

Technological Change and Incentive Pay Schemes in Finland, New Challenges for the Labour Market Institutions and Income Distribution

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Abstract

Changing economic environment under globalisation and skill-biased technical change are evidently to a large degree behind the trends in wage formation in past decades. Incentive pay schemes have recently gained popularity and there has been a shift into a use of rent sharing in Finland, too. All this has been thought to be a cause of concern for egalitarian wage distribution. However, it is shown that in firms with rents sharing wage dispersion is not higher. Inequality worries are not well grounded, at least in respect of all incentive schemes such as rent sharing. One reason is that rent sharing substitutes hierarchical wage structures. The distribution of educational capital, capital and R&D have also worked in the direction of mitigating the total increase in wage inequality in the latter part of 1990s, which shows a major difference to what has happened in US, at least until 1990s. Wage dispersion has stayed relatively constant in all Nordic countries despite the shift into local bargaining in firm level in Denmark and Sweden and despite the rise in education premium. Open issues are whether Europe can afford to rely on unemployment benefits and generous early retirement and still keep the environment for high-productivity firms healthy for strong growth? A second open issue is that whether decentralisation of labour market in some countries coincided with wage moderation and modest rise in wage dispersion only by pure chance. It is also clear that the ability to determine outside options collectively in wage negotiations is more difficult than before since human capital heterogeneity has increased. In recession at the beginning of the 1990s in Finland returns on unobserved human capital were higher. In the boom period 1995-1998 reallocation of skilled workforce lead to a rise in education premium, but not uniformly.

Keywords: labour market institutions, human capital, compensation policy, income distribution

JEL Classification numbers: O15, J31, J21, J50, C23

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1. Introduction

Finland is not an exception to the strong growth of the share of non-production workers in developed countries, while it belongs to the group of European countries with a relatively modest but still positive rise in the skill-premium (see e.g. Berman, Bound and Machin, 1998).¹ The stylised facts of the recent wage formation and wage dispersion have followed general regularities, but with some apparent differences between Europe and the US². To begin with, education premium shows cyclical pattern with a rise since the late 1970s in several western economies. A substantial share of the increase in the education premium in the US derives from a decline in the real wages of uneducated workers, while in Europe low wage incomes are rigid. Second, in the US, the wage dispersion in the 1980s and the 1990s rose within industries between plants, while wage variation within plants was relatively unaffected (Davis and Haltiwanger, 1991, Dunne et al., 2000, Autor, Katz and Krueger, 1998). In the 1990s the Nordic countries exhibited a more moderate increase in wage variation between plants together with some loosening of wage compression within plants (see Hibbs and Locking, 2000, Piekkola, 2002a).

The compensations for human capital are much affected by a uniform skill-biased technical change (SBTC) across countries. SBTC has diverging explanations: (i) technology replacing low-skill work, (ii) physical capital-skill complementarity, and (iii)

¹ This paper analyses the labour market in light of a project "Skill-biased technical change and demand for skilled workforce" financed by National Technology Agency in Finland (Tekes). This introduction reviews Piekkola (2002b) analysing technological progress and other factors behind changes in compensations for human capital in past two decades. Hence, globalisation effects are accentuated, while institutional changes in labour market have been rather scarce.

² For recent studies, see Katz and Murphy (1992), Juhn, Murphy and Pierce (1993), Gottschalk (1997), and Autor, Katz and Krueger (1998), and OECD (1996) for a comparison of low income earners in 13 countries.

technology-skill complementarity.³ Brehnahan (1998) points out that direct substitution (point (i)) took place in the 1960s and 1970s, while the education premium rose most rapidly in the 1980s and slowed down in the 1990s. Hence, technology had no direct effect in substituting for unskilled labour. The long-term view of technology-skill complementarity (point (iii)) has also been an appealing explanation in many labour market analyses for the rising wage inequality. Breshnahan (1999) and, to some extent, Autor, Katz and Krueger (1998), besides the direct substitution (i), stress organisational complementarity between ICT and the noncognitive skills of the highly educated (iii). Computer-based technologies increase the returns to creative use of information to tailor products and services and to introduce new products.

This paper analyses wage distribution and wage formation and the interaction with firm-level pay policy. Section 2 examines in greater detail wage dispersion in Finland and factors explaining changes in it. Section 3 concentrates to the determinants of rent sharing and job mobility. Section 4 ponders on the wage policies in small and large firms. Section 5 reviews the results both with global and institutional view in hand.

2. Dispersion of Wages and Its Components in 1989-1998

2.1 Wage dispersion

Piekkola (2002b) limits to analyse workers with more than elementary education since the excluded segment is heterogeneous (this workforce with a missing education code, also

³ See Piekkola (2002a). The segmentation of plants with regard to the amount and quality of capital can also explain the differences in the between-plant productivity and wage dispersion (Caselli, 1999, Kremer and Maskin, 1996). For (i), see also Galor and Tsiddon (1997), Acemoglu (1998), Caselli (1999), Galor and Moav (2000) and Dunne et al (2000).

due to lack of data, consists of around 30 percent of the total workforce).⁴ Figure 1 shows changes in compensations in annual earnings in Finland over a ten-year period.⁵

Figure 1 a-d: Variance of Average Earnings in 1989-1998

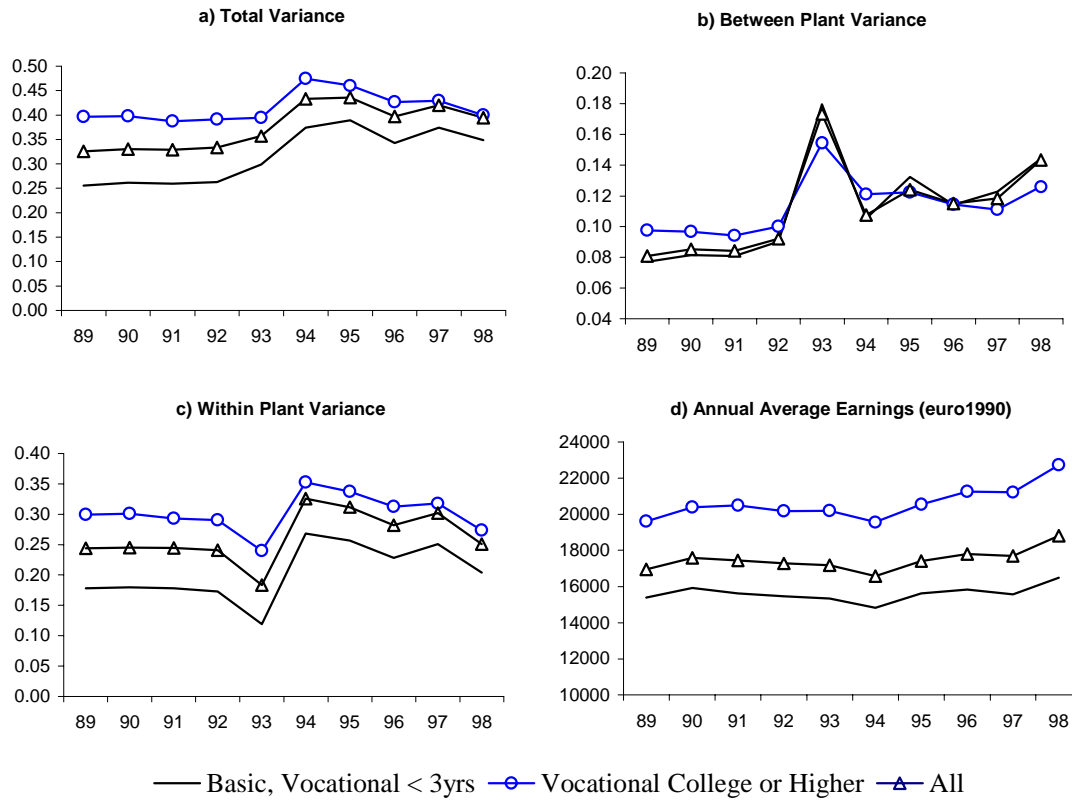


Figure 1a) shows no substantial rise in wage variance over the period but some increase among the low educated similarly to Sweden (see Hibbs and Locking, 2000, note that we also find a substantial increase in the wage dispersion of the excluded low educated

⁴ Heterogeneity has also changed since the inclusion of large number of small firms in the latter part of the 1990s in the employee statistics. Employees in these small firms mostly have a missing education code and are therefore categorised in the workforce with less than 3 years vocational education.

