Wage Mobility in Sweden

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Abstract *Look at this Kathy*

In this paper we examine three main questions: 1. Are there demotion and promotion in Swedish firms between 1970 – 1990. 2. Are hires and fires substitutes or complements to reorganizing work within firms in order to create wage mobility. 3.What institutional factors may have contributed to changes in mobility and the factors determining mobility over the examined period ? We have access to extensive longitudinal data from Sweden collected and compiled by the Central Confederation of Employers SAF from their database on wage statistics assembled from establishment level personnel record. They contain information for white-collar workers in every industry in the private sector within the SAF domain. Member firms have been providing information to the database since 1970 – 1990.

Using movement in within-firm wage quartiles as the measure of wage mobility, we find that new hires increase upward mobility and exits increase downward mobility. This implies workers benefit from growth in firm size, as upward wage mobility is associated with substantial real increases in wages and downward mobility with real decreases in wages. Growing firms make workers better off both relatively and absolutely, due to increases in both within-firm upward mobility and real wages hence we find that the two types of devices influencing mobility are both at work and complements each other. Older workforces, on average, have less upward wage mobility, and workforces with a greater fraction of female employment have less overall wage mobility.

I. Introduction

There is an extensive body of research about the mechanisms at work in career attainment and the organization structure around such attainment (see Spilerman 1986; Granovetter 1986, 1994; Baron 1994; Rosenfeld 1992; Sorensen and Kalleberg 1994;, Kalleberg and van Buren 1996).

Workers are keenly aware of within-firm wage mobility, not only as a measure of income prospects, but also as an indicator of future success within and outside the firm. This has been demonstrated in work examining mobility with data on a single firm (e.g. Baker, Gibbs, and Holmström 1994a,b; DiPrete 1989; Petersen, Spilerman and Dahl 1989; Rosenbaum 1979a,b, 1981, 1984) within-firm wage mobility is a key element of search models that specify the optimal path from job to job (Jovanovich (1979a,b, Malcolmson 1984); Topel (1989); Topel and Ward (1990) see also Granovetter 1994, Sorensen and Kalleberg 1994 for a sociological account on matching models).

In the empirical line of research mentioned above one gets insight into the relevant processes in a single organization. But it is difficult to assess whether the knowledge gained is peculiar to the organization studied or whether it has broader significance. Addressing these issues from more generalized perspective demands data on a large sample of firms. Very little is known about within-firm mobility in the economy as a whole.

Another line of research focuses on random samples of employees often using life course data. The employees are traced from one job to another (Rosenfeld 1992; le Grand and Tåhlin 2001). This research yields excellent descriptions of wage dynamics at the individual level but it cannot describe what happens at the firm level how employees move between positions within the same firm and how that movements is interrelated to what other employers do. Information about the organizational context is just missing. It lacks information about movement of different employees within the same organization so when one observes employees with high promotion rates and career growth one cannot ascertain whether this is particular to the organizations in that they work having favorable career

systems or whether it really is an aspect of the individual being a high achiever who could have done well in any organization.

Wage mobility is not just a worker's concern. Firms realize that mobility or the absence of it can have large effects on composition of their workforce through hiring, firing, reallocation of workers, retention, and training (see Haveman and Cohen 1994). It is far from obvious exactly what effects mobility has, however. [Kathy I do not know how to write this in a good way but this is what I am thinking: there seems to be two equilibria, one where firms only hires from within in order to preserve a system of motivators where if you do a good job you will be promoted. If the firm would hire from outside then the already employed will feel betrayed. There probability for promotion will decrease. The other case would be that the firm would only hire from outside and hence we will see a lot of turnover since employees know that the probability of getting promoted is low.

Furthermore, think of a firm hiring workers and using high wage mobility as a draw. Some workers will prefer high mobility, such as "up-or-out" paths. Some workers will prefer steady and predictable wage paths. A great deal will depend on where workers are in their life cycle, and on the firm's ability to match them to the appropriate jobs. The question then arises can and do firms use the two seemingly contradictory devises. Increasing the activity of hiring and firing and the reorganization of the internal match will that increase wage mobility in the firm.

In this paper we examine three main questions:

1. Do demotion and promotion exist in Swedish firms within the private business sector between 1970 – 1990?

2. Do firms choose to accommodate wage mobility by hiring and firing or change the matching between employees and tasks within the firm: are hires and fires substitutes or complements to reorganizing work in order to create wage mobility.

3. What institutional factors may have contributed to changes over time with respect to the the issues in questions 1 and 2.

We have access to Swedish wage statistics assembled by the Confederation of Swedish Employers during the period 1970-1990, and based on establishment level personnel records for all firm members within the sphere of the Confederation. The establishment characteristics include the following: detailed industry code, number of employees, region and area within region. For each employee we have information on among other aspects such as pay system, hours worked, part and full time employed union status.

II. Survey of the literature

What determines firms' choices of mobility strategies? The existing literature in economics and sociology have covered a broad range of issues.

There are evidence from a study of college and university administrators that with more promotion there will be less pay dispersion in public colleges (Pfeffer and Davis-Blake 1990). Pfeffer and Langton (1988) found that wage dispersion in more than 1800 academic departments was greater in private colleges and in larger departments than its counterparts.

