexplained.

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1 There exists equal importance of firm and person effects in the U.S. according to Abowd and Kramarz (2000). Industry effects are, though, likely smaller in France, at least true in earlier studies like Helwege (1992), where the industry effects are, in fact, a weighted average of person and firm effects.

2 See e.g. Oi (1983), Brown and Medoff (1989), Troske (1999).

We examine wage formation explanations for the firm-size effect. We argue that large firms (1) pay higher wages that lower job search, also because of good reputation and long work history, (2) can reward risky workers with good performance, since bad peformers can be fired and greater burden of profit variation – as a result of severe competition and globalisation- is borne by employees, (3) substitute high wages for high monitoring costs.

Following Burdett and Mortensen (1998) higher wages themselves lead to large firm size as the quit rate is lower. The employee has a lower chance of finding a firm offering still higher wages. Unobserved human capital (high effort) explains high wages, but total profits are the same irrespective of firm size. We show evidence that worker reallocation is lowered by compensation on unobserved human capital. Bayard and Troske (1999) show neither high productivity nor high concentration of observed skills to explain the firm size premium puzzle in the U.S.

We, however, also find unobserved human capital and compensations on education to improve firm profitability. We believe that the Fujiwara-Greve and Greve (2000) argument of reputation wages is valid. Large firms can credibly pay higher wages because of a longer history and reputation. This has positive implications on firm profitability. One puzzle is also that excess worker reallocation and job turnover are increasing in firm size. Ilmakunnas and Maliranta (2000) also find churning (and thereby excess worker reallocation) to increase in firm size in the private sector in Finland after controlling for firm age and industry, albeit not so in manufacturing. The reputation wage explanation can be more valid in the U.S. market, since job turnover is decreasing in firm size (see Burgess, Lane and Stevens, 1996).

Lazear (1995) suggests that firms that expect to live for a long time and grow fast can also hire more risky workers with an option value. Bad performers are fired which increases job turnover. Risky workers with good performance retain a wage premium, when the firm can enjoy for a long time the returns of investing in employees that turn out to be good. In the probation period, the wages have to be the same for all workers. We show evidence of ‘probation years’ as seniority payments in large firms are postponed to longer seniority. We also find that rent-hopping requires large starting wages in

smaller firms only (Teulings and Hartog, 1998, section 6.3).[3] After the probation period, risky workers that turn out to be bad performers are fired. The variance in ability leads to job destruction and worker reallocation rather than to a large variance of wages.

The option value of risky workers requires that the firm has private information about a worker's output or that workers suffer from mobility costs when moving to another firm. These ensure that after the probation period the compensations for good workers is lower outside the firm. Using Norwegian data, Fujiwara-Greve and Greve (2000) show that employees in large firms especially encounter difficulties to find new large firm with even higher wages. One reason for mobility costs can be that personnel in large firms have unobserved and observed skills that create large fixed costs. The mobility costs for individual workers from moving from one firm to another remain large. Kremer (1995) suggests that job reallocation problems of skilled risky labour are more easily solved in large firms. The large fixed costs may also emerge from higher segregation of the skilled workforce or task complexity, as considered by Kremer and Maskin (1995). Firm-specific knowledge may also explain the option value of risky workers. In large firms firm-level payments are on average the same as in small firms. But small firms also face more firm-specific risks and the variations if firm payments is high, which has a feedback effect on the ability to make use of the option value of risky workers. Firm-specific risks inhibit investments in general skills lowering the option value, as there is a higher chance of employees leaving the job in times when the firm is not performing well (see also Becker, 1964, Kessler and Lulfesmann, 2000). As suggested by Bhaghwati and Dehejia (1994), globalisation pressures (competition and variation in profits) also strengthen job turnover and labour market pressures. The reorganisation in firms may be more easily done in large firms, while the mobility costs for workers remain high. Finland also experienced a deep recession in the beginning of the 1990s and mobility costs were indeed exceptionally high. Voluntary separations drastically reduced, indicated by no decrease in separations while job destruction rose.

The unimportance of incentive payments in large firms relates to the organisational aspects of monitoring employees: following Bulow and Summers (1996) large firms substitute high wage earners for high monitoring costs. The lack of incentive-based

[3] However, especially the less-skilled experience more involuntary lay-offs. The worker has to accept lower offers, losing the rent-hopping career, and also the return to tenure is lost. Topel (1991) brings evidence that in U.S. the effect of involuntary job switches or 'bad workers' changing jobs is of minor importance as in Finland in Hohti, Ilmakunnas and Piekkola (1999).

payments is indicated by the modest within-plant wage dispersion in large firms, as also found in the U.S. by Davis and Haltiwanger (1996). We also show that firm-level compensations do not much vary depending on the level of hirings and in short tenures. Second, ex post bargaining, rent sharing, on the distribution of profits is used more in small firms (see Piekkola, 1999). Rent sharing is easier when employees and employers know the outside options (reservation wages).[4] As discussed, we show that firm level compensations (fixed payments) are not lower in large firms. There is instead no clear effect on job reallocation. In Hall and Lazear (1984) firm-level compensations negotiated on between employees and employers lower excess worker reallocation when there is uncertainty in market wages or profits, and wages are set at too low of a level if the firm works as a monopoly. We argue that in large firms, fixed-term payments rather emerge from firm-specific skills that justify an option value for risky workers. They are not based on wage negotiations between employers and employees rather the reverse. The employer wants to retain the option of firings employees if turning out to perform badly.

As implied by skill-biased technical change, the demand for an educated workforce is strong and physical capital, by being a complement to skilled labour, has a negative effect on overall labour demand. [5] But average firm-level compensations on unobserved human capital have a neutral effect on firm employment. Skill-biased technical change, not studied directly here, should be more easily explained by the implications of physical capital or computer use, or by the negative implications that good performance has on employment in other firms.

It is evident that labour market competition for trained workers does not inhibit employers to accrue returns from investment in general human capital. Becker's (1964) emphasis on the importance of firm-specific skills, while investment in general training can be fruitless, may apply to small firms only. The importance of unobserved human capital as opposed to incentive-based schemes can also relate to institutional factors such as centralised wage negotiations being more binding for large firms, creating wage compression and increased job turnover, both raising the importance of transferable human capital. But the magnitude of this effect is hard to evaluate given the 90 percent

[4] Plausibly also explaining much of the decrease in between-plant wage dispersion in Davis and Haltiwanger (1996).

[5] Besides Kramer (1993), Bresnahan (1999) also suggests an organisational complementarity between technology, such as the use of computers, and skilled white-collar workers.

average participation rate in unions. What is likely, however, is that wage compression raises the relative importance of job turnover effects.

Section 2 describes the data and Section 3 the empirical formulation. Section 4 examines the compensation policies and their relation to job mobility. Section 5 lays out the firm performance indications of alternative wage policies. Finally, we conclude in Section 6.

2. THE DATA AND EMPIRICAL FORMULATION

We have used data on individual employees from the Employment Statistics. This is a large data base that combines various registers kept by Statistics Finland and other authorities. We matched the total data of employees to the firm sample of Financial Statistics held by Statistics Finland. The variables used in the analysis for person i and firm j at time t obtainable directly from the data are:

Annual employment L_{jt}: Average number of salaried and hourly employees in firm *j* over the course of the calendar year in Financial Statistics.

Capital K_{jt}: Accumulated investment with 15 percent depreciation for machinery and 7 percent for other capital from 1987 using initial stock values in Financial Statistics.

Employment E_{kt}: Employment in establishment k in period *t*, determined by the employment at the end of December in each year in Employee Statistics.

Annual wages W_{it}: Real compensation (wage) for person i divided by months worked and multiplied by 12, and deflated by the consumer price index (1990=1.00) in Employee Statistics.

Years of Experience: Age minus years of education and age when school started.

Education: Highest education degree obtained in 8 grades.

Skilled workers/Employees: The share of employees with bachelor's degree with bachelor's degree (lower university and non-university degrees) or higher

Seniority γ: Duration of a job measured in years.

Value added per worker (part of quasi-rent): Value added divided by the producer price index at the two-digit level.

Market share: Real sales relative to sales at the two-digit industry level (NACE95).

Borrowing ratio: Expenditures on interest-bearing debts divided by cash-flow (Nickell and Nikolitsas, 1999, use all long-term interest payments). The borrowing ratio is set at the minimum zero or at the maximum four if it deviates more than five standard deviations from the estimated value. The OLS regression yielded $R^2 = 0.019$ with the following explanatory variables: unobserved individual effect, education effect, hirings effect, seniority effect, seniority squared effect, real sales per capita, short-term loans per capita, interest-bearing debt per capita, return on capital, dividends per capita, exports per capita, total factor productivity, market share and 32 industry dummies (see definitions later). 1.7 percent of observations receive the maximum value 4 for the borrowing ratio (426 observations out of 25,016).

Net profits: Gross profits (sales less wages, salaries, rents etc.) less interest on loans and depreciation.

Quasi rent: Value added less wage and capital expenses in firm j (average interest expenses times capital). The interest rate is obtained by multiplying interest expenses by three and dividing by the level of interest-bearing debt. This is averaged over the industry at the two-digit level when positive and deducted by consumer price inflation.

The log of relative total factor productivity:

$$\ln TFP = \ln\left(\frac{Y_{jt} / L_{jt}}{\overline{Y} / \overline{L}}\right) - \frac{S_{jt} + \overline{S}}{2} \ln\left(\frac{K_{jt} / L_{jt}}{\overline{K} / \overline{L}}\right) , \qquad (1)$$

where Y_{jt} is value added and S_{jt} is the cost share of the capital input:

$$S_{jt} = \frac{KCOST_{jt}}{KCOST_{jt} + LCOST_{jt}}, \qquad (2)$$

where $KCOST_{jt}$ is the nominal capital costs and $LCOST_{jt}$ is the costs of labour (wages and social security payments, all from Financial Statistics). $\overline{S}$ denotes the average capital cost share among all plants in a given two-digit industry. The capital costs are the sum of

depreciation of the total capital stock and 5 percent of the net capital stock in current prices (evaluated with 15 depreciation in machinery and 7 in others). The TFP of the benchmark plant is equal to one. $\overline{Y}$, $\overline{L}$ and $\overline{K}$ are the geometric means of value added, labour and capital, respectively, in each industry (Caves et al., 1982).