⁵ The variance components of total variance V , within plant variance V_{WI} and between plant variance V_{BE} are decomposed as follows: total $V = uV^U + (1-u)V^{NU} + u(1-u)(W^U - W^{NU})^2$, within $V_{WI} = uV_{WI}^U + (1-u)V_{WI}^{NU} + u(1-u)(W_{WI}^U - W_{WI}^{NU})^2$, between $V_{BE} = V - V_{WI}$, $V_{BE}^U = V^U - V_{WI}^U$, $V_{BE}^{NU} = V^{NU} - V_{WI}^{NU}$, where u = the share of highly educated workers and within effects are aggregated by using firm sizes as weights.

group). There is no clear US-style trend of increasing wage dispersion among the highly educated. From Figure 1d) the wage increase over the period has been 7 percent for the low educated and 16 percent for the highly educated, leading to an increase in the wage difference of around 20 percent (or 2000 Eurasia). This is equivalent to an increase in the wage ratios from 1.27 to 1.37, which is not very dramatic increase. But the well-known fact of the increasing share of highly educated workers with a higher wage variance has also somewhat contributed to the overall rise in wage dispersion. This can be seen from the wage variance of the highly educated approaching that for all in Figure 1a).⁶

Figure 1 also shows the effects of the record deep recession with a 14% decrease in GDP in 1991-1993 and unemployment reaching a peak of 16% in 1994. (For a description of the exceptional depression, see Koskela and Honkapohja, 1999.) It is seen from Figure 1c) that in the deep recession of the 1990s the within variance of wages decreased substantially, indicating substantial wage moderation within firms. Figure 1b) shows that the between effects rose leading to an increase in the total variance of wages in Figure 1a). Maliranta (2002b) also shows an increase in between-plant productivity dispersion in the recession period. Potentially, a stagnant labour market in that period essentially inhibits most of the voluntary labour mobility.

In the US (i) wage variance between plants has increased, (ii) the gap between average non-productive and productive worker wages has widened due to relatively lower wage increases for low educated and (iii) the increase in the share of non-production workers also explains the increase in the total variance (Dunne et al. 2000). In Finland the shifts in

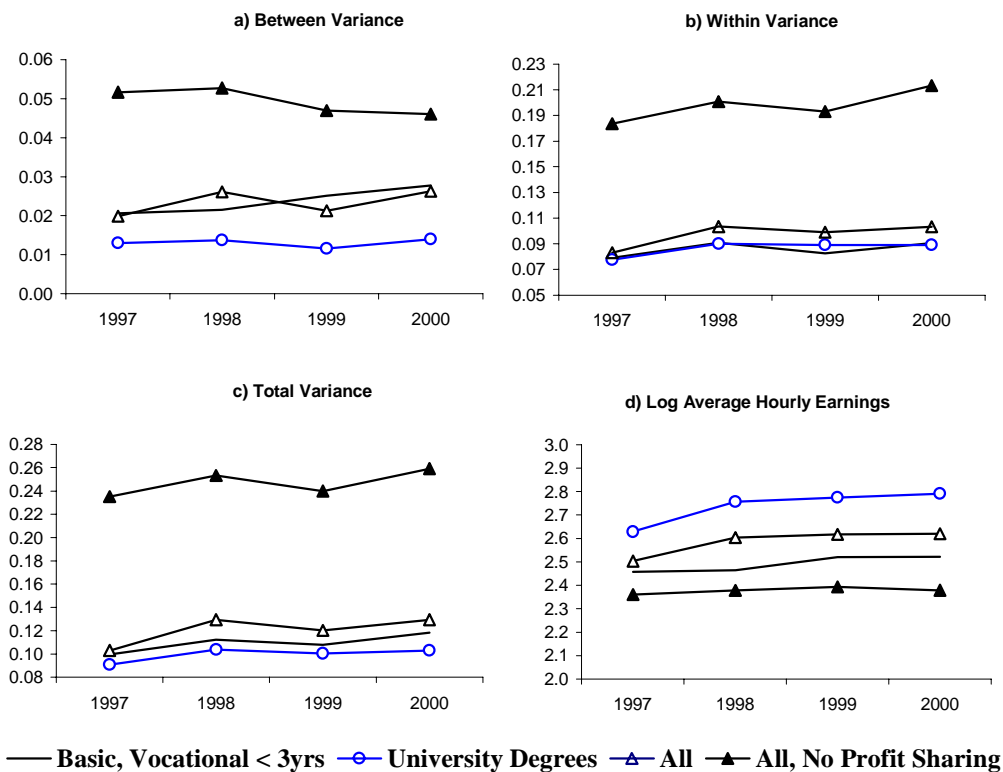
⁶ In detailed manufacturing data of Confederation of Finnish Industry and Employers (2002) there is no change in the wage ratios of the lowest and highest deciles for production workers and a slight decrease for non-production workers, which supports our results. Maliranta and Vainiomäki (2002), though, find

compensations have been of similar kind, but overall changes in wage dispersion have been moderate.

It is interesting to see whether the wage variation effects can relate to the extensive introduction of incentive payments in 1990s in Finland. Currently, 40 percent of workforce in manufacturing enters a profit sharing scheme with positive payments, in contrast to 28 percent of workforce in 1997. The following figure 2 shows these recent changes in wage dispersion in manufacturing firms (instead of plants) using data from the Confederation of the Finnish Industry and Employers.⁷ Figure shows the variation in average monthly earnings for workers participating in profit sharing (by education level) and for the rest of workforce (aggregate). Data set also includes employees with basic education. It is seen that wage dispersion is double higher among the employees that do not participate in profit sharing. Variance of wages in the firms applying profit sharing has also not exhibited significant increase in the period in Figure 2c). It is concluded that recent boom period (1996-2000 with an annual average GDP growth of 5 percent) shows no significant rise of between or within firm wage variance that can be explained by new incentive schemes.⁸

evidence for an increase in the spread in wages above median income in manufacturing in the latter half of the 1990s.

⁷ The data covers years 1996-2000 and includes both white-collar employees and workers. The white-collar employees receive salaries and the workers are remunerated on an hourly basis. There are approximately 2,1 million person-year observations of which 1,3 million are workers and 0,8 million white-collar

Figure 2 a-d: Incentive Payments in Manufacturing 1996-2000

The fact that the total wage variation has not been substantially increasing does not lead to the conclusion that the education premium has not been changed. Compensations for human capital are analysed in Piekkola (2002b) using the linked employer-employee Statistics Finland data of the labour market in 1987-1998. This allows us to separate compensations based on education/sex, unobserved human capital (person effects) and firm-specific payments (firm effect).⁹ Compensations for unobserved human capital are referred to as high wages of the individual throughout his work career that are not explained by education, experience or sex. Data and the estimation method used are described in Appendix.

employees. The data include rich set of variables covering compensation, education and profession. This number is reduced to about 1,7 million as the observations are dropped with inconsistent information.