Research has also pointed to some qualitative implications for movement within the wage distribution. Human capital, both general and specific, implies learning skills on the job, and therefore the worker rises in wages in wage percentiles over the life cycle.[1] Job matching implies finding a good match increases the match-specific component of earnings, raising earnings, and therefore causing upward movement in percentiles.[2] In addition, theoretical and empirical work has found a variety of possible explanations for within-firm wage mobility: promotions (Lazear and Rosen, 1981), job assignment and human capital accumulation (Gibbons and Waldman, 1999), and asymmetrically observed ability (Bernhardt, 1994). Finally, dual labor market models, segmentation theories, career

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[1] This is a fundamental result of human capital accumulation models, beginning with Becker (1975).
[2] See, for example, Jovanovic (1979a,b).

trajectories are areas heavily penetrated economists and/sociologists. Most pertinent for this work is Doeringer and Piore (1971); we refer particularly their formulation of internal labor markets as firms hiring at the lower levels of the hierarchy and promoting from within (see for instance Doering and Piori 1971, Spilerman 1977, 1986; Baron and Bielby 1980).

Another research aspect is attainment in organizations such as the determinants of promotion and departures (see Rosenfeld 1992; DiPrete and Soule 1986). And yet another strand deals with organization of career lines (see Rosenbaum 1979) such as; The effects of education on promotion prospects (see Spilerman and Lunde 1991). Turnover in high tech organizations have been shown strong among senior managers (Baron, Hannan and Burton 2001) and the effects of gender and race on careers (see Petersen et al 2000; Barnett, Baron and Stuart 1997).

Furthermore, firm's mobility policy must also balance the benefits of matching pay to productivity with the costs. The costs of this would be reductions in cooperation and teamwork, costs of monitoring output, and increased worker risk in compensation were mobility in pay to increase. If these factors are important in production the firm may reduce mobility. In short, it is not clear that all firms would prefer a great deal of variability in pay. The optimal mobility will depend on the production function for output as well as characteristics of the workforce. We relate the amount of upward and downward mobility in a firm to some aggregate characteristics – firm size, new hires, exits, average age of workers, gender composition of the workforce – to lay out some qualitative findings.

Do workforce characteristics affect the optimal level of mobility such as the stronger degree of diversity with respect to age, education, gender etc, the more mobility? Are there different factors that influence the frequency of downward respectively upward wage mobility exist?

Firm Size is related to numerous organizational characteristics such as having an internal labor market fomalization, complexity and differentiation in jobs and having full time employees (Kalleberg and Van Buren 1996). Size is also argued to affects organizational reward even net of other factors

associated with size. Kalleberg and Van Buren 1996 reported that organizational size was positively related to perceived promotion opportunities. Larger firms are not do not necessarily share their higher profits with their workers (see Sorensen 1983). On the other hand Kalleberg and van Buren (1996) do find empirical support for the link firm size and higher levels of earnings.

An additional question if how does firm size effect the firms' choices of devices for mobility strategy? Pfeffer and Cohen (1984) found no empirical correlation between internal labor markets and firm size. On the other hand individuals in organizations that cease growing face substantially more limited promotion prospects and this effect on careers has implications for attracting and retaining talent. (Pfeffer p 86 1997).

Organizational pyramids does not necessarily mean declining career chances the higher one rises in the organization (see Stewman 1986, 1988, Stewman and Konda 1983).

Firms can also chose demographic mix. What determines the demographic mix in a firm? According to Stinchcombe McDill and Waker (1968 p 221) it is "the passed history of the social composition of net flows into it". The process of organizational entry, internal transitions such as promotion and organizational exits are themselves affected by demographic composition, for instance turnover and the tendency for recruiting to reproduce friendship and social composition (see Pfeffer 1997 for an overview and Meyersson 1992 for an empirical assessment see also examples of analysis of determinants of demography see for instance (Baron, Mittman and Newman 1991). The implication of changes in demographic distribution is shown by Haveman (1995) who studies the entry rate, the exit rate the average tenure and the dispersion in tenure for managers in saving and loans. Explaining an organization's tenure distributions must be rooted in explanations of job mobility because movement of employees into and out of the labor force and movement of employees between organizations drives individual tenure.

So Kathy and Ed let us decide what variables are the important ones and why we chose the ones we did.

III. Institutions in Sweden

The longitudinal data from Sweden present a valuable and rare opportunity to analyze the effects of institutional change within a country. A comparison of conditions in Sweden in the period 1970-1990, is particularly interesting, as it gives information relevant both to theory and to social policy.

Sweden has a strong egalitarian traditions, allowing for much less inequality in pay than for instance the U.S. (see Fritzell 1991, Blau and Kahn 1996;). The countries are at opposite ends of the spectrum with respect to wage and income inequality. The distribution of market rewards before taxes may be more unequal in Sweden than for instance other welfare states such as Norway. But Sweden has a more progressive tax system, so that disposable income after taxes and transfers is more equal in Sweden than many other countries (e.g., Fritzell 1991 pp. 143-48, Table 5 p. 174, Björklund and Freeman 1997). The Swedish earnings inequality 1970 to 1990 shows that from 1975 the inequality went down and in 1983 there was a very clear trend change and the inequality went up again. (Figure 1 Davis and Henrekson 2000).

Sweden has a small discount on wages for new entrants relative to more experienced employees, (Edin and Topel 1997), a low return to job tenure (Edin and Zetterberg 1992), a low return to schooling (Edin and Holmlund 1995; Edin and Topel 1997), and small industry wage differentials (Edin and Zetterberg 1992), small gender wage gap on occupation establishment levels (Meyersson , Petersen and Snartland 2001) and small reached gender rank gap (Meyersson Petersen 2001, Petersen and Meyersson 2000).

Perhaps the clearest expression of the aversion to inequality is in the system of "solidaristic" wage bargaining in Sweden, which was particularly strong in the period 1950-1983. Conscious attempts were made to minimize wage differences between various groups and to institute the principle of equal pay for equal work and sometimes even equal pay for all. Edin and Richardsson 1999 report: "….based on strong ideological convictions among the union leaders and the membership at large, the aim of the policy turned to overall wage equalization." But since 1983, when the central bargaining system started to dissolve, there has been a move toward less rigid wage policies (SOU 1993, pp. 76-78). Research show that there is a sharply decline in

inequality during the first part of the examined period. Hibbs and Locking (1998) for example shows a decline for blue collars workers in the private sector after 1962 and 1982. And the inequality increases after and at the same time as there is a starting of the dismantling of the system of "solidarity"/ central wage bargaining systems.