Let $H_{(k,\,t)}$ denote the number of workers in establishment k at time t who did not work at the establishment at time $t-1$ in Employee Statistics. $S_{(k,\,t)}$ is the number of workers in establishment i at time $t-1$ who do not work at the establishment at time t and E_k denotes employment in establishment k in year t. These conventions mean our measures of the hiring rate, separation rate and separation rate in excess of job destruction rate, excess separation rate, for a given group of the workforce can be defined as follows:

$$HR_{(k,\,t)} = \sum H_{(k,\,t)} / ((\sum_i E_{kt} + \sum_i E_{k,\,t-1}) /2), \tag{3}$$

$$SR_{(k,\,t)} = \sum S_{(k,\,t)} / ((\sum_i E_{kt} + \sum_i E_{k,\,t-1}) /2), \tag{4}$$

$$EWR_{(k,\,t)} = \sum (S_{(k,\,t)} - JD_{(k,\,t)})/ ((\sum_i E_{kt} + \sum_i E_{k,\,t-1}) /2)] \tag{5}$$

$$= 0.5 \sum [(S_{(k,\,t)} + H_{(k,\,t)} - |H_{(k,\,t)} - S_{(k,\,t)}|)/ ((\sum_i E_{kt} + \sum_i E_{k,\,t-1}) /2)].$$

where $JD_{(k,\,t)} = \sum_i \Delta E^{-}_{ik} /((\sum_i E_{it} + \sum_i E_{i,\,t-1}) /2)$ is job desctruction or the number of jobs lost, where superscript "-" refers to negative changes (the positive changes are referred to as job creation). The separation rate in excess of the job destruction rate $EWR_{(k,\,t)}$ is referred to as excess worker reallocation. At firm level, it is equal to one half of churning, as seen from the second equality in (5). Very short tenures and job relations are underrepresented since there is no information on the division of the working months to other jobs within year.

The original sample of Financial Statistics consists of 6,092 firms and the final data of 5,361 observations with the average size distribution:

The last column shows the sales-based inverse of sample weight used by Statistics Finland before 1995. In the firm-level regressions, we use as weights the sample weight times the average number of employees (corrected for the loss of small firms due to only one year entering data and omitted, see the third column). The plant-level job and worker flows are calculated from the 8,021,902 person-year observations from total data on employees that work at least one year work in selected firms. Following the method by

Table 1. Size Distribution of Firms

Average Employees	Firms in Financial Statistics	Firms in Data	Inverse of Sample Weight
>500	219	215	1
100 – 499	903	883	1,1
50 – 99	894	869	1,8
20 – 49	1619	1572	3,8
7 -19	1512	1422	10,1
< 7	1773	658	32,7

Baldwin, Dupuy and Penner (1992), we consider birth and death of firms as a mere transfer of the firm, when persons employed either at the old firm at date t-1 or the new firm at date t amount to more than 60 percent of all persons working in these firms at dates t-1 and t. Using this criterion, unreal deaths and births are less than two percent of all firm births and deaths and these firms are linked. Firm deaths and births are roughly one fourth of all job flows so that the worker reallocation rate is around 0.5 percent lower after this correction. The employee data on personnel in selected 5,361 firms cover 3,099,342 observations and 791,437 persons. The division of firms into industries and the formation of data from the original sample are shown in the appendix A.

3. EMPIRICAL FORMULATION

The basic model is

$$\ln(\mathrm{w}_{\mathrm{ijt}}) = \theta_i + \psi_j + \beta x_{it} + e_{ijt}\,, \qquad (6)$$

where the wage is explained by time-varying person characteristics: experience and time dummies, hence $\beta\,\mathrm{x}_{\mathrm{it}}$ contains time dummies, a dummy indicating whether person i has switched jobs and experience up to the fourth power. The dummy is included to measure whether the time-varying compensations on experience are higher for persons that switch jobs more often. The subscript *j* refers to the firm as before, θ_i is the individual fixed effect, ψ_j the firm-specific payment, and e_{ijt} represents a statistical error term. The estimation proceeds by first estimating an equation where the wage is explained, in addition to experience, also by variables *Z*, which include interactions of person average and firm

characteristics (interactions of average experience, seniority, firm size (average number of workers) and industry dummies). The model is estimated in deviations from the individual means to purge the person fixed effects. The results of the estimation are shown as Table A.2 in the Appendix. The subsequent error term includes, in addition to the original error e_{ijt}, the projection of the firm effects on the interaction variables. The person average of the original error e_{ijt} is the person effect. We decompose this person effect into unobserved and education effects:

$$\theta_i = \alpha_i + u\eta_i + \varepsilon_i, \tag{7}$$

using the variance of θ_i as the weight. α_i is the unobserved person effect and η_i is the education/sex effect for group *u*. The firm effect

$$\psi_j = \phi_j + \gamma_j seniority + \gamma_{2j} seniority^2 + h_j hirings \tag{8}$$

includes a firm intercept ϕ_j, seniority slope γ_j, seniority slope squared γ_{2j} and hirings effect h_j. From the seniority slopes estimated, we calculate the average of marginal seniority effect $\gamma_j + 2*\gamma_{2j} seniority$.

We explain average firm level excess worker reallocation, employment and performance over time. The average person effects α_j and η_j for firm *j* are also reconstructed using information on the person's entire work history. The estimation equation for average excess worker reallocation EWR_j in firm j is

$$EWR_j = b_1 x\beta_j + b_2\alpha_j + b_3 u\eta_j + b_4\psi_j + b_5\kappa_j + \varepsilon_{jt}, \tag{9}$$

where $x\beta_j$ is the average predicted effect of time-varying personal characteristics, α_j is the average of unobserved individual effects, $u\eta_j$ is the average of education/sex effect, ψ_j is the average firm effect divided into the firm intercept, seniority and hirings effects, κ_j measures the firm-level factors: skilled share of labour, quasi rent, borrowing ratio and market share and ε_{jt} is a statistical error. The average of unobserved individual effects, α_j, and the average of education effect, $u\eta_j$, are from (7). Firm factors include the deviation of quasi rent from its mean time quasi rent to capture its nonlinearity and interaction between quasi rent and experience effect.

4. COMPENSATION POLICY AND WORKER MOBILITY IN FINNISH FIRMS

Table A.1 in Appendix shows the summary statistics for the variables used in our statistical analyses. The average borrowing ratio indicates that around 28 percent of cash flow goes to capital expenditures from borrowing (doubled in the recession years 1991-1992). Valued added per labour is 769 on average and quasi rent per labour 614 (all in thousand 1990FIM). The difference is explained by real wages (105 on average) and by compensations on capital. The average market share is little below 1 percent and average return on equity is close to zero.

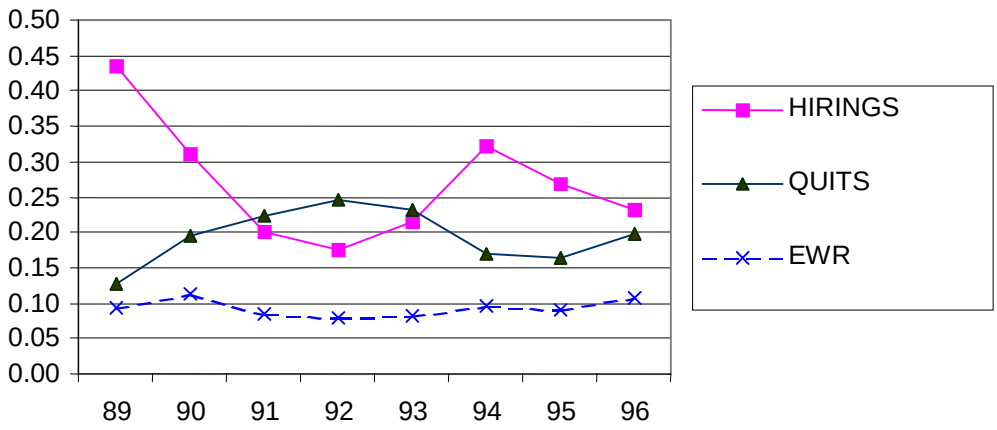
Firms with average size of employees less than 20 in employee statistics are referred to as small firms. They all belong to the lowest firm-size group in classification where each 20 firm size class represent 5 percentage of all employees recorded in the financial statistics (where small firms are underrepresented). We contrast these firms to large firms with average size 100 employees or more. Large firms typically belong to the firm size class between 15 and 30 in financial statistics that employ between 135 and 275 workers (the average size is 921). The firms larger in size than this are overrepresented in financial statistics, covering over 60 percent of workforce. We can see from table A.1 that, given the large weight on 10 – 30 firm-size class, firm-level variables for large firms do not extensively differ from those of the small firms at least for all background variables: borrowing ratio, quasi rent and profits per capita. One difference is that large firms have two times higher capital intensity and lower return on equity. In large firms the dispersion in wages and return on equity is significantly lower, while the variation in job turnover is larger than in small firms.

Figure 1 shows hirings, separations and excess worker reallocation (separations in excess of job destruction) in the period 1989-1996:

We can see from figure 1 that employment was on major part adjusted through hirings, extensively reduced irrespective of the education (skill) level in the deep recession in the beginning of 1990's. The separations did not remarkably rise during the recessionary period. Excess worker reallocation are very persistent throughout the time, as found in U.S. in Burgess, Lane and Stevens (1996).