⁸ Bauer and Bender (2001) obtain similar finding in Germany.

The compensations for education and unobserved human capital, based on the estimation of (a.2) and firm-level wages from the estimation of (a.3) shown in the Appendix, are depicted in Figure 3. Unobserved human capital and education are time-invariant person effects within the two periods 1987-1992 and 1993-1998 estimated. The only source of variation within these periods is employees entering or exiting the labour force.

Figure 3 a-d: Variance of Human Capital in 1989-1998

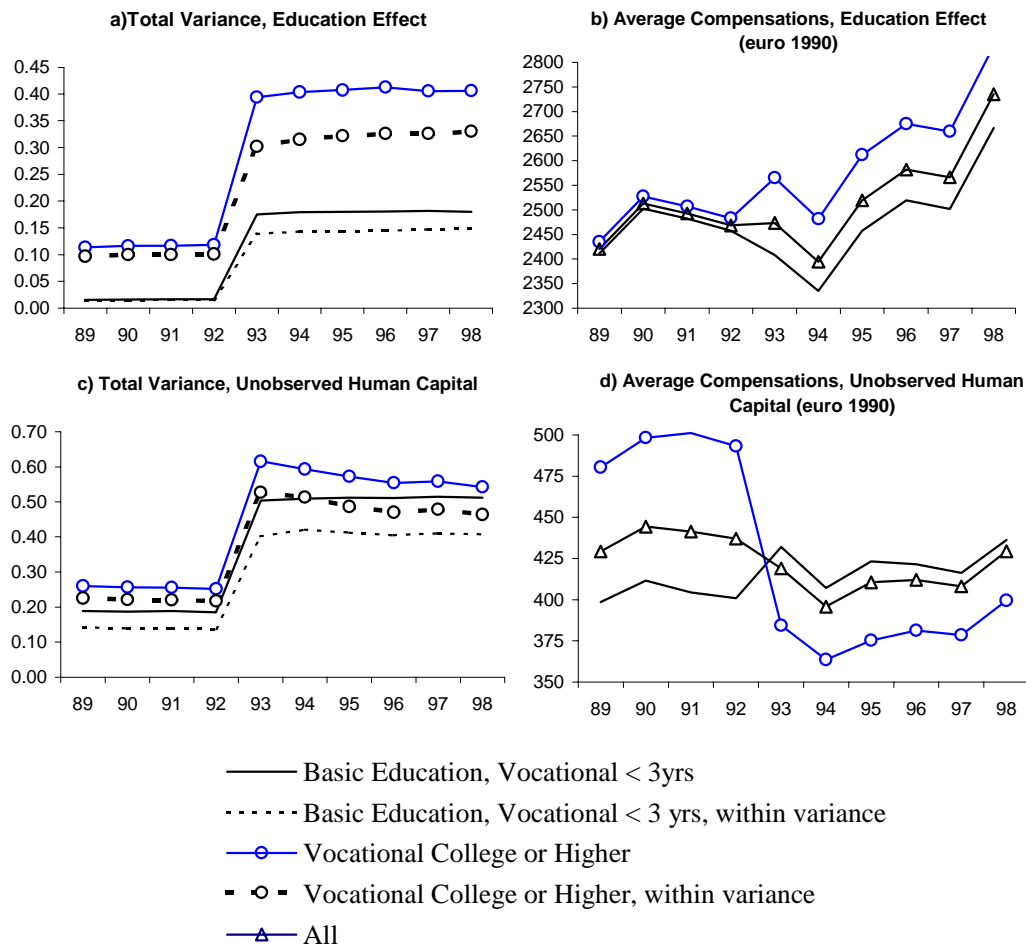


Figure 3 gives strong support for the claim that the premium on human capital has risen.

Figure 3b) shows that the education premium has risen over the period. (The education

⁹ Abowd et al. (2001) and Abowd and Kramarz (2000) show that person effects and firm-specific payments

effect here is the share of the educated effect from log wages multiplied by the average annual wage level.) Figure 3a) shows an increasing variation in the education premium paid between the five education fields and across younger and older age cohorts (separated in the education dummies). One good explanation here is the demand for workers only with education from a particular field (engineering, business fields). It is also seen that the major factor for the changes in the total dispersion is the within-plant variance [see Figures 3a) and 3c)].¹⁰ Similar kind rise in wage dispersion in highly-qualified jobs has been observed by Anderssen (2002) in Denmark and Ohlsson in Sweden (2002).

Figures 3c) and 3d) also show a rise in compensations for the unobserved human capital of the highly educated in the early 1990s and decreasing in the boom period. This fits the model with rapid technological innovation together with relatively immobile workforce in recession. The recession was characterised by a rapid decrease in separation rates and voluntary labour mobility with an increase in the return on unobserved human capital (for labour mobility, see also Böckerman and Piekkola, 2001). Much of the rise in the return on unobserved human capital takes place between firms, as the within variance was moderate in recession period.

The return on unobserved skills has taken a diminishing role in the recovery period since 1994, when the education premium began to rise. The education premium arises only in the boom period when the allocation of the highly educated in manufacturing and research recovers. Following Nelson and Phelps (1966) and Aghion and Howitt (1998), education, however, facilitates the adoption and implementation of new technologies, i.e.

explain about half of the inter-industry wage differentials each.

employees in R&D investment-related work are mainly highly educated. A higher return on unobserved human capital triggers a flow of the highly educated between creative use such as research and other work. Compensations for unobserved human capital of highly educated workers are spread to a general rise in the education premium in the boom period since 1995. It is also shown that productivity differences between firms narrowed after the recession; also the lack of low productivity (service sector) firms for its part explains the relative modest rise in the wage dispersion and education premium in Nordic countries.

Juhn, Murphy and Pierce (1993) argue that the skill premium in the unexplained part has been operating since the late 1960s, while returns to observable skills started to rise in the 1980s. This postponement of the rise in education premium has been a puzzle in the literature. Breshnahan (1999) also argues that the unexplained part grows along a longer period but is not directly linked to any phenomenon, which a theory might predict. Finally, Juhn et al. also present no definite reason for the different timing of the rise in returns to unobservable and observed skills. In a schumpeterian approach, a rise in compensations for unobserved skills, naturally, precedes the rise in the education premium. SBTC and creative destruction thus raise only the compensations for unobserved skills of the highly educated. It is also observed elsewhere that SBTC and rapid total factor productivity improvement are often characterised by decreasing prices of inputs, including labour (see Klenow, 1998). Compensations from unobserved human capital also reflect the option value of good performance in innovative research. Following Lazear (1998), the option value requires mobility costs for workers, which is

¹² Firm-level differences in compensations (firm effect) are not shown reaching the peak in the recession period.

apparent during a recession, and/or the loss of firm-specific knowledge (in innovations) when switching jobs.¹¹