Beginning already in 1966 wage setting for most white collar workers in the private sector was determined through negotiations between SAF and PTK, the main cartel for private sector white-collar union. By 1970-71 national system of centralized wage bargaining for white-collar workers was firmly in place their system lasted until 1988 when the engineers union broke out and struck a separate agreement with their own employers' federation (see Elvander and Holmlund 1997).(footnote).

During the beginning of the studied period the norm for the negotiation was based on that the international business sector should be wage leading and the wage cost should be the same in the sheltered sector, non trading sector. The wage bargaining process was based on three stages a central framework agreement an number of national industry negotiations and local negotiations at the individual plants. The central framework agreement was implemented through subsequent rounds of bargaining at the industry and plant level. In the typical case there components were included First one and for all equally large wage increase specified in monetary units, rather than in percent Second a guarantee for wage drift this to compensate worker that were not affected of wage drift conditions on the market. Third a specific increase of pay directed to low wage earners. According to Ekberg (2001) even if the central norm was accepted at the first two levels the local negotiations caused wage drift at the individual plants. During 1971 – 1980 the wage drift in the manufacturing industry was about 42% of the total wage increase. During 1981 - 1990 the wage drift was about 50% of the total wage increase for employees in the manufacturing industry

After 1983 the central wage bargaining system was dissolving despite the governments attempts to save the system. The vast majority of all employees after 1988 wages were determined by industry level and plant level bargaining (Calmfors and).

There are laws regulating the work time, terms of firing, and working environment. Between 70 to 89% of all employees in Sweden are unionized during the examined period. For a more extensive overview of the Swedish labor market (see Ekberg 2001).

Taxation has also been a device to keep small inequality small. Sweden has a high rate of taxation on labour income compared to the U.S. and many other countries. Given a flat rate schedule higher tax rates compress the after tax earnings distribution compared to the pre-tax distribution. Sweden 's Tax rate schedule for labour income also looks highly progressive on the surface although that assessment is less secure upon careful examination (Normann and McClure 1997).

Sweden has had a high statutory tax rates on corporate profits but much lower effective tax rates because of accelerated depreciation provisions and other loopholes,(Davis and Henrekson 1999; Davis and Henrekson 2000 p.12). Capital intensive manufacturing industries which tend to have high mean wages and low wage dispersion can more readily exploit these loopholes than most other industries. Second accroding to Davis and Henrekson, institutional ownership by pension funs and life insurance companies is heavily tax preferred in Sweden as compared to direct business ownership by households. This aspect of the tax system do not benefit owners operated personal and business services which tend to have relatively low mean wages and high wage dispersion. (See for an overview on the Swedish tax systems Davis and Henreksoon 1999.)

During the examined period 1970-1990 there may be events of importance to the mobility patterns in private business in Sweden. After the first oil crisis 1973 Sweden choose to conduct an expansive domestic stabilization policy price and wage levels were increasing faster compare to the countries Sweden traded with. The Swedish krona was tied to a fixed exchange rate.. The policy was full employment. The stabilization policy led to a cost crisis with a decline for the Swedish export. The Swedes devaluated three times during 1976-1977, and once during the second oil crisis 1979. Finally in 1982 the government devaluated the krona with 16%. The government deregulated different markets such as the financial market in the late 1980s. During the examined period the inflation was high and varied, the unemployment one of the lowest in Europe around 2-4%.

Finally Swedes express great concern for equality of the sexes, as is particularly apparent in the political sphere. This concern has been expressed in the area of family policies, where Sweden since the 1970s has had more extensive and progressive policies than any other country. Maternity as well as paternity leaves have been more extended than elsewhere, and childcare is provided universally with a strengthening of policies since 1979[1] (see Kamerman 1988, 1991a,b). For example, since 1937, Sweden has had laws providing job protection during absences in the period before and after childbirth, while the U.S. passed the first such legislation in 1993.[2] Hence comparisons between the three countries can give an indication of the impact of extensive family policy and childcare on the gender wage gap and in particular the within-job-establishment gap.

IV. The Calculation of Within-Firm Mobility

Relative Compensation

When looking at workers who stay in the same firm over some period of time, a natural way to assess their wage mobility is by writing out a transition matrix of wage quartiles for period t to period $t+1$. In so doing we can see whether the relative positions of workers seem to be fixed in the firm wage distribution or whether workers move up and down the wage distribution over time.

We use quartiles to assess worker wage mobility, placing them in the 0, 1, 2, or 3 quartile in each year they remain with a given firm. Workers who are in the lowest wage quartile in time t, and remain there at $t+1$, will be in the (0,0) cell, and workers in the next-highest quartile in both periods will be in the (1,1) cell, and similarly along the diagonal. Workers who move up wage quartiles will be in the upper off-diagonal of the matrix, and workers who move down wage quartiles will be in the lower off-diagonal. The off-diagonal components with the largest mass should be cells adjacent to the diagonal. It is far more likely that a worker in quartile 1 at time t, given any movement, will move to either quartile 2 or quartile 0 than it is to move to quartile 3. So the farther away from the diagonal a cell is the less probability mass it should contain.