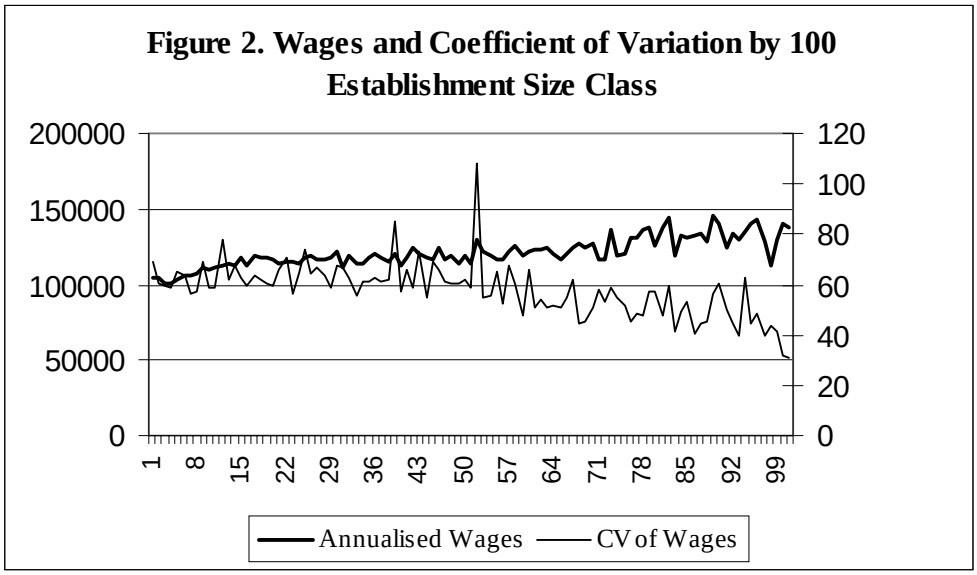
The estimation of dividing person effect into unobserved human capital and education/sex effect is shown in table A.3 in Appendix. It is seen that the person effect is

Figure 1. Hirings, Quits and Excess Worker Reallocation

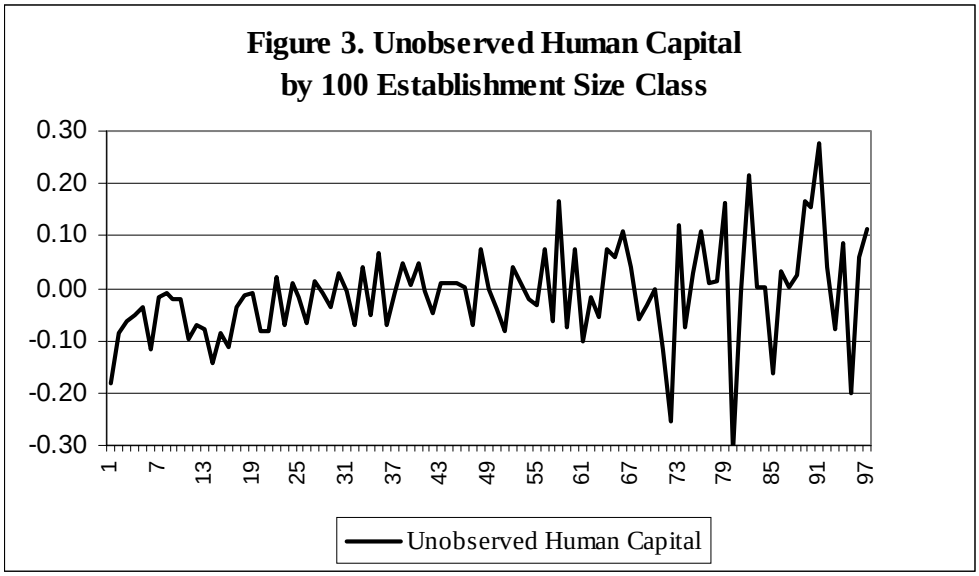


32 percentage points higher in males as compared to females. This is roughly equal to the difference in person effect between those with master's degree and upper secondary education. Figure 2 depicts the mean annual wages and its coefficient of variation and figure 3 unobserved human capital compensations based on the estimation of equation (7) by 100 establishment size classes, each representing 1% of total employment (estimation results of equation 7 are shown as table A.2 in Appendix).

Figure 2. Wages and Coefficient of Variation by 100 Establishment Size Class



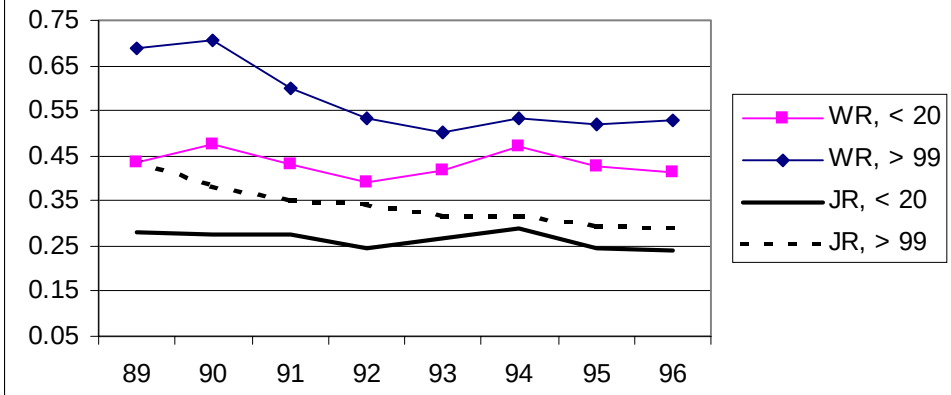
We can see from figure 2 that wages are increasing in firm-size. The mean wage differential between plants in the 10th and 90th size classes is 23,000 markkas (in 1990 prices), which equals 21% of the overall mean wage. The figure is sizeable although less than the 62% figure obtained in U.S. manufacturing data for production workers in



Davis and Haltiwanger (1996). It is also seen that the decrease in wage dispersion as firm size increases is substantial. Moving from plants that employ 10^{th} of workforce to the largest 90^{th} of workforce the coefficient of variation decreases from 62% to 43%. The decrease in wage dispersion exceeds that obtained for U.S. markets in Davis and Haltiwanger (1996). It appears from figure 3 that the unobserved human capital component of wages α_j increases as firm size goes up (moves around zero given that it is residual from the estimation of (7)). This is the major factor explaining the wage rise. The rise of 21% in wages can be explained by 14% contribution of unobserved human capital, 12% from education (including sex effect), while experience compensations are 3 percentage points lower. We argue that large firms (1) pay higher wages that lower job search also because of good reputation and long work history (Burdett and Mortensen, 1998, Fujiwara-Greve and Greve, 2000), (2) can reward risky workers with good performance, since bad peformers can be fired and greater burden of profit variation – as a result of severe competition and globalisation- is borne by employees (Lazear, 1995), (3) substitute high wages for high monitoring costs (Bulow and Summers, 1996). The recruitment of risky workers with an option value should raise job turnover. Figure 4 presents job and worker reallocation in the smallest (less than 20 employees) and largest firms (more than 100 employees) and Figure 5 shows excess worker reallocation depending on firm size:

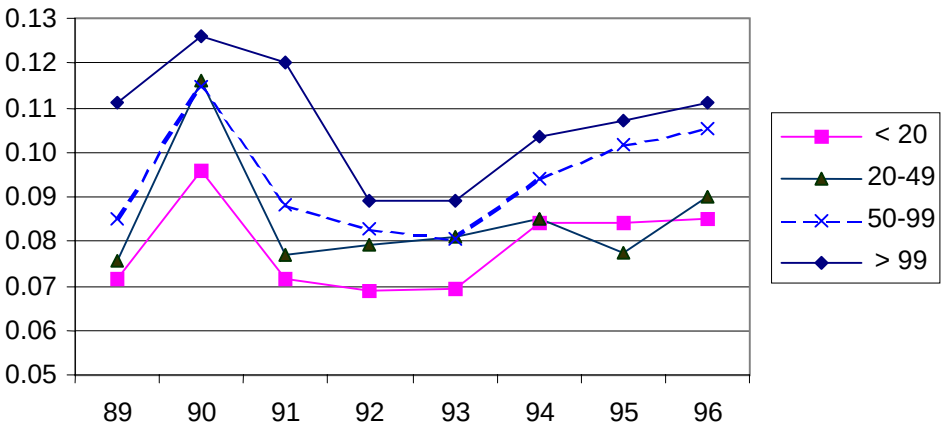
It is evident from Figure 4 that worker reallocation (WR, the sum of hirings and separation rates) and job reallocation (JR, the sum of job creation and destruction rates) are higher in the large firms (differs in manufacturing sector alone). Figure 5 shows

Figure 4. Worker (WR) and Job Reallocation (JR) in Smallest and Largest Firms



that excess worker reallocation increases in firm size. In year 1996 in middle-size and large establishments 11 percent and in small establishments 8,5 percent of employees switch jobs in excess of that required for the actual net employment change. We argue that the large job and worker turnover relates to the employment of risky workers.

Figure 5. Excess Worker Reallocation and Firm Size



But wage profiles in large firms are persistent in a way that leads to other explanations. Table 2 shows the means, standard deviation and correlation and Tables 8 and 9 the corresponding figures for small and large firms based on the estimations of equations (7) and (8). The unobserved person and education/sex effects are weighted by the corresponding variance of the individual effect.

Table 2. Summary Statistics and Correlations 1989-1996

Variable	Mean	Std. D.	lnw	x β	α	uη	ψ	ϕ	γ * Seniority	γ2 * Seniority^2	ρ * Hirings	ρ Hirings slope
Log wages (1990 FIM)	11.5878	0.4893	1.0000	0.2827	0.6106	0.2632	0.0530	0.0052	-0.0249	0.0948	-0.0003	-0.0090
x β	0.8118	0.2511	0.2827	1.0000	-0.0081	-0.2139	0.0059	-0.0250	-0.1677	0.2574	-0.0029	0.0042
α, Individual Unobserved Factors	0.0001	0.1224	0.6106	-0.0081	1.0000	0.0000	-0.0140	0.0340	-0.0354	-0.0188	-0.0281	-0.0302
uη, Individual Observed Factors	10.6865	0.0586	0.2632	-0.2139	0.0000	1.0000	0.0466	0.0037	0.0757	-0.0304	0.0019	0.0002
ψ, Firm effect	-0.0654	0.1146	0.0530	0.0059	-0.0140	0.0466	1.0000	0.6376	0.2190	0.2107	-0.1735	-0.1803
ϕ, Firm Intercept	-0.0606	0.1364	0.0052	-0.0250	0.0340	0.0037	0.6376	1.0000	-0.1852	0.0520	-0.6827	-0.5208
γ * Seniority	-0.0346	0.1028	-0.0249	-0.1677	-0.0354	0.0757	0.2190	-0.1852	1.0000	-0.6447	0.0183	0.0312
γ2* Seniority^2	0.0288	0.0835	0.0948	0.2574	-0.0188	-0.0304	0.2107	0.0520	-0.6447	1.0000	-0.0043	-0.0126
ρ * Hirings	0.0009	0.0716	-0.0003	-0.0029	-0.0281	0.0019	-0.1735	-0.6827	0.0183	-0.0043	1.0000	0.6742
ρ Hirings slope	0.0110	0.3519	-0.0090	0.0042	-0.0302	0.0002	-0.1803	-0.5208	0.0312	-0.0126	0.6742	1.0000

Correlations of α and η corrected for the sampling variance of the estimated effect.