2.2 Explaining Wage Dispersion

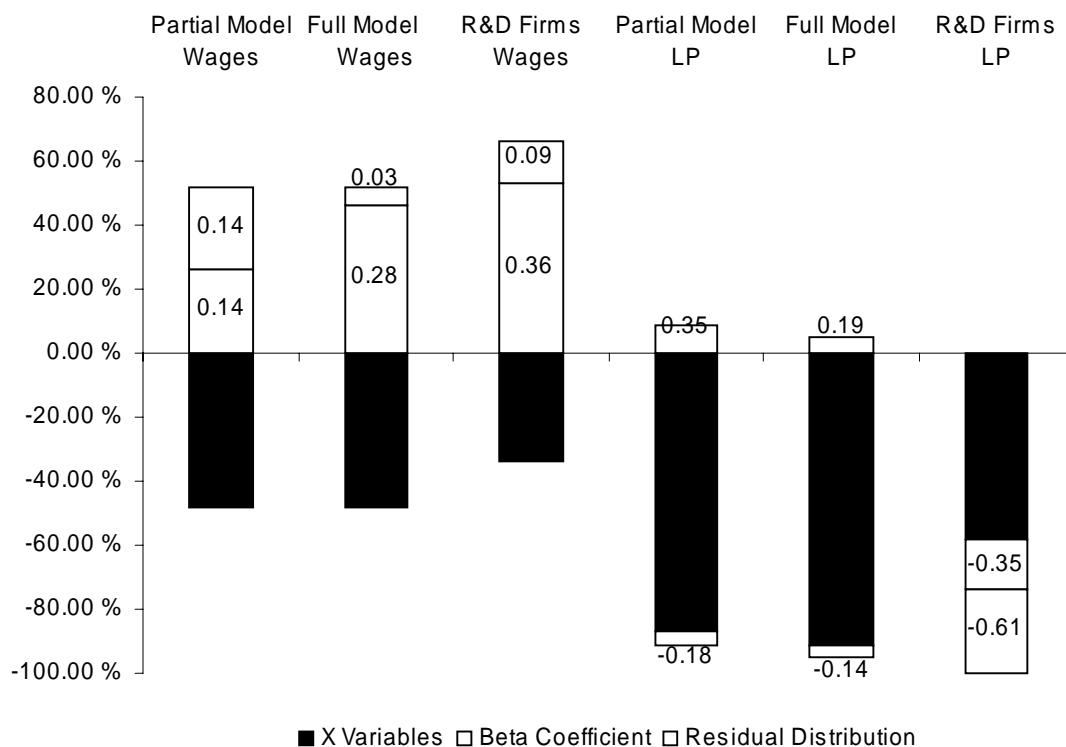
Piekkola (2002b) aims to explain the overall modest rise in wage dispersion despite the rising human capital compensation differentials. The firm average value of wages and human capital components of the entire workforce are linked to the Financial Statements Data (consisting originally of 9,553 firms in the period). The analysis following Juhn, Murphy and Pierce (1993) focuses on the effects of the variation between firms of human capital and skill intensity such as R&D, skilled labour share, market share etc. The analysis explains between firms variance, which is the biggest source of wage variance according to Figures 1b) and 1c) (in contrast to increasing within variance in compensations to human capital in Figure 2). The final analysis of changes is done between years 1995-1998 and 1989-1991. This helps to omit the peculiarities that were characteristics of recession period 1992-1994 leading to large increase in between-plant variance in that period. Juhn et al. decomposes the changes over time in the distribution (dispersion measure) of a variable into three components: 1) change over time in the distribution of explanatory variables, 2) change over time in the effects of explanatory variables (price effects or regression coefficients), and 3) change over time in the residual distribution (unexplained by observables).

The first set of explanatory X variables includes some worker characteristics like average seniority, average seniority squared, and highly educated share. Plant characteristics

¹¹ Piekkola (2002) shows unobserved human capital to be concentrated in the largest firms. High mobility costs for workers are indicated by 1) low worker mobility, 2) modest rent sharing and absence of rent hopping and 3) long-term employment relations with the importance of firm-specific experience.

include log capital per employee, R&D intensity, five size class variables, two-digit industry dummies interacted with log capital per employee and a multi-unit dummy variable. The full model includes human capital characteristics: average compensations for unobserved human capital and education and the firm effect. It is shown in Piekkola (2002a) that the distribution of observables (X variables) in a pooled regression explain fairly well the 9th decile and 1st decile firm distribution in compensations, but there is a steady relative increase in the differential associated with the price effects (Beta coefficients). The narrowing of the labour productivity differences after 1994 is also evident and explained by changes in the distribution of observables. These include the supply of human capital (education and unobserved), capital and R&D investment. The following Figure 4 shows changes in compensation in the 9th decile and 1st decile firms.

Figure 4. Components for Change in Log Wages and Labour Productivity (LP) Dispersion Between The Average of 1996-1998 and 1989-1991



The area of the pillars above the zero horizontal line shows factors contributing to wage dispersion (and vice versa for the area below zero horizontal line). The first two pillars show the partial and full model explanations for the -0.02 decrease in the log wage difference between 9th decile and 1st decile firms. It is seen that changes in differentials associated with the observables (beta coefficients) and changes in the distribution have opposite effects (as is already apparent from Figure 3). These two forces are nearly equally strong, explaining the relatively minor changes in the total wage differential. Maliranta and Vainiomäki (2002) with worker characteristics included is comparable to the partial model. The decrease in the log wage is of similar magnitude in the manufacturing industry in the five-year average difference between 1994-1998 and 1984-1989. Similar to our analysis, the wage differential associated with the distribution of observables and the price effects are of opposite signs. Finally, the change in price effects dominates in R&D intensive firms leading to an increase in wage dispersion. It can be seen that distribution of observables explains why the increasing price difference of human capital has not led to rising wage dispersion.

It is seen that in Finland the shifts in compensations have been of similar kind as in the US: increasing between plant wage variance, widening gap between low-educated workers and highly educated, rising share of the highly educated with higher wage variance. Skill-biased technical changes have been uniform across countries emphasising the importance of globalisation, instead of institutional progress, in explaining changes in wage formation. However, overall changes in wage dispersion have been moderate and especially wage dispersion among the highly educated has not risen to the same degree. The other basic results can be summarised by the following observations:

- * In the recession period creative destruction with product innovations lead to higher return on compensations of unobserved human capital and rising wage differential between firms.
- * In the boom period the return on education rises, when reallocation of highly educated workers recovers, together with a rise in the dispersion of human capital payments.
- * The major source of wage dispersion is between-firm variance over the economic cycles, but distribution of educational skills, capital and R&D investment and related narrowing labour productivity differences between firms have worked in the direction of mitigating the total increase in the wage inequality, offsetting almost all of the distribution effects of the rise in the price of human capital.

3. Rent Sharing and Job Switches

3.1 Rent sharing

This section analyses in greater detail rent sharing as part of firm-level incentives. The share of the quasi rent effect from the total firm effect gives an estimate of the percent of wages paid as rent sharing. Equations (a.4) and (a.5) in Appendix show, respectively, the firm-effect and quasi rent. In Piekkola and Kauhanen (2002) empirical estimation is carried out for the half of the firms, where the rent sharing is highest, using the Arrelano and Bond (1991) IV (GMM) method. The estimates for all firms are roughly similar, but the model has substantially less predictive power. The quasi rent effect share of the firm effect is rather low, which is natural since the total average firm effect over firms is by

definition equal to zero.¹² Piekkola and Kauhanen (2002) do not find any clear relation between the wage component capturing compensations on transferable human capital and the firm effect, including rent sharing. In this way, rent sharing can be quite independent of wage pay trends, albeit a substitute for other firm-level incentive schemes. Rent sharing is instead negatively correlated with firm-level fixed payments (starting wages).