Transition Matrices

The structure for worker mobility we use is a modification of the standard wage function used in labor economics, which Mincer (1974) describes. The workers in a firm are ordered by wage, $\{w_1 < w_2 < \ldots < w_N\}$, where w_1 is the lowest and w_N is the highest wage of the N workers. Then the wages are divided into quartiles, so the first quartile, $\{w_1, w_2, \ldots, w_{N/4}\}$, is the bottom 25% of wages, $\{w_{(N/4)+1}, w_{(N/4)+2}, \ldots, w_{N/2}\}$ is the second quartile of wages, and so on. The likelihood of a worker being in the first quartile can be written by an adapted form of Mincer's basic equation:

$$(1) \quad Pr(Q_{ijt} = Q_0) = \alpha + \beta X_{it} + \delta Y_{jt} + \varepsilon_{ijt}$$

where Q_{ijt} is worker i's quartile in firm j in period t, X_{it} are characteristics that proxy worker i's stock of human capital, Y_{jt} is characteristics of firm j in that period, and ε_{ijt} is the random error term. Each firm *j* has as components of the transition matrix of wages from *t* to *(t+1)* the percent that rise in quartiles, the percent that fall in quartiles, and the percent that stay in the same quartile. We examine these percentages as characteristics of the firm; we are not examining individual determinants of mobility here. Therefore we concentrate on the elements of Y_{jt}.

The transition matrix has the form

$$M = \begin{bmatrix} m_{oo} & m_{01} & m_{02} & m_{03} \\ m_{10} & m_{11} & m_{12} & m_{13} \\ m_{20} & m_{21} & m_{22} & m_{23} \\ m_{30} & m_{31} & m_{32} & m_{33} \end{bmatrix}$$

and the percent of workers in the upper triangle, $(m_{01} + m_{02} + m_{03} + m_{12} + m_{13} + m_{23})$, is what we refer to as the percent upward wage mobility. Downward mobility is defined analogously, and no mobility is the sum of the percentages along the diagonal.

We estimate the following basic equation for upward mobility. The percent of the firm's workers who rise in quartiles is:

(2)   Percent $(Q_{it} < Q_{it+1}) = \alpha + \beta_1(\text{Firm size}_t) + \beta_2(\% \text{ New hires}_{t,t+1}) + \beta_3(\% \text{ Exits}_{t,t+1}) + \beta_4(\text{Mean Age}_t)$

$+ \beta_5(\text{Fraction Female}_t) + (\text{Industry dummies}) + (\text{Year dummies}) + \varepsilon_t$.

The inequality on the left-hand-side is reversed for downward wage mobility. The percent of workers who experience no wage mobility have the analogous equation:

(2′)   Percent $(Q_{it} = Q_{it+1}) = \alpha + \beta_1(\text{Firm size}_t) + \beta_2(\% \text{ New hires}_{t,t+1}) + \beta_3(\% \text{ Exits}_{t,t+1}) + \beta_4(\text{Mean}$

$\text{Age}_t) + \beta_5(\text{Fraction Female}_t) + (\text{Industry dummies}) + (\text{Year dummies}) + \varepsilon_t$.

An important point in the interpretation of transition matrices is that workers are measured in each year not relative to their starting cohort's wages only, but to the entire firm's distribution of wages. This has implications for the sum of the probabilities of the upper and the lower off-diagonals of the matrix. For a matrix where the workers were measured into wage quartiles at *t*, and the same workers measured again in *t+1*, if there were no employment changes the upper and lower matrices would have symmetric probability weights, since a movement up a relative scale would necessarily imply a corresponding movement down. However, this is a strained way of measuring wage mobility. What is more natural, and probably more relevant to workers, is where they are in the firm's distribution of wages at any point in time, and so the quartiles are constructed using the wages of the whole firm in each time period. This means that if, for example, the firm hires a top manager with the highest wage in the firm between periods *t* and *t+1*, the entire rest of the firm moves down in the wage rankings (though not all move in quartile rankings), and therefore all workers who move in the transition matrix will necessarily move down. Note the new top manager is not included in the transition matrix, not having been there in period *t*. In the data, this example is likely to be reversed, as most new workers will come in at the lower levels of the firm, generating upward mobility. Since only

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upward mobility would be generated if the cause of mobility is younger workers entering the firm at lower wage levels, since we do see some downward mobility, it cannot be only that mechanism that generates our results. However, examination of the percentages of upward and downward mobility in Table 1 indicates that over all these firms upward and downward mobility both matter (8% and 4.3%, respectively) and the effect of entry of new workers (who are generally at the low end of the pay scale) at time $t+1$ does not eliminate downward mobility.[3]

Stability versus Variability in Compensation

A measure of the firm's internal mobility, and an indicator of its compensation strategy, is the sum of probabilities of the upper and lower off-diagonals relative to the diagonal. Since upper off-diagonal components represent movement up the firm's wage distribution, this means the firm promotes internally or places and trains its workers well. The lower off-diagonal can represent effective demotion - the firm does not raise these workers' wages relative to everyone else in the firm - or, alternatively, that it recruits high-level employees from outside. The diagonal, in contrast, means the worker's place in the wage distribution of the firm is near where it was in the previous period. This implies a firm with a lot of stability of compensation: where you sit is where you stay. It also implies that starting salary is a good predictor of future wages, whereas a firm with more upper and lower probability mass will have wage paths less predictable by initial wages, holding employment constant. If employment is growing, mobility will rise as long as new workers do not have the same distribution of wages as current workers.

Wage Mobility versus Turnover

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[3] To verify that new workers are paid less in our data, note that the mean real wage for new hires is 17730 kronar, and 20814 kronar for those who are not new hires (cf. Table 6).

The firm has at least two separate ways to adjust the composition of the labor force - changing tasks and therefore wages amongst current workers, or hiring and firing..