Table 3. Summary Statistics and Correlations Small Firms < 20

Variable	Mean	Std. D.	lnw	x β	α	uη	ψ	ϕ	γ * Seniority	γ2 * Seniority^2	ρ * Hirings	ρ Hirings slope
Log wages (1990 FIM)	11.4465	0.5839	1.0000	0.2626	0.6687	0.1709	0.1044	0.0004	-0.0183	0.0282	0.0572	0.0265
x β	0.7673	0.2566	0.2626	1.0000	-0.0501	-0.2252	-0.1392	-0.0070	-0.0076	-0.0075	-0.0258	-0.0146
α, Individual Unobserved Factors	-0.2324	0.1806	0.6687	-0.0501	1.0000	0.0000	0.0235	-0.1005	0.0812	-0.1048	0.1544	0.0655
uη, Individual Observed Factors	10.7139	0.0592	0.1709	-0.2252	0.0000	1.0000	0.0157	-0.0502	-0.0140	0.0279	0.0777	0.0597
ψ, Firm effect	-0.0637	0.2431	0.1044	-0.1392	0.0235	0.0157	1.0000	0.4234	0.0039	0.0355	-0.0334	-0.2068
ϕ, Firm Intercept	-0.0715	0.5483	0.0004	-0.0070	-0.1005	-0.0502	0.4234	1.0000	-0.6625	0.5475	-0.5461	-0.5393
γ * Seniority	0.0260	0.9853	-0.0183	-0.0076	0.0812	-0.0140	0.0039	-0.6625	1.0000	-0.9577	-0.0833	-0.0352
γ2* Seniority^2	-0.0281	0.6361	0.0282	-0.0075	-0.1048	0.0279	0.0355	0.5475	-0.9577	1.0000	0.0796	0.0422
ρ * Hirings	0.0100	0.3137	0.0572	-0.0258	0.1544	0.0777	-0.0334	-0.5461	-0.0833	0.0796	1.0000	0.8178
ρ Hirings slope	0.0249	1.1933	0.0265	-0.0146	0.0655	0.0597	-0.2068	-0.5393	-0.0352	0.0422	0.8178	1.0000

Correlations of α and η corrected for the sampling variance of the estimated effect.

Table 4. Summary Statistics and Correlations: Large Firms > 100

Variable	Mean	Std. D.	lnw	x β	α	uη	ψ	ϕ	γ * Seniority	γ2 * Seniority^2	ρ * Hirings	ρ Hirings slope
Log wages (1990 FIM)	11.5908	0.4872	1.0000	0.2831	0.6071	0.2658	0.0707	0.0009	-0.0343	0.1180	-0.0008	-0.0102
x β	0.8128	0.2511	0.2831	1.0000	-0.0071	-0.2150	0.0178	-0.0534	-0.2413	0.3255	-0.0031	0.0060
α, Individual Unobserved Factors	0.0051	0.1208	0.6071	-0.0071	1.0000	0.0000	-0.0774	0.0159	-0.0674	-0.0247	-0.0063	-0.0146
uη, Individual Observed Factors	10.6857	0.0589	0.2658	-0.2150	0.0000	1.0000	0.0985	0.0100	0.1408	-0.0520	-0.0105	-0.0066
ψ, Firm effect	-0.0655	0.0789	0.0707	0.0178	-0.0774	0.0985	1.0000	0.2733	0.4966	0.3534	0.0719	-0.0341
ϕ, Firm Intercept	-0.0607	0.0589	0.0009	-0.0534	0.0159	0.0100	0.2733	1.0000	-0.0917	-0.1464	-0.5620	-0.5041
γ * Seniority	-0.0357	0.0727	-0.0343	-0.2413	-0.0674	0.1408	0.4966	-0.0917	1.0000	-0.4313	0.0364	0.0478
γ2* Seniority^2	0.0302	0.0682	0.1180	0.3255	-0.0247	-0.0520	0.3534	-0.1464	-0.4313	1.0000	-0.0096	-0.0172
ρ * Hirings	0.0007	0.0368	-0.0008	-0.0031	-0.0063	-0.0105	0.0719	-0.5620	0.0364	-0.0096	1.0000	0.6715
ρ Hirings slope	0.0107	0.2389	-0.0102	0.0060	-0.0146	-0.0066	-0.0341	-0.5041	0.0478	-0.0172	0.6715	1.0000

Correlations of α and η corrected for the sampling variance of the estimated effect.

From Table 2 it appears that fixed payments, the firm intercept ϕ, has a large variance with a standard deviation of 0.136 (with mean value –0.061). This and the total firm effect ψ_j are roughly the same irrespective of firm size but the variation is greater in small firms. Fixed payments (firm intercepts) are negatively correlated with the short-run seniority effect. As discussed in the introduction, the negative correlation relates to the endogeneity of worker mobility and rent hopping: employees switching jobs should be compensated from it from the very beginning, leading to large fixed payment and low initial seniority payments. But the negative relation becomes absent as the firm size grows.

We can also see that in large firms high wages and the firm effect are due to compensations from longer seniority, since the correlation between the firm effect and seniority is large in Table 4. Large firms with high wages tend to have high seniority payments from long tenures. Seniority effects squared (γ_{2*} Seniority^2) also correlates with experience payments $x\beta_j$ in Table 4. We suggest that reputation wages and not only the probation period in the recruitment of risky workers lead to the persistence of wages in short tenures and to the postponement of seniority payments in large firms.

From the positive hirings effect it is seen that the compensations are higher when the firm is recruiting more people. But the recruiting costs appear to be lower in large firms. Hence, the size of the available labour pool does not limit the amount recruited by large firms as Weiss and Landau (1984) claim. Rather, there might be large fixed costs in hiring, as suggested for high-skilled by Kremer (1993). The hirings effect and fixed payments are negatively correlated. Hence, either large fixed payments or hirings costs can be behind the firm-specific knowledge and mobility costs of workers, essential for risky workers to have an option value.

It is seen from Table 2 that the firm effect, $\psi_j = \phi_j + \gamma_j seniority + \gamma_{2j} seniority^2 + h_j hirings$ has a rather modest correlation with wages *ln(w)* of around 0.05. This hints that the payments on the transferable human capital or experience are rather independent of firm payments. Consider next the implications of wage compensations on excess worker reallocation, employment creation and hirings. Wages are divided to payments on experience, unobserved human capital and education and to compensations on firm level. In firm effects seniority wages are measured by the firm average of the marginal impact of one additional year of seniority. The slope of the seniority-wage profile $\gamma+2\gamma_2 sen$ is on average 5.2 percent. Table 5 explains the average excess worker reallocation EQR_j, average hirings and the change in logarithmic employment between the end and starting year when the firm enters the panel.

Table 5. Estimates of the Relation Between Excess Worker Reallocation, Employment and Compensation Policies

Dependent Variable	Excess Worker Reallocation		Difference in log(Employment)		Excess Worker Reallocation in Small Firms (< 20)		Excess Worker Reallocation in Large Firms (> 100)		Hirings	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Average Predicted Effect of x Variables ($x\beta$)	-0.277	(26.5)	-0.793	(5.7)	-0.236	(13.8)	0.109	(0.3)	-0.521	(12.7)
Average Individual Effect (α)	-0.009	(1.7)	0.060	(0.8)	0.010	(1.2)	-0.349	(12.3)	0.050	(2.3)
Average Education Effect ($u\eta$)	-0.032	(2.4)	0.548	(3.0)	-0.020	(0.9)	-0.030	(2.0)	0.210	(3.9)
Average Firm Effect Intercept (ϕ)	-0.010	(3.2)	-0.009	(0.2)	-0.020	(2.3)	0.019	(0.6)	-0.033	(2.7)
Average Hirings Effect	-0.014	(2.3)	0.007	(0.1)	-0.027	(2.2)	0.029	(0.6)	-0.066	(2.8)
Average Seniority Effect (γ+2*seniority*γ^2)	0.015	(3.2)	0.000	(0.0)	0.026	(3.6)	0.181	(3.4)	0.025	(1.3)
Skilled Workers/Employees	0.000	(0.0)	0.144	(1.3)	0.011	(0.9)	-0.015	(0.6)	0.059	(1.8)
Log(Capital/L)	-0.002	(2.3)							-0.027	(8.8)
Quasi-Rent/L/100	-0.001	(1.4)	-0.142	(13.6)	-0.001	(0.9)	-0.019	(0.9)	0.002	(1.3)
Quasi-Rent/L, Quadratic/10000	0.000	(1.6)	0.015	(2.3)	0.000	(0.4)	0.003	(1.7)	0.000	(1.6)
Quasi-Rent/L, Predicted x Variables /10000	0.058	(1.0)	0.000	(2.0)	0.000	(1.0)	-0.008	(3.4)	-0.225	(0.9)
Borrowing ratio	0.005	(2.1)	-1.443	(1.8)	0.012	(0.1)	0.000	(0.9)	0.019	(2.2)
Market Share	0.000	(1.9)	-0.263	(9.0)	0.012	(2.5)	0.869	(3.1)	-0.001	(1.8)
Average employees < 7	-0.017	(5.0)	0.004	(2.2)					0.007	(0.5)
Average employees 7-19	-0.012	(3.8)	-0.074	(1.6)					-0.013	(1.1)
Average employees 50-99	0.008	(2.4)	-0.034	(0.8)					0.024	(1.7)
Average employees 100-499	0.009	(3.1)	-0.025	(0.5)					0.096	(8.0)
Average employees > 500	0.019	(6.0)	-0.079	(2.0)					0.202	(16.1)
Sample size	5359		5275		1850		1076		5275	
Coefficient Degrees of Freedom	52		52		43		45		52	
Root Mean Squared Error	0.9171		12.1375		1.0413		1.0540		3.6195	
R^2	0.2655		0.1605		0.1542		0.4519		0.1939	

The dummies include 35 industry dummies. The quadratic quasi rent per labour is the product of quasi-rent and the deviation of it from its mean. The logarithmic difference in employment is between the last and first year the firm is observed. All estimations are ordinary least squares using appropriate firm employment weights, see section 2.

It is seen from column 1 in table 5 that the unobserved human capital α_j and the education/sex effect $u\eta_j$ component of market wages mitigate excess worker reallocation, and from column 4 in large firms, in particular. This could be explained by the direct positive effect that higher wages have on firm size, following Burdett and Mortensen (1998). The employee has a lower chance of finding a firm offering still higher wages and lower job search in itself raises the size of firms. One contradictory result is that higher unobserved human capital payments are shown later also to improve firm performance and from column 2 that compensations on unobserved human capital have no clear relation to the employment demand. These findings are consistent with reputation wages, as in Fujiwara-Greve and Greve (2000), and to the recruitment of risky workers with an option value, as in Lazear (1995). It is seen from first column in table 5 that the unexplained excess worker reallocations remain large, 4 percent higher in largest than in smallest firms according to the size dummies. This is again in line with Lazear (1995) that large firms employ risky workers with large worker turnover.