The attainment of job stability may be an important reason for the use of rent sharing. Labour supply elasticity is negatively related to labour market frictions. Lower labour supply elasticity of highly educated faced by firms imply that frictions are higher for highly educated. However, firms respond to the potential job-to-job search of highly educated workers by using rent sharing more intensely. Higher share of skilled workers in the workforce also has a positive effect on rent sharing, but not for low-educated workers. One explanation for the latter is that the wage premium and wage expenditures has to be substantially raised when the share of highly educated is increased, not leaving space for any implementation of profit sharing for low-educated workers.

Job search explanations are least important in R&D intensive firms. Rent sharing increases with R&D intensity especially if labour supply is fairly inelastic, since the interaction of R&D intensity and labour supply elasticity has a negative sign in all regressions (dropped in some estimations for experienced workers). Hirings effects are also absent for highly educated, i.e. rent sharing is independent of wage effects of new hirings. Profit sharing is allocated more for experienced workers and does not respond to the position of the firm in the density function of firm-level wages (indicating job opportunities). Rent sharing is also not paid in order to accommodate labour costs for

¹² The median firm has negative rent sharing, -0.66 for prime-age and -0.09 for experienced workers.

economic performance (the labour demand is inelastic). With the flexible technology used in R&D-intensive firms, the high monitoring costs appear to require performance-related pay systems other than seniority payments. This shows the importance of human capital accumulation in explaining rent sharing.

It can be concluded that the share of the highly educated, R&D intensity, firm size and the desire to have some stability in the skilled workforce predicts the use of rent sharing. The probability that an employee is included in a rent sharing plan is higher for educated and in R&D-intensive firms.

3.2 Worker Mobility

The results of the study by Piekkola (2002b) fits well the predictions of human capital accumulation, such as high wages in large firms, result not only from long-term employment relationships but also from the allocation of able workers to better paying firms. This reallocation takes place at an increasing rate with age except for the 49-64-years-old age group. The relative unimportance of starting wages undermines the importance of a good match, underlined by job search theory. As predicted by human capital model, workers may accept lower starting wages in return for seniority/rent payments as human capital accumulates. This differs in job search models, where a good job match (high starting wages) also implies greater investment in firm-specific capital (high seniority payments/rent sharing).

On the other hand, the career considerations are less important for older age group, and starting wages play a more dominant role in job switches. It is apparent that the firm-level

payments have negative effects especially for the older age group. This is in line with Dustmann and Meghir (1998) according to which older workers have relatively more firm-specific capital. This is also in line with a theory of optimal incentive contracts for workers such that pay ought to become more performance related as the worker approaches retirement due to the deterioration of career concerns as a motivator (see Gibbons and Murphy, 1992). For prime-age workers, starting wages and seniority payments/rent sharing also work as substitutes.

The 49-64-years-old age group has a considerable greater threat of losing job, accentuated by the high earnings level or for low-educated by rent sharing (for highly educated). The job switches of older workers also relate negatively to the presence of job opportunities, as captured in the elasticity of the labour supply. Older workers have to accept lower wage offers in new jobs. Older workers also lose jobs if new recruitment associates with an increase in the firm-level of wages. For low-educated older workers, rent sharing has insignificant effects, which may show evidence of job destruction in firms that apply rent sharing.

4. Wage and Employment Policy Strategies of the Firms

It can be argued that in large firms, in particular, wage incentives have evolved into a direction of more local bargaining, also in the form of rent sharing. Small firms have more flexibility in compensations, to begin with. Employees can be more easily individually numerated. It would then seem that large firms would benefit from using profit sharing or wage incentives as they can decrease the monitoring costs. There is, however, a contradictory argument concerning the firm size. It is well known that group incentives do not necessarily work well in large organisations, owing to free rider effects, see e.g. Kandel and Lazear (1992). However, horizontal monitoring (FitzRoy and Kraft 1987) or peer pressure (Kandel and Lazear 1992) may decrease this effect. This section summarises the wage policies adapted by firms in 1990s in Finland according to Piekola (2001). It is useful first to analyse employment effects of alternative wage compensations and wage incentives.

Table 1. Employment and Wage Compensations

<i>Employment in the Firm</i>			
	Small Firms	Large Firms	Non-Zero R&D Firms
R&D	+ (+)	? (?)	0 (+)
Compensations for Education	+ (?)	? (+)	-
Compensations for Unobserved Human Capital	-	+	+ technol. firm
Share of the Educated	?	+	+
Firm-Level Payments	-	+	+
Capital Intensity	? (-)	- (+)	-

+ indicates positive, - negative and ? ambiguous effect on employment, in parenthesis for the higher educated. Employment is measured by hirings and change in log employment in the end and beginning of the observation period.

Skill intensity: R&D-intensity, the share of the educated workforce, or the unobserved human capital usually relates positively to employment growth. It is seen that in *large firms*, both compensations for transferable skills (education and unobserved) and firm-specific skills (firm-level payments) relate positively to employment growth. The share of the educated has a positive effect while capital intensity a negative effect on employment growth. In other words, physical capital and unskilled workforce are substitutes. In *small firms*, high wages may also reflect a shortage of labour rather than relate to strong employment growth. In small firms the use of R&D investment, on the other hand, raises total employment. What explains the good employment rates of the skilled and the high unemployment rates of the aged and the unskilled? This may be best explained by firm differences. The good employment in R&D-intensive firms with a high share of the educated has not taken place at the expense of the unskilled in those firms, but at the expense of the unskilled in other firms. Hence, there might have been an increasing gap in employment performance in firms using a skilled and an unskilled workforce or only an unskilled workforce.

The following Table 2 shows consistency of the results with alternative wage models. In *small firms* fixed-term wages or starting wages are used to lower excess worker reallocation. High wages raise stability of workforce and, as discussed, not necessarily relate to strong employment growth. There is also support for Hall and Lazear (1984) that in small firms fixed payments such as fixed-term contracts or starting wages lower excess separations. R&D-intensive small firms also rely on rent sharing or high starting wages.

Table 2. Wage Policy in Small and Large Firms

<i>Wage Formation</i>	
Non-Technology Firms	Technology Firms
	High R&D Intensity
<i>Small Firms:</i>	
Fixed-Term Contracts	Additional features:
Flexible Wages	Rent Sharing and/or High
<i>Large Firms:</i>	Starting Wages to Attract New
Recruitment of Risky Workers	Workers
Reputation Wages (moderate R&D intensity)	Steep Seniority Profile because of Human Capital Accumulation
Rent Sharing Schemes	

In *large firms*, uncertainty about employers' outside options may not be resolved by wage negotiations. It is also difficult to set fixed-term individual-specific contracts to lower excess separations. Large firms prefer to use rent sharing, especially when it is difficult to measure performance. They also retain their option to fire risky employees if they turn out to be bad performers, following from the option value of risky workers, see Lazear (1998). Large firms may be better able to select large pool of new employees with high wages and promote those who turn out to be most skilled. There is less risk that the investment into the skill level of employees is wasted when the employee switches to work in another firm (which is a more potential threat in small firms).

Long run seniority payments are higher in large firms, while the short run seniority payments are higher in small firms. It is suggested that the fact that seniority payments are postponed in large firms also follow from this option value of risky workers. Seniority payments are postponed to see whether the risky new high-wage worker turns

out to be skilled. Excess worker reallocation of new workers remains high in the screening process, but not after certain length of stay in the firm.

Large firms are also heterogeneous depending on R&D-intensity. Highly R&D-intensive large firms pay firm-level compensations to recruit more personnel. The labour supply elasticity faced by firm is low and the risk of employees leaving the high-wage job is relatively low. On the other hand, labour force is relatively young (also in view of the stability needed to finish the long-term R&D projects) and labour shortage can be an important issue. Large firms with moderate R&D intensity, in any case, rely more on internal growth and wage incentives are used to increase stability of the workforce, similarly as in small firms. High wages are not paid to promote high employment growth, but because of difficulty in keeping good quality workers in service.