It is possible that changing wages is an alternative to changing the composition of the workforce by hiring and firing. Posing the question of whether firms shift between workers (turnover) or within workers (reallocating tasks and therefore generating wage mobility) implies that these shifts are substitutes to the firm. However, it is at least conceivable that these strategies are complementary, rather than substitutable.

If these strategies are complements firms that experience higher turnover would also have more wage mobility. It is important to distinguish the two stories that could support this complementarity. The first is that there are some firms with more freedom in their personnel policies, and there are other firms with less. Some firms would have a flexible approach, changing wages more readily and hiring and laying off more readily; others would be locked in to a pre-committed wage structure and would be restricted in hiring and laying workers off. This story might be consistent with a highly regulated and a less regulated sector, for example. The second story is that growth in firm size drives both wage mobility and turnover. In this case, growing firms (measured as more hires than exits) have more wage mobility primarily due to the new workers' impact on the wage distribution, which implies upward mobility for incumbent workers. For shrinking firms, the effect of more exits than hires is less obvious. Other things equal, if those who leave had the highest wages, then exits should imply more upward mobility, and if those who leave had lower wages, exits imply downward mobility.

V. Data

The Swedish data were collected and compiled by the Swedish Employers' Confederation (SAF) from their database on wage statistics, assembled from establishment-level personnel records. These data are extensive and detailed and contain information for all blue- and white-collar workers in every industry (except the insurance and banking industries) in the private sector within the SAF domain. Member firms have provided

information to the database from 1970 up to 1990, once or twice a year. The data have been used for inputs in the yearly wage negotiations and are monitored not only by SAF but also by the labor unions. Hence the data are of exceptionally high quality. They should be very reliable compared to standard sample surveys with personal reports of pay rates and hours worked.

The establishment characteristics include the following: detailed industry code; size (the number of employees); region and area within region. For each employee surveyed, information was obtained on method of wage payment (incentive- or time-rated), education, age, hours worked, part-time or full-time employed, union status and if unionized the name of the union, and a detailed description of job content, usually a four-digit code.[3]

The data white-collar workers covers practically the entire occupational spectrum, including managers and professionals. Chief executive officers and members of executive teams are excluded. Focusing on 1990, we have information on 391 997 white-collar employees respectively. Among the white-collar workers there were 22 031 establishments.

The wage data are reported in an unusually detailed manner. For each person, the wages (as well as hours worked) are reported separately for pay earned during regular hours and pay earned during overtime hours. Furthermore, for employees who receive one part of their pay from time-rate jobs and another part from incentive-rated jobs (i.e., piece-rates. bonuses. or commissions), the wages are specified separately by form of pay for the two components: baseline (i.e., fixed) pay and incentive pay

The partition of the wage data into the part earned on regular hours and the part earned on overtime is very important. It makes the wage data less prone to bias than virtually every other study used for assessing wage discrimination. Moreover, unlike most studies, we need not impute hourly wages from monthly earnings and hours worked. Our information on how employers pay their employees is quite precise, not meshing labor supply and other adaptations by employees with pay rates actually paid to men and women.

The analysis in this paper is based on a sample drawn from the described data base. The sample contains all full-time white-collar workers in firms with at least 100 employees. This cutoff point is not arbitrary, however. First, there are many firms in the Swedish data that have fewer than 4 employees, so movement in quartiles is caused by any hiring or firing or movement in pay regardless of how small, and the movement in quartiles in such firms would be quite extreme. As our analysis takes firms as the unit, the many small firms would dominate the results. Second, larger firms are far less likely to drop out of the data due to closing down.[4]

Method

The wage mobility matrices were constructed as described in the previous section. Workers' wages were ranked by quartile in each year, into quartiles 0,1,2,3. Quartile rank was compared across adjacent years for workers in the firm for both years, for example, ranks in 1970 were compared to ranks in 1971. Then changes in quartiles (0-0 meaning first quartile in both years, 0-1 meaning first quartile in first year and second quartile in the second year, and so on) and the percent that fell into each quartile were computed. These percentages of those who rose in quartiles, those who fell in quartiles, and those who remain in the same quartile are in Table 1. As previously mentioned, the percentages along the diagonal are highest, the adjacent cells have the next highest, and the non-adjacent cells have very low percentages.

The construction of wage quartiles, and measurement of mobility within a 4x4 matrix, requires some justification. How much real wage change is associated with movement out of the previous year's quartile? We look at average wage changes for those with no change within quartiles and those

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[4] The average number of years in the data, by firm, is 12.56. The difference between last and first year, (Max(year) – Min(year) + 1) is 13.18. The variable (number of years in data/difference in last and first year) by firm was constructed and

who move across quartiles. The results are shown in Table 2. There is ample evidence that movement

out of the quartile represents a substantial wage change. First, note that real wage changes are about

3% per year for those in the lowest no-change quartile (0,0) and close to 1% for workers in the other

no-change quartiles (1,1), (2,2), (3,3). Second, movement up in quartiles yields wage changes much

higher than no-change workers. Movement up by one quartile yields 7-9% increase in real wages, by

two quartiles 31-37%, and by three quartiles 107%. For downward quartile movements, down one

quartile yields a decrease of -2.2 to -2.7%, down two quartiles -29%, and down three quartiles -50%.

The frequencies of quartile movement are as expected (see Table 1): more upward mobility than

downward mobility (8% compared to 4%) with almost all mobility consisting of one-quartile

movement.

Since the unit of observation is the firm, when using wage mobility as the dependent variable,

for explanatory variables we use aggregate characteristics of the workforce, specifically average age

and percent female full-time employees. As we use average age, we do not use average experience or

tenure, since both are highly correlated with age. We also cannot use average educational level as an

explanatory variable, since only around 35% of firms reported complete education data, and the ones

that did report are decidedly not a random sample of all firms.[5] Characteristics included in all

regression results are percent of workers who are female, and average age of workers in the first

period. (This is the age and gender of all white-collar workers, not just the ones in the transition

matrices.) We also control for year effects and industry fixed effects in the regression results.