Given the initial log wage regression the effects of unobserved human capital should be interpreted relative to the expected wage. An increase in unobserved human capital by 10 percentage points decreases excess worker reallocation on average by 0.9 percentage points, but the effect is 3 percentage points in large firms. This is substantial given the average excess separation rate of 9 percent.

Table 5 shows some evidence of the importance of incentive-based schemes in small firms. There is support for Hall and Lazear (1984) that in small firms fixed payments (firm intercept) lower excess worker reallocation. According to the model, excess worker reallocation is too high when the firm behaves as a monopoly and wage negotiations and the resulting higher fixed payments lower the job search of employees. Fixed payments rather than rent sharing are used when the outside options of employees or employers are not known. In large firms, uncertainty in outside options of employers may instead not be resolved by wage negotiations. Following Nickel (1999), high monopoly rents may not signal profitability whereas that workers are not receiving their share of the firm's success. Large firms may also be willing to retain their option to fire risky employees if turning out to be bad performers.

Average compensations on experience have similarly an insignificant effect on excess worker reallocation in large firms. In small firms an increase in wages by 10 percentage points generated by an increase of the average experience level of employees by 6 years, from the average of 21 years, lowers excess worker reallocation by 2 percentage points. It is

seen that seniority payments even raise excess worker reallocation. The magnitude is sizeable only in the largest firms, with a 10 percentage point increase in wages due to seniority payments raising excess worker reallocation by 1.8 percentage points. We can see that compensations on general experience do not raise mobility costs in large firms and seniority payments from short tenures are not used for this purpose as postponed to later period. Both indicate the importance of reputation wages or the recruitment of risky workers with an option value.

We can see that average hirings effects (last column) are fairly similar to the employment change effects (second column). The latter measures the change in logarithmic employment between the last and first year that the firm enters the panel. This is in line with the argument that firms adjust the size of personnel primarily through recruitment. The clearest effect on total employment comes from compensations on education/sex. A shift to firms with employees having a master's degree rather than upper secondary education (equivalent to a 60 percent rise in wages) implies an increase in the overall hirings rate by 10 percentage points. This equals one third of the average hirings rate of 33. We find unobserved human capital to be fairly neutral in employment effects. It does not affect employment similarly as compensations on education, capital, and high quasi rent generated by an experienced workforce.

6. COMPENSATING WORK AND THE PERFORMANCE OF FIRM

In Table 6 we measure firm performance by average total factor productivity, average log of value added and by average net profits per person. Tables 7 and 8 show these respectively for small and large firms. The log of net profits is obtained for a reduced number of firms since profitability was negative in many firms in the severe recession period of 1992-1994.

We can observe that unobserved human capital α has a strong positive effect on total factor productivity, valued added per labour and profitability, and from Tables 7 and 8 irrespective of firm size. A 14 percentage point rise in wages due to unobserved human capital, the difference in unobserved human capital between the smallest and largest firms, see Figure 4, is associated with a similar rise in profitability. The effect is stronger for large firms from Table 8. The implications are weaker on total factor productivity as compared to profitability. This can be explained by the greater emphasis that the total factor productivity measure gives to physical capital.

Table 6. Total Factor Productivity, Valued Added and Net Profits Per Capita As a Function of Compensation Policies

Dependent Variable:	log(TFP) Level		Log of Valued Added/L/100		Log of Net Profits/L/100		Log of Net Profits/L/100 No Industry Dummies	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept	-21.089	(9.7)	-19.520	(14.4)	-8.835	(2.3)	-15.327	(5.4)
Average Predicted Effect of x Variables ($x\beta$)	-0.409	(2.5)	-0.247	(2.4)	0.026	(0.1)	0.003	(0.0)
Average Individual Effect (α)	0.601	(7.3)	0.793	(15.5)	0.965	(6.5)	0.675	(4.9)
Average Education Effect ($u\eta$)	1.969	(9.8)	1.277	(10.2)	0.563	(1.6)	1.127	(4.3)
Average Firm Effect Intercept (ϕ)	-0.035	(0.8)	-0.024	(0.9)	0.066	(0.5)	0.082	(0.6)
Average Hirings Effect	0.056	(0.6)	-0.031	(0.6)	0.033	(0.1)	0.046	(0.2)
Average Seniority Effect (γ+2*seniority*γ^2)	0.055	(0.8)	0.074	(1.7)	0.293	(2.2)	0.345	(2.6)
Skilled Workers/Employees	-1.117	(8.8)	-0.500	(6.4)	0.731	(3.3)	0.525	(2.8)
Log(Capital/L)					0.269	(13.0)	0.245	(13.7)
Excess Worker Reallocation	-0.876	(4.1)	-0.958	(7.2)	-0.189	(0.5)	-0.937	(2.5)
Quasi-Rent/L/100	-0.000020	(7.9)	0.000	(45.1)	0.036	(3.2)	0.041	(3.7)
Quasi-Rent/L, Quadratic/10000	2.787	(3.1)	2.376	(4.3)	0.000	(4.8)	0.000	(6.2)
Quasi-Rent/L/100, Predicted x Variables /10000	6.304	(4.5)	16.440	(18.9)	-2.795	(2.1)	-3.308	(2.4)
Quasi-Rent/L/100, Excess Worker Reallocation /10000	0.336	(10.4)	0.030	(1.5)	3.758	(1.7)	6.556	(3.0)
Borrowing ratio	0.000	(0.2)	0.003	(1.8)	-0.401	(5.3)	-0.331	(4.7)
Market Share	-0.004	(1.1)	0.001	(0.4)	0.004	(1.1)	0.000	(0.1)
Return on Capital	0.525	(0.3)	2.586	(2.0)	0.068	(4.3)	0.069	(4.3)
Exports/Employees	-0.032	(0.6)	0.007	(0.2)	-0.491	(0.1)	2.921	(0.8)
Average employees < 7	-0.104	(2.2)	-0.041	(1.4)	0.353	(3.8)	0.291	(3.2)
Average employees 7-19	0.168	(3.2)	0.028	(0.9)	0.033	(0.4)	0.005	(0.1)
Average employees 50-99	0.416	(9.2)	0.083	(3.0)	-0.056	(0.6)	-0.047	(0.5)
Average employees 100-499	0.543	(11.5)	0.212	(7.2)	-0.033	(0.4)	-0.036	(0.4)
Average employees > 500	0.026	(0.1)	0.443	(2.6)	0.264	(3.2)	0.274	(3.4)
Sample size	5133		5228		3359		3359	
Coefficient Degrees of Freedom	55		52		59		59	
Root Mean Squared Error	13.5292		8.5229		19.3973		19.8023	
R^2	0.3493		0.7232		0.2438		0.2038	

The dummies include 35 industry dummies. The quadratic quasi rent per labour is the product of quasi-rent and the deviation of it from its mean. The last column excludes industry dummies.

Seniority payments associate with higher profitability. A 10 percent increase in wages generated by seniority payments raises net profits by 3 percentage points. However, the coefficient for the largest firms is insignificant from Table 8, confirming the minor role that incentive payments play in improving efficiency. One should also bear in mind from table 4 that seniority compensations in large firms are concentrated on longer tenures and possibly less related to firm performance. We can see that payments on unobserved skills improve profitability in large firms and incentive-based schemes in small firms. As a result, we do not find any difference in average profitability between small and large firms in Table A.1 in the Appendix. We cannot claim that reputation wages or the recruitment of risky workers in large firms is more efficient than the incentive payments used in small firms.

Table 7. Total Factor Productivity, Valued Added and Net Profits Per Capita As a Function of Compensation Policies in Small Firms < 20

Dependent Variable:	log(TFP) Level		Log of Valued Added/L/100		Log of Net Profits/L/100		Log of Net Profits/L/100 No Industry Dummies	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept	-21.186	(4.2)	-19.31	(5.5)	-9.224	(1.2)	-7.524	(1.8)
Average Predicted Effect of x Variables ($x\beta$)	-0.729	(3.2)	-0.354	(2.2)	-0.522	(1.4)	-0.736	(2.0)
Average Individual Effect (α)	0.427	(4.0)	0.666	(8.9)	0.486	(2.7)	0.571	(3.4)
Average Education Effect ($u\eta$)	1.823	(6.5)	0.760	(3.9)	0.410	(0.9)	0.557	(1.4)
Average Firm Effect Intercept (ϕ)	-0.127	(1.1)	-0.075	(1.0)	-0.025	(0.1)	0.090	(0.5)
Average Hirings Effect	0.049	(0.3)	-0.092	(0.9)	0.065	(0.2)	0.205	(0.8)
Average Seniority Effect (γ+2*seniority*γ^2)	0.066	(0.7)	0.066	(1.0)	0.395	(2.5)	0.333	(2.2)
Skilled Workers/Employees	-0.835	(4.9)	-0.257	(2.2)	0.461	(1.6)	0.591	(2.4)
Log(Capital/L)					0.165	(5.0)	0.100	(3.4)
Excess Worker Reallocation	-0.499	(1.6)	-0.473	(2.2)	-1.053	(1.9)	-1.397	(2.6)
Quasi-Rent/L/100	-0.020	(2.4)	0.007	(1.2)	0.020	(1.8)	0.018	(1.6)
Quasi-Rent/L, Quadratic/10000	0.000	(4.2)	0.000	(27.5)	0.000	(6.6)	0.000	(7.6)
Quasi-Rent/L/100, Predicted x Variables /10000	3.361	(3.2)	4.078	(5.6)	-0.154	(0.1)	0.396	(0.3)
Quasi-Rent/L/100, Excess Worker Reallocation /10000	3.215	(2.0)	14.486	(12.8)	9.126	(3.8)	9.814	(4.1)
Borrowing ratio	0.400	(6.7)	0.074	(1.8)	-1.046	(7.3)	-0.850	(6.3)
Market Share	0.019	(0.5)	0.063	(2.3)	0.015	(0.3)	-0.019	(1.4)
Return on Capital	-0.005	(1.2)	0.000	(0.1)	0.032	(1.9)	0.029	(1.8)
Exports/Employees	0.572	(0.2)	0.503	(0.3)	1.566	(0.4)	-1.962	(0.5)
Sample size	1773		1853		1164		1164	
Coefficient Degrees of Freedom	46		47		47		17	
Root Mean Squared Error	13.0936		9.1826		17.6891		17.824582	
R^2	0.2384		0.6611		0.2320		0.199239	

The dummies include 35 industry dummies. The quadratic quasi rent per labour is the product of quasi-rent and the deviation of it from its mean.