Finally, the wage structure in R&D-intensive firms follows a steep seniority profile, since workers get access to valuable knowledge in the firm. They should accept low starting wages in return for high seniority payments. But starting wages are also high in technology firms with high R&D intensity. As discussed, this usually relates to strong employment growth and explained then by shortage of labour.

5. A shift to local bargaining and wage determination in Europe - synthesis

5.1 Labour market: globalisation

It is evident that some common technological progress in all developed markets explains a rise in the demand for educated workers. Berman, Bound and Machin (1998) show that Nordic countries (Denmark, Finland and Sweden) have very similar within-industry changes in the proportion of non-production employment to those in the US. The basic argument is that the environment in which firms currently operate has become much more global.¹³ Globalisation associates with increases in international trade in goods and services, greater flows of direct investment and the growth in international financial transactions. The relative wages of skilled workforce has undoubtedly risen, albeit less in Nordic countries than in US.

A uniform change in economic environment across a broad range of industries and economies has also raised pressures for changes in industrial relations. It is stressed here that this can also lay the background for productivity equalisation after erosion of excess economic rents and trade frictions. It is shown that production factors have been allocated more evenly between firms in the latter part of 1990s. Creative destruction in the beginning of 1990s eroded the low productivity firms giving space of growth for good performing firms. Product market competition and opening domestic market for foreign firms may have worked in the same direction. A reduction in trade frictions and rent margins forces wages to follow more closely productivity and narrowing productivity differences are reflected on wages. This can explain why wages have evolved much the

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same in Nordic countries without any major labour market reform, such as Finland, and in Sweden and Denmark with a deliberate institutional shift towards more decentralised local bargaining. Improvements of outside options of the firms (to relocate production) and increased foreign ownership have also enforced wage moderation in all Nordic countries.

The emergence of IT sector and new industries, at the expense of old ones, is not only behind a rise in structural unemployment in Finland, but also behind a rise in new wage methods. Similar phenomenon has taken in all countries, including Germany, where most of the decrease in centralised bargaining has taken place outside the traditional manufacturing (with metal industry as an exception). Despite institutional reorganising wage dispersion has stayed surprisingly the same in Nordic countries.

Following table 3 shows the rapid rise in rent sharing in past five years in Finland. It is seen that the share of manufacturing firms using profit sharing has substantially increased and in 2000 half of the firms applied it and 40 percent of the employees entered the scheme. These figures are probably somewhat downward biased, as we know only those firms that have actually paid and those persons who received profit shares, instead of having information on firms that have a profit sharing plan.

Table 3. Shares of Employees/Firms With Profit Sharing in Finland

	1996	1997	1998	1999	2000
Employees	0.16	0.23	0.36	0.35	0.40
not R&D related work	0.16	0.23	0.35	0.35	0.39
R&D related work		0.36	0.56	0.58	0.62
Vocational or lower	0.16	0.22	0.32	0.32	0.37
Vocational college or higher	0.13	0.38	0.52	0.56	0.61
Firm size <50	0.05	0.11	0.03	0.06	0.08
50<Firm size <100	0.04	0.06	0.10	0.09	0.11
Firm size>500	0.17	0.24	0.37	0.36	0.41
Observations	134942	200034	173884	237934	225417
Firms	0.16	0.31	0.41	0.42	0.48
Share of blue-collar	0.38	0.30	0.36	0.37	0.40
Share of white-collar	0.34	0.48	0.62	0.61	0.65
Manufacturing	0.18	0.36	0.46	0.45	0.50
IT sector	0.20	0.30	0.31	0.46	0.48
Construction	0.06	0.10	0.24	0.26	0.37
Business Services	0.14	0.35	0.44	0.42	0.56
Observations	979	1088	1136	1111	956

R&D-intensity was a factor that is likely to be connected with profit sharing since measurement of output in these firms is difficult and co-operation is important. There seems to be a clear difference in the frequency of profit sharing between the ones in R&D- related work and others. However, the pace of growth of profit sharing has been faster for those in non-R&D related work, at least from the year 1997 onwards. It has to be noted that in the year 1996 there are only a few R&D employees in the data. Disregarding that year does not change the empirical results presented.

It is seen from Table 3 that only 10 percent of the employees in smaller firms with fewer than 100 employees enter the scheme compared with the nearly 40 percent in the firms with over 500 employees. It is also seen from the column indicated by the share of blue-collar employees that only about 40 percent of the employees do actually obtain profit sharing in firms where the scheme is applied. The comparable figure for white-collar employees has risen from 34 percent to 65 percent. As discussed, one reason can be that

small firms have more flexible wage structure, and lower need for additional incentive schemes. It is clear that profit sharing is a group incentive scheme in Finland that is not necessarily applied to all employees. It is not characteristics for firms with high wage dispersion. One explanation is that some of the more popular incentive pay schemes such as rent sharing have substituted hierarchical pay structures.

4.2 Labour market: Institutional explanation

Globalisation as fundamental change in international economy has also been challenged (see e.g. Wade, 1996 and Weiss 1998). Institutional analyses emphasise the various way to mediate and refract common economic pressures. Examples of institutional approach include Turner (1991) and Thelen (1991, 1993). According to these studies, the dual system of industrial relations in Germany has allowed German unions to withstand pressures of globalisation better than workers in the US and Sweden.

The emphasis on the degree of co-ordination is important in institutional approach. Finland is traditionally categorised as one of the countries with most centralised bargaining. Nickell and Layard (1999) show following tabulation of the extent of centralised wage bargaining, reclassified in order of the extent of centralisation

Table 4. Degree of Centralisation

	Union members %	Degree of Co-ordination		Centralisation ³
		Unions ²	Employers ²	
Austria	46.2	3	3	17

Norway	56.0	3	3	16
Sweden	82.5	3	3	15
Denmark	71.4	3	3	14
<i>Finland</i>	<i>72.0</i>	<i>2</i>	<i>3</i>	13
Germany	32.9	2	3	12
Netherlands	25.5	2	2	11
Belgium	51.2	2	2	10
Australia	40.4	2	1	8
France	9.8	2	2	7
Portugal	31.8	2	2	7
Spain	11.0	2	1	7
Ireland	49.7	1	1	6
UK	39.1	1	1	6
Italy	38.8	2	2	5
Japan	25.4	2	2	4
Switzerland	26.6	1	3	3
USA	15.6	1	1	2
Canada	35.8	1	1	1

1 Share of workers

2 Co-ordination rate 3=high, 2=average 1=low

3 Calmfors and Driffil, 1988, table 3, 17 shows most extensive centralisation

It is seen that, next to Austria, the degree of coordination is greatest in Nordic countries according to Calmfors and Driffil index. However, some criticism can also be raised to this classification in one dimension. The second and third columns reflect the participation of employees and employers in the coordination of wages. In Germany and Japan employers are relatively active in wage coordination and Japan's position as one of the least coordinated systems is not necessarily well founded. Switzerland and Austria are in the classification nearly the two extremes although the actual wage determination and the ability to restrain wages to curb inflation are very similar. Centralised wage bargaining does not also predict low wage variance. In Austria wage dispersion is high comparable to Germany that is classified as country with less centralisation.