Summary statistics of these and other descriptive variables are found in Table 3.

VI. Empirical Findings

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had mean of .9572 and s.d. of .1098. This is good evidence that firms do not enter and exit the data very often.

Firm Size

Table 4 gives regression results for the following dependent variables: percent of firm with upward movement, percent with downward movement, percent with no movement in quartiles, and percent with any movement in quartiles. First looking at the effect of firm size, the coefficient on firm size is negative and significant for downward mobility, and positive and significant for no mobility. Firm size is negative and significant for total mobility – larger firms have less upward and downward mobility. This is consistent with large firms having more rigid, hierarchical salary setting and promotion rules. The effect of the firm's size should be somewhat offset by whether the firm is growing or shrinking, however.

New Hires and Exits

We next examine the effect of hires and the effect of exits on wage mobility. New hires (as the percentage of the total labor force in year *t*) and exits (as the percentage of the total labor force in year *t)*[6] will change: 1) the firm's size, and 2) its distribution of wages, depending on what the pay of new entrants is and what the pay of exits was. There are two cases that merit special mention.

The first case is all new hires coming in at the lowest level. An example would be the firm hiring at the bottom pay level, as it would in an internal labor market. The new hires push some current workers into a higher quartile. Then some workers who had been in the firm last year would show upward mobility, even if their pay did not change! The rest of the workers who were there last year would stay in the same quartile. Therefore, the effect of an internal labor market is to generate only upward mobility and no downward mobility (other factors constant).

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[5] Specifically, firms that reported education data for any or all of their employees were heavily concentrated in technical fields, with 44.7% of all workers' reported education in a single educational code (Sun Group 41), which is less than a BA in technical, industrial, or natural science fields. Since we are describing a general pattern of results for firms of 100 or more employees, we look more closely at the results for firms that report education in other work (see Ierulli, Lazear, and Meyersson Milgrom, (2001).

[6] Both percentage of total workers and percentage of total full-time workers were tried. There is essentially no difference in results.

The second case is the following: suppose now that the firm hires, but the number of hires are the same at each quartile. Then, though there may movement from other causes across quartiles (i.e. from reasons other than hiring) in general workers will stay in the quartile where they had been before. Hiring that takes place uniformly across levels will not generate upward or downward mobility.[7]

Looking at the coefficients on new hires, there is clearly a large effect of being a growing firm on upward mobility. This could be consistent with: a) more flexibility in wages for growing firms, b) internal labor markets, or c) general growth in firm size where employment growth at the level is proportional to size of level (percent employment change by level is constant, and lower levels contain more workers than higher levels.)

The same models apply in exits. If exits increase, holding new hires constant, the effect on upward mobility is insignificant, while the effect on downward mobility is positive and significant. If exits induce downward mobility it must be that exits are on average at the lower part of the wage distribution. This is consistent with a bureaucratic model of hiring and firing - last in, first out – or with younger workers changing jobs more readily than older workers.

Given the results of new hires and exits on wage mobility, it is not surprising that the effect of both new hires and exits are negative and significant in the third regression, where the dependent variable is no wage mobility. Since size of the firm is positive and significant in this regression, and as size of the firm is positive, it indicates that a larger firm size raises the probability mass along the diagonal – more stay in their initial quartiles in large firms. In addition, note that firm size is insignificant for upward mobility, and negative and significant for downward mobility. Larger firms seem to provide some insurance against real wage decreases but may not provide as many opportunities for large wage increases, unless they are growing.

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[7] In the empirical work we are examining net wage mobility, which is the sum of mobility induced from hires, from exits, and from wage movements upward and downward that are caused for other reasons – merit wage increases, for example. We restrict our discussion here to wage mobility caused by hiring and exits purely for expositional simplicity.

Average Age and Percent Female

Average age of workforce is negative and significant for upward mobility, and positive and significant for downward mobility, with the size of the negative coefficient twice that of the positive coefficient (-0.308 to 0.127). Older workers are also less likely to change quartiles, which is consistent with human capital models, since older workers are better known by their firms and there are less likely to be surprises in either direction in expected productivity.[8] Since younger workers typically come in at the lower end of the wage distribution, this by itself would generate upward mobility. However, this begs the question of why younger workers choose these firms, or why these firms hire more young workers. While it might seem that growing industries would be more attractive to new entrants to the labor market, industry was controlled for, so any fixed effect of industry does not explain this result.

The fraction of the workforce that is female is positive and barely significant for no mobility, and insignificant for upward and downward mobility. However, the magnitude is large – for every 1% increase in female workers, there is almost 2% decrease in mobility. Since the average firm is 22% female, this effect is large, accounting for almost 40% of the size of the constant term in the no mobility regression. It is not clear whether this effect is a glass ceiling, since that explanation would also imply a glass floor – downward mobility is also reduced as percent female increases.

Another point that comes from the regression statistics in Table 4 is that we can explain more variability in upward mobility than we can of lack mobility, and much more than we can explain of downward mobility. In fact, comparing adjusted R-squareds across regressions indicates we cannot explain much of downward mobility at all. This is consistent with the labor literature finding very few demotions or real wage decreases, and almost nothing in the way of theoretical models describing them. Although these tables refer to downward mobility relative to others in the firm, and not absolute

wage levels within the firm, a fall in wage quartiles implies a fall in wages relative to others in the firm. It can be argued workers would measure their position much more by their wage relative to the wage distribution of their firm, than, say, the average wage in the country as a whole.