Table 8. Total Factor Productivity, Valued Added and Net Profits Per Capital As a Function of Compensation Policies in Large Firms > 100

Dependent Variable:	log(TFP) Level		Log of Valued Added/L/100		Log of Net Profits/L/100		Log of Net Profits/L/100 No Industry Dummies	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept	-20.71	(3.5)	-20.52	(7.4)	0.648	(0.1)	-21.962	(3.2)
Average Predicted Effect of x Variables ($x\beta$)	0.918	(1.8)	0.373	(1.6)	2.036	(2.1)	2.314	(2.6)
Average Individual Effect (α)	0.174	(0.7)	0.426	(3.6)	1.119	(2.3)	0.194	(0.5)
Average Education Effect ($u\eta$)	1.868	(3.3)	1.329	(5.1)	-0.713	(0.7)	1.414	(2.1)
Average Firm Effect Intercept (ϕ)	2.342	(3.2)	0.299	(0.9)	-0.563	(0.4)	0.669	(0.8)
Average Hirings Effect	1.549	(1.7)	-0.161	(0.4)	-0.574	(0.4)	0.797	(0.6)
Average Seniority Effect (γ+2*seniority*γ^2)	-0.306	(0.8)	0.030	(0.2)	0.405	(0.6)	0.386	(0.7)
Skilled Workers/Employees	-0.712	(2.0)	-0.556	(3.4)	1.863	(2.9)	0.762	(1.5)
Log(Capital/L)					0.463	(9.0)	0.463	(11.4)
Excess Worker Reallocation	-0.123	(0.2)	0.054	(0.2)	2.836	(2.4)	0.727	(0.7)
Quasi-Rent/L/100	-0.015	(0.3)	0.143	(7.0)	0.196	(2.4)	0.276	(3.5)
Quasi-Rent/L, Quadratic/10000	0.000	(0.2)	-0.001	(21.8)	0.000	(3.3)	0.000	(2.8)
Quasi-Rent/L/100, Predicted x Variables /10000	2.209	(0.4)	-6.513	(2.8)	-23.541	(2.6)	-33.169	(3.7)
Quasi-Rent/L/100, Excess Worker Reallocation /10000	10.664	(1.7)	2.432	(0.8)	-24.576	(2.1)	-12.249	(1.1)
Borrowing ratio	0.292	(4.3)	0.058	(1.8)	0.262	(1.8)	0.358	(2.7)
Market Share	0.006	(1.9)	0.001	(0.7)	0.013	(2.2)	0.005	(1.2)
Return on Capital	-0.151	(3.0)	0.038	(1.6)	0.528	(5.9)	0.482	(5.3)
Exports/Employees	34.860	(1.2)	25.558	(1.9)	37.270	(0.7)	49.664	(1.0)
Sample size	1076		1067		722		705	
Coefficient Degrees of Freedom	49		49		47		17	
Root Mean Squared Error	17.4755		8.1042		26.8132		28.0687	
R^2	0.4866		0.8839		0.3755		0.2852	

The dummies include 35 industry dummies. The quadratic quasi rent per labour is the product of quasi-rent and the deviation of it from its mean.

The differences in wage formation are also not an outcome of a difference in the share of skilled workforce (lower university and non-university degrees), see table A.1 in the Appendix. Compensations on education improve total factor productivity irrespective of firm size but have no clear relation to profitability. The effect of educational compensations on profitability turn out to be positive only when dropping industry dummies in the last column.

Time-varying compensations, experience payments, have a negative effect on firm performance. The compensations lower productivity. This is especially true in small firms where an increase in wages by 10 percent, when the average experience of employees increases six years from the average, lowers total factor productivity and profits per labour around 7 percentage points. It is tempting to conclude that the lower worker reallocation in small firms with high payments on experience, see table 5, deteriorates firm performance. We can see from the interaction term between quasi rent and experience that high quasi-rent firms form an exception. The exception also extends to high quasi rent industries, namely energy and water, consumer-good manufacturing (food, textile, clothing), trade and construction in decreasing order. Experienced personnel is valued in firms, where wage expenses form low share of all valued added and where the share of experience personnel is relatively large.

A high borrowing ratio, especially in small firms, associates with lower profitability. Earlier we found no strong link between wage policy and liquidity constraints. Liquidity constrained firms lower their hirings and labour demand, but not their wages.

Since a large share of small firms is concentrated in services, it is worthwhile to consider whether the firm-size effects are industry specific. Comparing the third and fourth columns in Table 6 it is seen that the exclusion of industry dummies does not change substantially the results, except for educational payments. Tables A.4, A.5 and A6 in the Appendix depict excess worker reallocation, employment and firm performance in some manufacturing industries, ICT and business services and trade. It is seen that in the trade sector the results differ from those obtained for typical small firms. Seniority payments have a weaker positive effect on profitability than in manufacturing and the ICT sector. Compensations on experience also associate with no deterioration in profitability. In ICT and business services unobserved human capital is relatively unimportant in profitability but clearly plays an important role in total factor productivity. One possible reason can be the keener relation between unobserved human and physical capital (largely buildings) in these industries. The workforce is highly educated and compensating it also has a very strong positive effect on employment and total factor productivity. Given that ICT industries are growing fast the

profitability implications are also relatively unimportant relative to future prospects in firm performance. This can also explain why the borrowing ratio lowers profitability but raises productivity. From all this we can again conclude that the firm size differences and especially with respect to unobserved human capital, are not explained by the location of small firms in trade and large firms in manufacturing. Small firm results are not typical for trade and service sectors, where the share of small firms is large.

7. CONCLUSIONS

Firms recruiting personnel with unobserved human capital perform better. It especially pays for large firms to recruit high wage earners, whether in terms of paying reputation wages or employing risky workers. Small firms face greater productivity and performance uncertainty, and use their better monitoring of employees and incentive-based payments to reduce excess worker reallocation. Compensations adjust more to the profit flows and there are large fixed costs in recruitment. However, mobility costs for employees are not high and fixed term contracts are used to lower excess worker reallocation. Large firms are more willing to retain their monopoly power and maintain large worker reallocation or fire employees that turn out to perform badly.

The relative share of unobserved human capital explaining the firm-size premium might also be important in the United States. Davis and Haltiwanger (1996) also provide evidence of incentive-based mechanisms being lower in the U.S. as the firm size increases, since wage differentials between bottom and top earners is decreasing in firm size (10^{th} least earner as compared to 90^{th} highest earner). As discussed, large part of higher wages are also unexplained by observable characteristics. The bigger difference is that job turnover is decreasing in firm size, as evidenced in Brown and Medof (1994). One explanation is that the reputation wage effect and/or the direct size increasing effect of lower job search dominates in large firms, while in Finland the recruitment of risky workers with an option value is more important.

The biggest decision in the wage level is made when the employee is recruited, whereas wages can be more easily adjusted upwards later in the flexible labour market in the U.S. Our results are in line with wage compression in corporatist institutions, where worker

mobility is comparable to the U.S. level (see e.g. Piekkola and Böckerman, 2000). Bertola and Rogerson (1997) argue that under wage compression a negative labour demand shock such as the deep recession in the beginning of 1990's in Finland leads to intense labour shedding and hiring. We have shown that especially the level of hirings adjusts, while wage policy and separations are less cyclical. The mobility costs of employees rise substantially. We can see that wage compression does not prevent large firms from paying substantially higher wages. The decision to pay high wages is made at the time when the person is recruited rather than paying high seniority wages. It is also true that large firms may have been more subject to shifts in profit margins and severe competition as an outcome of globalisation, and high worker reallocation may have strengthened the concentration of high wage earners in large firms.

The firm size effect can also emerge from other institutional factors. Under strong unions in large firms the inefficiency of seniority payments emerge from Kuhn and Robert's (1989) LIFO lay-off model, where the last employed is the first to be kicked out. The unions, possibly more powerful in large firms, set higher wages for intramarginal workers with longer tenure. General wage agreements can also be more binding in large firms, as being often the targets of unionization drives (Voos, 1983, Brown et al., 1990). In any case, we can see that higher-level wage negotiations in Europe are used as protection against aggregate shocks, but this does not show up as a decrease in job turnover, especially in large firms. Finally, we have no information on firm age, but we expect it to be of minor importance, as in Troske (1999), when worker characteristics such as experience and education are controlled for.

Appendix A.

The 5,361 observations are from the following industries: mining (nace 10-14) 23, consumer goods (nace 15, 17-19) 481, other manufacturing (nace 20-25) 605, non metallic mineral products (nace 26,36-37) 605, metals and machinery (nace 27-29) 807, energy and water (nace 40-43) 99, construction (nace 44-45) 670, trade (50-55) 1594, ICT and business services (nace 30, 71-72, 741-745, 642) 684, household services (nace 746-747, 93-99) 194. We ignore the transport (except telecommunications), educational and health sectors. The estimated equations include 35 industry dummies at the two digit level while the three-digit level is used in construction and services (see above).

In the final sample used in the estimations, there are 5,361 firms with 3,349 firms with one plant, 1107 firms with 2-3 plants and 900 firms with 4 plants or more. The plant level job and worker flow are calculated from the 8,021,902 person-year observations (438,247 plant-year observations) in the period 1987-1996 of persons who worked for at least one year in the sample firms during the period 1989-1996. The employee data on personnel in selected firms cover 3,099,342 observations and 791,437 persons after deleting (i) 55,406 observations of persons to whom wages in one year deviate more than five standard deviations from the estimated value (the OLS regression was similar to Abowd, Kramarz and Margolis, 1999, p. 326, with explanatory variables: sex, year, 8 education classes and work experience up to the fourth power, see Table A2 in Appendix A), (ii) 6,582 observations where the hirings coefficient was not estimable (hirings or separation rate not obtainable) and (iii) 24 empty observations. It is important to note that the time span of 8 years is sufficiently long to separate person and firm effects, requiring in every firm at least one person to experience job switch.

535,258 observations out of 4,770,543 had a missing seniority starting date in the firm. For these observations, the observed firm switches are used to calculate seniority from the beginning of January. The problem is that there is no job switch for 26% of the 108,452 individuals who had a missing starting date in 1989, and for 29% of the 94,624 individuals in 1990, etc. For these individuals seniority is calculated from the beginning of the personnel data period (1987). Finally, in the calculation of the seniority and hirings effects, we pooled 1,259 firms (5,717 observations) that had less than 10 observations into a single firm in the 5 main industries.