Nickell and Layard (1999) argue that wages respond to production shocks strongest in countries with low degree of centralisation. This is also not necessarily true. In Guichard and Laffargue (2000) production has strong effect on wages in all countries except in Greece, Spain and Portugal. All these countries in southern Europe have relatively low degree of wage coordination. In their study, Finland, Sweden, Germany and Austria belong to the group of countries where product shocks have strong effects although the degree of coordination is high. Andersen (2002) has also observed that the sensitivity of wages to short-run fluctuations in activity has not raised in 1990s despite the market decentralisation process in Denmark.

It is also well known that in Sweden and Denmark labour market has been reformed in the past decades. Currently, in Denmark only minimum wage rise is agreed in central negotiations in most of the wage contracts. In addition, wages are negotiated at firm-level without entitlement to strike on the part of employees, currently the contract is done for four years. All this is to say that despite very high union participation rate, the labour market is liberal compared to 1980s. In Sweden local bargaining has been adapted in more and more since the many reforms taken place since 1993/1994 agreement. In difference to Denmark, employees have generally a well-stated option for a choice of wage agreement decided on industry level if firm-level negotiations do not lead to desired results.

It is seen that high degree of centralisation has not inhibited the rapid growth in the popularity of rent sharing in Finland. This shows evidence that globalisation process has resulted into very similar outcomes despite diverging institutional background in Nordic

countries. Finland is lagging behind in institutional reforms. However, wage flexibility pressures in firm level have taken place quite independent of the degree of centralisation. Rent sharing is popular in large firms. In small firms, to some extent, wages can respond more strongly to changes in firm profitability (see Piekkola, 2002). There is less need for separate rent sharing.

Institutional factors have thus less importance than often argued. Human capital investment has taken a prominent role in the success stories of firms. Human capital is individual-specific and it is more difficult to set standards for wage determination collectively. It is also evident that dispersion in compensations for human capital has increased in the 1990s. In the period of turmoil at the beginning of the 1990s returns on unobserved human capital were higher. In the boom period 1995-1998 reallocation of skilled workforce lead to a rise in education premium, but not uniformly. Pay incentives in firm level can also be explained by human capital model. It is shown in Kauhanen and Piekkola (2002) that new methods of payment such as rent sharing are less popular in capital-intensive firms. It is the human capital and not physical capital that has lead the way for new wage incentives.

Centralised bargaining at the national and industry levels is admittedly behind some of the country differences in wage dispersion and explains differences in the effects of opportunity incomes. In many European countries, low productivity plants may not survive, which narrows the wage dispersion across plants.¹⁴ Potentially, the labour market institution reforms in Denmark can explain part of the low unemployment and good employment in service sector, but evidence for this is not very clear cut. Change in

¹⁴ For the role of trade unions, minimum wage, and immigration, see Levy and Murnane (1992) and for the effects of centralised bargaining on firm deaths, see Moene and Wallerstein (1997).

outside options in wage negotiations can have more influential effects in coordinated wage setting.

4.3 Final remarks

If the globalisation and skill-biased technical change arguments are correct, why have the between-plant effects been modest compared with US? Some arguments are given above such as redistribution of factors of productions across firms more equally and narrowing profit margin differences. Due to these factors the fear of “race to the bottom” in labour standards or wage levels due to globalisation are less founded when globalisation equalises productivity and wage differences rather than vice versa.

It is also clear that the findings in Dunne et al. may partly hold for the earlier period in Finland. Maliranta and Vainiomäki (2002) find a major increase in labour productivity dispersion when comparing the low productivity years 1984-1989 with the period ten years later.¹⁵ Second, investments also boomed in 1980s given the capital market liberalisation. Thus physical capital-skill complementarity explanations discussed in section two may have contributed to the rise in wage differentials in the earlier period, but not anymore in 1990s. Third, R&D investments are also distributed more equally across plants in the latter part of 1990s and thus have not contributed to a rise in wage dispersion. Maliranta (2000a) shows that SBTC first lead specifically to an increase in between-plant productivity in R&D intensive firms in the beginning of 1990s and later to an overall improvement in productivity with 3-5 years lag. Dunne et al. instead emphasises changes in the distribution of capital and computer investment across plants

to explain the major part of the rise in wage and productivity differences in the US.¹⁶ Finally, Fortin and Lemieux (1997) also list some unique institutional changes in the US that can explain about third of the rise in equality in 1980s: the decline in minimum wages, the decline in unionisation rate and economic deregulation in transportation, communications and financial and energy industries.

The productivity growth and evolution of firms is also partly independent on what happens to the low productivity firms/employees, where centralised bargaining has most clear-cut effects. This is part of the problem of structural reforms. Can Europe afford to rely on unemployment benefits and generous early retirement and still keep the environment for high-productivity firms healthy for strong growth? This seems to be something that has been so far possible in Nordic countries. One advantage of small country is the easiness of contacts between employers and employees. It is evident that in continental Europe large countries have changed industrial relations and labour market practises to a lesser extent and are now facing a challenge of adapting new reforms.

A second open issue is that has decentralisation of labour market coincided with wage moderation and modest rise in wage dispersion only by pure chance. Is wage moderation due to temporary abstaining of the use of negotiation power in unions or temporary outside options of firms related to massive increase in FDIs and outsourcing? It is quite possible that ageing and heightened labour shortage may increase the bondage between structural unemployment, labour force supply of skilled and ability to moderate wages.

¹⁵ It should be noted that SBTC can indeed lead to a rise in productivity differentials rather than to a strong increase in productivity growth. Kahn and Lim (1998) find no TFP growth acceleration due to SBTC.

The ability to determine outside options collectively in wage negotiations can also be more difficult than before since human capital heterogeneity has increased. In recession at the beginning of the 1990s in Finland returns on unobserved human capital were higher. In the boom period 1995-1998 reallocation of skilled workforce lead to a rise in education premium, but not uniformly.

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¹⁶ They obtain this result by analysing the marginal contribution of capital and computer investment, holding other observables at the pooled level (thus unobserved part capturing the influence of the time variation of these variables).

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Appendix. The Linked Employee-Employer Data and Estimation Method

The original data in Employment Statistics in Statistics Finland cover 23,776,631 observations from individuals that during 1989-1998 worked at least one year in the private sector. The plant level job and worker flows are based on 20,909,731 person-year observations after deleting (i) 71,073 observations with an inconsistent establishment or firm code, (ii) 47,194 with missing observation years, (iii) 1,838,647 with a missing industry code, (iv) 62,648 with no sex code and (v) 697,995 observations when wages deviate more than five standard deviations from the predicted value. (The OLS regression was similar to Abowd, Kramarz and Margolis, 1999, p. 326, with explanatory variables work experience up to the fourth power, six education class dummies and sex.)

Following the method by Baldwin, Dupuy and Penner (1992), the birth and death of firms is considered as a mere transfer of the firm, when persons employed either in the old firm at date $t-1$ or in 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 as the same firm (even though the firm code differs). The worker reallocation rate (the sum of the hiring and separation rates) is around 0.5 percent lower after this correction.

Person and firm effect calculations are based on 12,824,574 observations (firm code non-zero). 556,835 observations out of the 6,136,985 observations of the first year that an individual is recorded in the firm had a missing seniority starting date. For these observations, seniority is set at 1 based on the observed firm switches. Seniority also

receives the value of one if the missing date is from 1987. Therefore, since 1989 (the record starts at year 1987 but employer statistics start at year 1989) 117,572 individuals have a seniority of 1 in year 1989, 86,557 have a seniority of 2 in year 1990, 63,538 have a seniority of 3 in year 1991 etc.