It should also be noted that the coefficients of any two of the first three regressions generally imply the coefficient of the third regression; that is, the coefficients are jointly determined. For the purposes of this paper, we focus rather more upon upward and downward mobility regressions and rather less on the no mobility and total mobility regressions, but we could equally well focus on any two of the four.

Correlation of Wage Mobility and Turnover

Since we have postulated that both wage mobility and turnover are adjustment mechanisms for the firm, a key point is what their empirical relationship is. How does total turnover (exits plus new hires) correlate with age mobility (movement in wage quartiles)? The results in Table 5 strongly indicate that turnover and wage mobility are found together in firms, and do not appear to be substitutes as strategies. There is a correlation of 0.7183 between total turnover and upward wage mobility, and 0.5148 between total turnover and downward wage mobility. This positive relationship means that firms do not use wage mobility instead of hiring or firing; rather that firms with high wage mobility also are characterized by high employment mobility as well. As the effect of employment mobility is greater for upward mobility than downward mobility, employment mobility is on net better for employees than the lack of it, both in relative and absolute terms. It is better in relative terms because it produces upward mobility within the firm, and better in absolute terms because the upward mobility generates a large real wage increase.

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[8] This finding can be explained by other models in ways that are consistent with the results we find. For example, if match-specific capital matters, then older workers are more likely to be in the job that is their best match, at which point no other

Turnover and Characteristics of Workers

Since new hires and exits are significant explanatory variables for, respectively, upward and downward mobility, it is interesting that their effects are not symmetric – the coefficient on new hires much larger for upward mobility than the coefficient on exits for downward mobility. Since the coefficient for new hires is consistent with internal labor markets, Table 6 looks at characteristics of workers who are new hires and exits to see why the asymmetry exists.

New hires exhibit the characteristics that describe entrants to internal labor markets. They are younger and are paid lower wages, as well as having less variance in pay. This implies there is more homogeneity in pay at the entry level of the firm, and more variability in higher levels.

Exits, on the other hand, exhibit no clear differences from workers who do not exit, except for being more likely to be female (29% compared to 20%). The exits are paid slightly less, and are slightly younger, but not significantly so. It seems that workers who exit are on average similar to workers who do not and so do not generate effects as large as new hires, who are compositionally different from the rest of the firm. Since the exits are not too different from the rest of the firm it is logical that their coefficient is smaller than that of new hires.

VII. Conclusion

Within-firm wage mobility over all whole economy has been largely unstudied due to data limitations. The absolute amount of wage mobility in this Swedish data is not large, which is expected due to the influence of centralized wage-setting, but it still yields suggestive results. The determinants of firm-level mobility presented here lead to four conclusions: 1) that firm size matters in mobility,

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surises remain. Similarly, if knowledge of workers' abilities accrues over time then the firm will place the worker in slots that change less and less at the margin over time.

with large firms exhibiting greater wage rigidity than smaller firms; 2) that growing firms have more upward mobility, consistent with an internal market for labor but not with simple flexibility in wage setting; 3) that shrinking firms have more downward mobility; and 4) that turnover in the workforce, measured by new hires and exits, is greater in firms with more wage mobility than less. We see these results as promising for three reasons. They corroborate the models of internal labor markets in the large firms of 40% of the Swedish private sector, rather than solely within a single firm. They clarify the relation of firm growth to wage mobility – growth in firm size yields upward mobility, and shrinking firm size yields downward mobility. Finally, they sh. These results give some idea of the determinants of mobility in the economy, rather than in one firm. They also corroborate an important policy result, because growth is good for workers as well as firms, by increasing upward mobility and average wages in the economy.

VI. References

Baker, George; Gibbs, Michael; and Holmstrom, Bengt. "The Wage Policy of a Firm." *Quarterly Journal of Economics* 109 (1994a): 921-56.

Baker, George; Gibbs, Michael; and Holmstrom, Bengt. "The Internal Economics of the Firm: Evidence from Personnel Data." *Quarterly Journal of Economics* 109 (1994b): 921-56.

Barnett, William. P., James N. Baron, and Toby E. Stuart 2000. Avenues of Attainment: Occupational Demography and Organizational Careers in the California Civil Service. *American Journal of Sociology* Vol 106 No 1 (July): 88-144.

Baron, James N., Michael T. Hannan and M. Diane, Burton 2001. Labor Pains: Change in Organizational Models and Employee Turnover in Young, High-Tech Firms. *American Journal of Sociology* Vol 106 No 4 (January) 2001: 960-1012

Baron, James, N. and William T. Bielby 1980. Bringing the Firms Back in: Stratification, Segmentation and the Organization of Work. *American Sociological Review* 49:454-73

Baron, James, N. Alison, Davis-Blake and William T. Bielby 1986. The Structure of Opportunity: How Promotion Ladders Vary Within and Among Organizations. *Administrative Science Quarterly* 31:248-73.

Baron, James. N. 1994. Reflections on Recent Generations of Mobility Research, pp. 384-396 in Grusky D. B. (ed) West View Press San Francisco.

Baron, James .N., B. S. Mittman and A. E, Newman 1991. Targets of opportunity: Organizational and environmental determinants of gender integration within the California civil service 1979-1985. *American Journal of Sociology* 96: 1362-1401.

Becker, Gary. *Human Capital*. 2nd ed. New York: National Bureau of Economic Research, 1975.

Bernhardt, Dan. "Strategic Promotion and Compensation." *Review of Economic Studies* 62 (1995): 315-339.

Björklund, Anders and Richard B. Freeman 1997. Generating Equality and Eliminating Poverty the Swedish Way, in Richard B. Freeman, Robert Topel and Birgitta Swedenborg (Eds.) The Welfare State in Transition: Reforming the Swedish Model, Chicago and London the University of Chicago Press.