Table A.1 Summary Statistics: Mean, Standard Deviation

Variable	Mean	Standard Deviation	Mean Small Firms	Standard Deviation Small Firms	Mean Large Firms	ST Large Firms
Firm Size	411	12451	9	64.8	921	24107
Real Wages	106334	438362	100629	468555.8	110046	580471
Excess Worker Reallocation	0.10	1.07	0.09	1.12	0.10	1.40
Separation Rate	0.17	1.49	0.17	1.55	0.18	1.91
Hirings Rate	0.33	3.99	0.28	2.93	0.41	6.61
Experience	21	63	20	71.2	21	76
Seniority	9	63	7	51.2	10	92
$Seniority^2$	9	175	8	281.6	9	89
Average Predicted Effect of x Variables ($x\beta$)	0.76	2.70	0.70	3.31	0.79	2.87
Average Individual Effect (α)	0.13	2.79	0.08	3.34	0.16	3.00
Average Education Effect ($u\eta$)	10.68	1.85	10.69	1.81	10.68	2.68
Average Firm Intercept (ϕ)	-0.06	6.92	-0.07	7.80	-0.06	1.78
Average Hirings Effect	0.00	2.87	0.01	3.13	0.00	1.28
Average Seniority Effect (γ+2*seniority*γ^2)	-0.03	4.09	-0.12	5.53	0.02	3.47
Skilled Workers/Employees	0.15	2.63	0.16	2.90	0.16	3.43
Log(Capital/L)	6.71	21.17	6.09	19.10	7.25	28.51
Quasi-Rent/L/100	6.58	291.82	7.56	423.23	7.03	255.46
Quasi-Rent/L, Quadratic/10000	407	134544	1034	219894.6	147	19506
Quasi-Rent/L, Predicted x Variables /10000	0.05	2.36	0.06	3.38	0.06	2.17
Quasi-Rent/L, Excess Quits /10000	0.01	0.22	0.01	0.29	0.01	0.24
Market Share	2.75	103.77	0.14	29.34	5.99	209.36
Borrowing ratio	0.29	6.76	0.27	5.74	0.30	10.39
Return on Equity	0.29	48.95	0.41	78.16	0.23	11.33
Value Added/Employees/100	0.01	0.29	0.01	0.42	0.01	0.26
Profits/Employees/100	0.28	61.15	0.31	42.44	0.32	124.35
Exports/Employees/100	0.00	0.10	0.00	0.14	0.00	0.02

Calculations use as weights the sample weight times the average number of employees, as regressions. Wages, opportunity income, valued added, net profits and exports per labour and quasi rent in thousands of 1990FIM.

Table A.2 Estimates of the Effects of Experience, Year, Individuals and Firms on the Log of Wages for 1989 to 1996

Variable	Mean	Coefficient	t-value	Variable	Mean	Coefficient	t-value
Number of job switches	2.8804E-18	0.00384	(2.1)				
Experience/10	3.133E-18	0.29321	(9.4)				
Experience/10^2	-1.59263E-15	-0.00550	(45.6)				
Experience^3 / 100	-3.8304E-17	0.01291	(33.2)				
Experience^4 / 1000	1.6175E-15	-0.00118	(28.0)				
Firm size X Experience	-7.55622E-15	0.00000	(5.6)				
Firm size squared X Experience	2.5564E-11	0.00000	(4.0)				
Firm size X Experience X Seniority	5.3679E-14	0.00000	(4.6)				
Firm size squared X Experience X Seniority	-1.69478E-11	0.00000	(1.7)				
Year 1989	5.5324E-18	1.12780	(5.1)				
Year 1990	7.3863E-18	1.02482	(5.4)				
Year 1991	7.5782E-18	0.85215	(5.4)				
Year 1992	6.2800E-18	0.63453	(5.1)				
Year 1993	5.5765E-18	0.44842	(4.8)				
Year 1994	5.8724E-18	0.28524	(4.5)				
Year 1995	5.2826E-18	0.15548	(4.9)				
Industry 10-14 X Experience	9.1508E-21	0.00123	(0.4)	Industry 10.14 X Experience^2	1.0249E-18	0.00002	(0.3)
Industry 15-16 X Experience	2.7910E-19	-0.00411	(1.4)	Industry 15.16 X Experience^2	4.5614E-18	0.00024	(8.8)
Industry 17 X Experience	2.7452E-20	-0.01220	(4.0)	Industry 17 X Experience^2	-3.42926E-18	0.00053	(9.1)
Industry 18 X Experience	-5.49048E-20	-0.00466	(1.5)	Industry 18 X Experience^2	3.73353E-18	0.00019	(3.6)
Industry 19 X Experience	3.088E-20	-0.00554	(0.8)	Industry 19 X Experience^2	-7.32065E-20	0.00015	(0.5)
Industry 20 X Experience	-1.83016E-20	-0.00382	(1.3)	Industry 20 X Experience^2	0	0.00023	(3.8)
Industry 21 X Experience	6.6801E-19	-0.00567	(2.0)	Industry 22 X Experience^2	6.03953E-19	0.00038	(13.8)
Industry 22 X Experience	-1.83016E-20	-0.00288	(1.0)	Industry 22 X Experience^2	-6.65721E-19	-0.00022	(5.8)
Industry 23 X Experience	-6.29118E-20	-0.00330	(1.1)	Industry 23 X Experience^2	-6.4742E-19	0.00032	(5.8)
Industry 24 X Experience	-7.79248E-20	-0.00524	(1.8)	Industry 24 X Experience^2	3.10913E-18	0.00045	(12.1)
Industry 26 X Experience	-2.72393E-09	-0.00407	(1.4)	Industry 26 X Experience^2	1.24623E-10	0.00018	(3.8)
Industry 27 X Experience	-1.14385E-21	-0.00064	(0.2)	Industry 27 X Experience^2	-3.22223E-18	-0.00004	(11.9)
Industry 28 X Experience	1.71578E-21	-0.00111	(0.4)	Industry 28 X Experience^2	-19.44736422	0.00000	(0.3)
Industry 29 X Experience	-1.96599E-19	-0.00637	(2.3)	Industry 29 X Experience^2	1.766720191	0.00039	(16.4)
Industry 30 X Experience	-3.94629E-19	0.00743	(0.9)	Industry 30 X Experience^2	1.19608E-17	-0.00243	(1.2)
Industry 31 X Experience	-1.14385E-21	-0.00471	(1.7)	Industry 32 X Experience^2	1.14385E-20	0.00036	(11.8)
Industry 32 X Experience	-1.25824E-20	0.00421	(1.3)	Industry 32 X Experience^2	3.3675E-18	0.00038	(1.4)
Industry 33 X Experience	-9.43677E-21	-0.00547	(1.3)	Industry 33 X Experience^2	-4.34663E-20	0.00000	
Industry 34 X Experience	-8.00696E-21	-0.00538	(0.7)	Industry 34 X Experience^2	-9.15081E-21	0.00074	(0.5)
Industry 35 X Experience	-1.04662E-19	-0.00394	(1.3)	Industry 35 X Experience^2	1.82559E-18	0.00018	(3.0)
Industry 36 X Experience	-4.48961E-20	-0.00585	(1.9)	Industry 36 X Experience^2	4.5754E-19	0.00023	(3.0)
Industry 40 X Experience	-4.46102E-20	-0.01035	(3.5)	Industry 40 X Experience^2	-1.5911E-18	0.00030	(6.8)
Industry 451 X Experience	4.6898E-20	-0.00349	(1.1)	Industry 452 X Experience^2	-6.2683E-19	0.00031	(3.2)
Industry 452 X Experience	-2.71665E-20	-0.00171	(0.6)	Industry 452 X Experience^2	-2.03605E-19	-0.00026	(6.0)
Industry 453 X Experience	-1.77297E-20	-0.00677	(2.2)	Industry 453 X Experience^2	6.74872E-20	0.00020	(2.2)
Industry 50 X Experience	7.2920E-20	-0.00344	(1.2)	Industry 50 X Experience^2	-3.01748E-18	0.00012	(2.3)
Industry 51 X Experience	-7.16337E-20	-0.00496	(1.8)	Industry 52 X Experience^2	7.069E-18	0.00017	(7.3)
Industry 52 X Experience	1.9274E-19	-0.00505	(1.8)	Industry 52 X Experience^2	-4.55524E-18	0.00006	(2.4)
Industry 55 X Experience	-4.63974E-20	-0.00498	(1.7)	Industry 55 X Experience^2	2.83904E-18	0.00015	(3.1)
Industry 71 X Experience	-4.5754E-21	0.00349	(0.4)	Industry 72 X Experience^2	0	0.00116	(1.0)
Industry 72 X Experience	-8.60748E-20	-0.00131	(0.4)	Industry 72 X Experience^2	6.74872E-19	0.00025	(3.1)
Industry 741 X Experience	-2.75096E-19	-0.00404	(1.4)	Industry 742 X Experience^2	3.01062E-18	0.00009	(2.1)
Industry 746 X Experience	-2.03034E-20	-0.00630	(1.8)	Industry 746 X Experience^2	-2.56223E-19	-0.00006	(0.4)
Industry 747 X Experience	6.2912E-21	-0.01048	(3.6)	Industry 747 X Experience^2	-2.42496E-19	0.00026	(2.6)
Industry 93 X Experience	6.8917E-20	-0.01467	(4.7)	Industry 93 X Experience^2	1.54992E-19	0.00052	(4.8)
Coefficient Degrees of Freedom		85					
Sample Size		3161329					
Root Mean Squared Error		0.71643					
R^2		0.011					

Table A.3 Education Effect

Variable	Coefficient	t-value
Intercept	10.57	(12074.8)
Primary Education	-0.22	(203.1)
Upper Secondary Education 10-11 years	-0.15	(141.1)
Vocational Education 13-14 years	0.12	(74.2)
Bachelor's Degree 15 years	0.23	(99.1)
Master's Degree 16 years	0.40	(247.8)
Post-Graduate Degree	0.67	(104.5)
Sex	0.32	(402.9)
Sample size	1 834 655	
Coefficient Degrees of Freedom	7	
Root Mean Squared Error	0.159	
R^2	0.1865	

The benchmark education class is upper secondary education of about 12.