In the estimation 47 industry dummies at the two-digit level or at the three-digit level used in construction and services have been used. Finally, in the calculation of the firm effects, we pooled 172,796 firms (659,708 observations) that had less than 10 observations into a single firm in the 8 main industries. Firm effects were then estimated in 65,643 firms, of which 13,530 had no workers with higher education.

The total data of employees in this data is matched with the firm sample of Financial Statistics held by Statistics Finland. The 9,553 firms in the original linked employer-employee data 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), trade (50-55) 1594, transport and business services (nace 30, 71-72, 741-745, 60-67) 684, household services (nace 746-747, 93-99) 194, education and health 44.

In section 3 sample data is used. The general sampling rate in data from employee statistics is 10 per cent but 50 per cent for employees with a bachelor's degree (lower university and non-university degrees) and 100 per cent for employees with a higher university degree. Fifty per cent of firms with an average size of 100-500 and 30 percent of firms with an average size of over 500 employees enter the sample. This results in

1,101,553 person-year observations from 133,371 individuals in the years 1989-1997 (after deleting the year 1998).

Estimation method

At the first stage, we use data on individual employees from Employment Statistics. This is a large data base that combines various registers kept by Statistics Finland and other authorities. The empirical formulation follows Abowd, Kramarz and Margolis (1999) in such a way that the person-effects are estimated before the firm-effects instead of analysing them simultaneously. The estimation procedure raises the identification problem of separating person and firm effects. The data suggests that the time period of ten years is long enough so that workers experience job switches and in each firm there is at one person leaving or entering the firm (see the discussion of the identification problem in Abowd et al. 1999). Condition effects through interaction terms are also used to provide an approximate solution to simultaneous analysis of person and firm effects. The two-stage approach used gives a very low correlation of the person and firm effects (below 0.006, not shown).¹⁷ The dependent variable is the log of the wage $\ln(w_{ijt})$ of a person i working in firm j at time t measured as a deviation from individual mean μ_{wi} (in difference Abowd et al. estimates deviations from grand mean). This is expressed as a function of individual heterogeneity, firm heterogeneity and measured time-varying characteristics

¹⁷ Abowd, Creecy and Kramarz (2002) also conclude that the application of simultaneous solution (with the new method proposed) does not change the substantive conclusions about the relative importance of person

$$\ln(w_{ijt}) - \mu_{wi} = \theta_i + \psi_{J(i,t)} + \beta(x_{it} - \mu_{xi}) + e_{ijt}. \quad (\text{a.1})$$

θ_i is the time invariant compensations for human capital (individual fixed effect). ψ_j captures the effect of unmeasured employer heterogeneity, where $J(i,t)$ indicates the employer of i at date t . $\beta(x_{it} - \mu_x)$ shows compensations for time-varying human capital stated as a deviation from individual mean: hence it contains time dummies and experience up to the fourth power. e_{ijt} represents a statistical error term. The wage model at the first stage includes only time varying characteristics as deviations from their means: βx_{it} and $\bar{x}_i \bar{y}_j$ showing interactions of person average \bar{x}_i and firm characteristics \bar{y}_j (interactions of average experience with the average number of workers and its second power, with the average number of workers times seniority and its second power, with 45 industry dummies and with 45 industry dummies times seniority). The estimation uses 12,824,574 observations and is done in two periods, years 1987-1992 and 1993-1998. 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 effect is the person average of the original error: $\theta_i = \text{mean}_i(\ln(w_{it}) - \hat{\beta}_1 x_{it} - \hat{\beta}_2 \bar{x}_i \bar{y}_j)$, where $\hat{\beta}_1$ and $\hat{\beta}_2$ are the estimated values of the coefficients. The decomposition of the person effect θ_i for the two periods 1987-1992 and 1993-1998 uses the weighted least square estimates of:

$$\theta_i = \alpha_i + u_1 \eta_i + u_2 d_i + \varepsilon_i, \quad (\text{a.2})$$

and firm effects in Abowd et al. (2002). See also Abraham and Farber (1987) for IV regression to obtain a control for “match quality” between the firm and the individual effect.

using the variance of $\ln(w_{it}) - \hat{\beta}_1 x_{it} - \hat{\beta}_2 \bar{x}_i \bar{y}_j$ as the weight. α_i is the intercept (unobserved person effect), η_i is the education level, d_i is the sex dummy and ε_i is the statistical error. Six education grades are separated according to five fields ((i) general education, humanities, aesthetics, medical and health, field unknown, (ii) commercial and clerical work, law, social science, (iii) technology and natural science, (iv) transport and communication and (v) agriculture and forestry (no field for elementary and doctorate and also unspecified field for vocational). Furthermore, until 1993 those less than 34 years of age and others are separated and in 1993-1998 those less than 37 years of age are separated from others using dummies. The reason is the reforms in the education system that took place especially in the 1980s so that the same educational degree for young and old may not be comparable. This leads to 45 education dummies. Compensations for unobserved human capital α_i is our proxy for returns in innovative work and is indeed higher in firms with positive R&D investment (25% of all firms in the Statistics Finland sample of Financial Statements of Firms, see Piekkola, 2001). The firm effect ψ_{jt} is the difference between $\ln(w_{it}) - \hat{\beta}_1 x_{it} - \hat{\beta}_2 \bar{x}_i \bar{y}_j$ and person effect θ_i .

$$\psi_{J(i,t)} = \ln(w_{it}) - \hat{\beta}_1 x_{it} - \hat{\beta}_2 \bar{x}_i \bar{y}_j - \theta_i. \quad (\text{a.3})$$

The firm effect $\psi_{J(i,t)}$ is the difference between $\ln(w_{it}) - \hat{\beta}_1 x_{it} - \hat{\beta}_2 \bar{x}_i \bar{y}_j$ and person effect θ_i . The decomposition of the firm effect uses 10,851,754 observations for 1990-1998 (the year 1989 is dropped since the hirings rate is not obtainable) to estimate

$$\psi_{J(i,t)} = \phi_{jt} + \gamma_{1j} q_{jt} + \gamma_{2j} HR_{jt} + \gamma_{3j} S_{it} + \gamma_{4j} S_{it}^2 + \varepsilon_{jt}, \quad (\text{a.4})$$

where ϕ_j is a firm intercept, slope, γ_{1j} is quasi rent slope with $q_{it} \equiv QR_{it} / L_{jt}$ quasi rent per worker, γ_{2j} is hirings HR_{jt} slope, γ_{3j} is seniority slope for seniority s_{it} , γ_{4j} is seniority-squared slope, and ε_{jt} is the statistical error term. The quasi rent effect $\gamma_{1j}q_{jt}$ measures the extent of rent sharing. Following Abowd and Allain (1996) the quasi rent is obtained by

$$QR_{it} = v_{jt} - 0.03k_{jt} - (1 + \theta_{it} - \bar{\theta})\bar{w}, \quad (\text{a.5})$$

where v_{jt} is value added, k_{jt} is real capital per worker (obtained by aggregating plant level investment), θ_{it} is the person effect and $\bar{\theta}$ and \bar{w} are grand average person effect and wages, respectively. (Wage expenses are from total expenditures on labour divided by the number of employees from Financial Statistics. Value added per worker is value added divided by the producer price index at the two-digit level.) Transferable human capital, as captured in the person effect θ_{it} , determines the opportunity income of individual i . Note that quasi rent receives a negative value if value added is not obtainable. The analysis here uses, however, only employee data linked to firm-level data. The procedure used to estimate labor supply is similar to Barth and Dale-Olsen (2001) with the exception that they estimated firm effects by using firm dummies.