Table A.4 Compensation Policies, Worker Mobility and Firm Performance in Wood, Pulp and Paper, Printing, Oil Refining, Chemical, Rubber and Non-Metallic Industries

Dependent Variable	Excess Work Reallocation		Difference in log(Employment)		Total Factor Productivity		Log of Net Profits/L/100	
Variable	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Intercept					-48.85	(7.6)	-18.44	(1.4)
Average Predicted Effect of x Variables (x β)	-0.369	(10.3)	-0.308	(0.6)	0.834	(1.6)	-0.138	(0.1)
Average Individual Effect (α)	-0.051	(4.5)	-0.087	(0.6)	-0.160	(1.0)	0.671	(2.0)
Average Education Effect (u η)	-0.224	(4.8)	0.649	(1.0)	4.454	(7.5)	1.459	(1.2)
Average Firm Effect Intercept (ϕ)	0.023	(1.1)	0.568	(1.9)	1.128	(3.9)	-0.631	(0.9)
Average Hirings Effect	0.064	(2.1)	0.730	(1.8)	1.583	(3.8)	-1.233	(1.4)
Average Seniority Effect (γ+2*seniority* γ^2)	-0.027	(1.6)	-0.697	(3.1)	-0.257	(1.2)	0.811	(1.7)
Skilled Workers/Employees	0.124	(4.7)	0.685	(2.0)	-0.996	(1.5)	0.653	(0.9)
Log(Capital/L)	0.004	(1.7)	-0.194	(5.6)			0.185	(2.7)
Excess Worker Reallocation					-1.774	(5.2)	-2.109	(1.6)
Quasi-Rent/L/100	-0.009	(2.2)	0.139	(2.6)	0.126	(2.4)	0.121	(1.2)
Quasi-Rent/L, Quadratic/10000	0.000	(1.4)	-0.001	(3.7)	0.000	(1.7)	-0.001	(2.6)
Quasi-Rent/L/100, Predicted x Variables /100	0.904	(1.8)	-15.352	(2.2)	-17.226	(2.6)	-7.311	(0.6)
Quasi-Rent/L, Excess Work Reallocation / 1000					25.886	(3.3)	29.060	(2.0)
Borrowing ratio	-0.011	(1.1)	-0.202	(1.6)	0.548	(4.5)	-1.469	(3.3)
Market Share	0.001	(3.2)	0.023	(5.7)	-0.007	(1.8)	-0.014	(1.9)
Return on Capital					-0.010	(0.3)	0.033	(0.6)
Exports/Employees					10.628	(2.6)	-12.745	(1.3)
Average employees < 7	-0.005	(0.4)	-0.286	(1.8)	-0.046	(0.3)	-0.092	(0.2)
Average employees 7-19	0.008	(0.9)	-0.007	(0.1)	-0.186	(1.6)	-0.165	(0.7)
Average employees 50-99	0.002	(0.3)	-0.007	(0.1)	0.171	(1.5)	0.137	(0.6)
Average employees 100-499	0.007	(1.0)	-0.099	(1.0)	0.462	(4.8)	-0.015	(0.1)
Average employees > 500	0.016	(2.1)	-0.400	(3.9)	0.604	(6.2)	0.090	(0.4)
Sample size	598		598		588		403	
Coefficient Degrees of Freedom	18		18		21		22	
Root Mean Squared Error	0.8225		11.0140		10.6015		17.5522	
R^2	0.2581		0.3351		0.3420		0.3328	

The quadratic term is the product of quasi-rent and the deviation of it from its mean. The interaction terms are the products of the quasi-rent and the deviation of it from its mean and the other interaction term.

Table A.5 Compensation Policies, Worker Mobility and Firm Performance in ICT and Business Services

Dependent Variable	Excess Worker Reallocation		Difference in log(Employment)		Total Factor Productivity		Log of Net Profits/L/100	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept					-15.96	(3.7)	-17.98	(2.1)
Average Predicted Effect of x Variables ($x\beta$)	-0.267	(9.2)	-0.549	(2.4)	0.093	(0.3)	0.493	(0.7)
Average Individual Effect (α)	0.006	(0.5)	-0.066	(0.6)	0.826	(5.8)	0.126	(0.4)
Average Education Effect ($u\eta$)	0.017	(0.4)	0.930	(3.0)	1.403	(3.5)	1.328	(1.6)
Average Firm Effect Intercept (ϕ)	0.000	(0.0)	-0.417	(2.2)	0.418	(1.7)	-0.764	(1.3)
Average Hirings Effect	0.020	(0.6)	-0.844	(3.4)	0.480	(1.5)	-0.715	(1.0)
Average Seniority Effect (γ+2*seniority*γ^2)	0.028	(1.9)	0.319	(2.7)	-0.156	(1.0)	0.881	(2.8)
Skilled Workers/Employees	-0.019	(0.8)	-0.573	(3.0)	0.170	(0.4)	-0.181	(0.4)
Log(Capital/L)	0.001	(0.5)	0.017	(0.7)			0.341	(5.4)
Excess Worker Reallocation					-0.504	(2.0)	-1.417	(1.6)
Quasi-Rent/L/100	0.003	(0.6)	0.007	(0.2)	0.129	(3.0)	0.189	(2.4)
Quasi-Rent/L, Quadratic/10000	0.000	(2.2)	0.000	(0.1)	0.000	(3.1)	-0.001	(3.8)
Quasi-Rent/L/100, Predicted x Variables /100	-0.146	(0.3)	-0.761	(0.2)	-12.814	(2.5)	-13.214	(1.4)
Quasi-Rent/L, Excess Worker Reallocation / 1000					-5.549	(0.8)	-21.662	(1.6)
Borrowing ratio	0.015	(2.0)	-0.181	(3.1)	0.326	(4.3)	-1.765	(6.2)
Market Share	0.000	(0.4)	0.003	(0.4)	-0.010	(1.0)	0.007	(0.4)
Return on Capital					0.016	(1.5)	0.093	(3.7)
Exports/Employees					12.101	(0.6)	36.930	(0.9)
Average employees < 7	-0.003	(0.4)	0.069	(1.0)	0.134	(1.4)	0.343	(1.7)
Average employees 7-19	-0.002	(0.2)	0.067	(0.9)	-0.115	(1.2)	-0.015	(0.1)
Average employees 50-99	0.009	(0.7)	0.016	(0.2)	-0.010	(0.1)	-0.004	(0.0)
Average employees 100-499	-0.015	(1.3)	-0.057	(0.6)	0.287	(2.5)	-0.210	(0.9)
Average employees > 500	0.002	(0.1)	0.064	(0.3)	0.643	(2.5)	-0.632	(1.4)
Sample size	673		673		669		446	
Coefficient Degrees of Freedom	18		18		21		22	
Root Mean Squared Error	1.0044		7.8321		10.1609		16.8665	
R^2	0.1558		0.0728		0.1671		0.3011	

The quadratic term is the product of quasi-rent and the deviation of it from its mean. The interaction terms are the products of the quasi-rent and the deviation of it from its mean and the other interaction term. Industries include office accounting and computing machinery, electronic equipment, computer and related activities, telecommunication and business services, where the share of the educated workforce is large (NACE 71, 741-743).

Table A.6 Compensation Policies, Worker Mobility and Firm Performance in Trade

Dependent Variable	Excess Worker Reallocation		Difference in log(Employment)		Total Factor Productivity		Log of Net Profits/L/100	
Variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Intercept					-19.61	(6.2)	-4.62	(0.9)
Average Predicted Effect of x Variables ($x\beta$)	-0.304	(19.1)	-0.433	(2.2)	-0.668	(2.1)	0.544	(1.1)
Average Individual Effect (α)	0.025	(2.8)	-0.223	(2.1)	0.041	(0.3)	1.100	(4.4)
Average Education Effect ($u\eta$)	-0.046	(2.6)	0.277	(1.3)	1.803	(6.1)	0.053	(0.1)
Average Firm Effect Intercept (ϕ)	-0.007	(2.0)	-0.017	(0.4)	-0.105	(1.7)	-0.198	(0.5)
Average Hirings Effect	-0.048	(5.1)	-0.001	(0.0)	0.081	(0.5)	-0.566	(1.1)
Average Seniority Effect (γ+2*seniority*γ^2)	0.015	(1.9)	0.011	(0.1)	0.065	(0.5)	0.304	(1.1)
Skilled Workers/Employees	0.019	(1.5)	-0.244	(1.6)	-1.487	(3.2)	0.400	(1.2)
Log(Capital/L)	-0.003	(2.0)	-0.090	(5.6)			0.287	(7.6)
Excess Worker Reallocation					-1.188	(5.2)	0.730	(1.0)
Quasi-Rent/L/100	-0.001	(1.8)	0.005	(0.6)	0.006	(0.5)	0.058	(3.7)
Quasi-Rent/L, Quadratic/10000	0.000	(1.4)	0.000	(4.1)	0.000	(5.1)	0.000	(2.0)
Quasi-Rent/L/100, Predicted x Variables /100	0.122	(1.5)	0.198	(0.2)	0.284	(0.2)	-6.000	(3.1)
Quasi-Rent/L, Excess Worker Reallocation / 1000					7.399	(4.1)	2.433	(1.0)
Borrowing ratio	0.007	(2.4)	-0.363	(10.5)	0.317	(6.5)	-0.206	(2.1)
Market Share	-0.001	(1.8)	-0.037	(5.2)	-0.026	(2.5)	0.017	(1.2)
Return on Capital					-0.003	(0.6)	0.038	(1.4)
Exports/Employees					6.703	(1.4)	-1.128	(0.1)
Average employees < 7	-0.020	(3.5)	-0.083	(1.2)	-0.371	(3.7)	0.348	(2.1)
Average employees 7-19	-0.017	(3.1)	-0.006	(0.1)	-0.349	(3.5)	0.205	(1.2)
Average employees 50-99	0.016	(2.4)	-0.017	(0.2)	0.264	(2.3)	-0.134	(0.7)
Average employees 100-499	0.018	(3.0)	0.004	(0.1)	0.418	(4.0)	-0.194	(1.1)
Average employees > 500	0.035	(5.8)	-0.247	(3.3)	0.697	(6.5)	0.031	(0.2)
Sample size	1572		1572		1548		964	
Coefficient Degrees of Freedom	18		18		21		22	
Root Mean Squared Error	0.8933		10.8402		15.5603		19.5964	
R^2	0.3034		0.1936		0.1921		0.1811	

The quadratic term is the product of quasi-rent and the deviation of it from its mean. The interaction terms are the products of the quasi-rent and the deviation of it from its mean and the other interaction term.

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