Calmfors and

Davis, Steven J. and Magnus Henrekson 2000. Wage-Setting Institutions As Industrial Policy. Working Paper 7502 NBER.

Davis Steven J. and Magnus Henrekson 1999. Explaining National Differences in the Size and Industry Distribution of Employment. *Small Business Economics* 12 (February): 59-83.

DiPrete, Thomas and Whitman T. Soule 1986. The Organization of Career Lines. *American Sociological Review* 51 (June): 295-309.

DiPrete, Thomas. 1989, The Bureaucratic Labor Market. New York: Plenum Press

DiPrete, Thomas 1987. Horizontal and vertical Mobility in Organizations *Administrative Science Quarterly* 32 : 422-444.

Edin Per-Anders and Robert Topel 1997. Wage Policy and Restructuring: The Swedish Labor Market Since 1960. In Richard B. Freeman, Robert Topel and Birgitta Swedenborg (Eds.) The Welfare State in Transition: Reforming the Swedish Model. Chicago and London: The University of Chicago Press.

Edin, Per-Anders and Johnny Zetterberg, 1992. Interindustry Wage Differentials : Evidence from Sweden and a Comparison with the United States. *American Economic Review* 82 No 5 December 1341-1349.

Edin, Per-Anders and Bertil Holmlund 1995. The Swedish Wage Structure: The Rise and Fall of Solidarity Policy? In Freeman, Richard B. and Lawrence Katz (eds.) Differences and Changes in Wage Structures: Chicago: Chicago University Press.

Elvander, Nils and Bertil Holmlund 1997. The Swedish Bargaining System in the Melting Pot: Norms and Outcomes in the 1990s. Solna Sweden: Arbetslivsinstitutet.

Ekberg John 2001

Fritzell, J. (1991), *Icke av marknaden allena: Inkomstfördelningen i Sverige*. Stockholm. Almqvist Wiksell International, Sweden.

Gibbons, Robert, and Waldman, Michael. "A Theory of Wage and Promotion Dynamics Inside Firms." *Quarterly Journal of Economics* 114 (November 1999): 921-56.

Granovetter, Mark 1986. Labor Mobility Internal Market and Job Matching: A comparison of the Sociological and Economic Approaches. *Research in Social Stratification and Mobility* 5: 3-39.

Granovetter Mark 1994. Toward a sociological theory of Income Differences. pp. 370-383 in D.B. Grusky (ed) Social Stratification in Sociological Perspective Class, Race, & Gender. West View Press

Haveman H. A. 1995. The Demographic Metabolism of Organizations: Industry dynamics, Turnover, and Tenure distributions. *Administrative Science Quarterly* 40: 586-618

Haveman H A. and L. E Cohen 1994. The Ecological dynamics of Careers. The Impact of Organizational Foundign Dissolution and Merger on Job Mobility. *American Journal of Sociology* 100(1): 104-52.

Hibbs, Douglas A. and Håkan Locking 1998. Wage Dispersion and Productive Efficiency Evidence for Sweden. Working Paper (June) Department of Economics Göteborg University

Jovanovic, Boyan. "Job matching and the Theory of Turnover." *Journal of Political Economy* 87 (October 1979): 972-90 *(a)*

Jovanovic, Boyan. "Firm-Specific Capital and Turnover." *Journal of Political Economy* 87 (December 1979): 1246-60. *(b)*

Kalleberg A.L. and M. E Van Buren 1996. Organizational Differences in Earnings. pp. 200-213 chapter 10 in A.L.Kalleberg, D. Knoke, P.V. Marsden and J. L. Spaeth (Eds.). Organizations in America Analyzing Their Structure and Human Resource Practices, Sage Publications.London.

Kalleberg A.L. 1996 The Structure of Organizational Earnings Inequality. pp. 214-232 Chapter 11 in Kalleberg, A. L. D. Knoke, P. V. Marsden and J.L. Spaeth (Eds.) Organization sin America Analyzing Their Structures and Human Resource Practices. Sage Publications London.

Kamerman, S. B. (1991a), Parental Leave and Infant Care: U.S. and International Trends and Issues. 1978-1988. Pp. 11-

23 in *Parental Leave and Child Care: Setting a Research and Policy.* J. S. Hyde and M. J. (Eds.). Templ

University Press, Essex. Philadelphia. PA.

----.(1991b), Child Care Policies and Programs: An International Overview. *Journal of Social Issues 47(2),* 179-196.

----. (1988), Maternity and Parenting Benefits: An International Overview. Pp 235—244 in the The *Parental Leave Crisis: Toward a National Policy*. E. F. Ziegler and M. Frank (Eds.). Yale University Press, New Haven. CT.

Lazear, Edward, and Rosen, Sherwin. "Rank-Order Tournaments as Optimum Labor Contracts." *Journal of Political Economy* 89 (1981): 841-864.

Le Grand C. and M. Tåhlin, Job Mobility and Earnings Growth forthcoming in *European Sociological Review* 2002.

McDill and Waker, 1968

Meyersson, E. M. 1992. The Impact of Ownership structure, Team Composition on Firm Performance Stockholm: IUI.

Meyersson Milgrom E. M. and T. Petersen and V Snartland. 2001. Equal Pay for Equal Work? Evidence from Sweden and comparison with Norway and the U.S. Forthcoming in *Scandinavian Journal of Economics* No 4.

Meyersson Milgrom Eva. M. and Trond Petersen The Glass ceiling: cohort and lifecycle effects. Mimeo 2001

Mincer, Jacob. *Schooling, Experience, and Earnings*. New York: National Bureau of Economic Research, 1974.

Norman, Erik and Charles E. McClure Jr 1997. Tax Policy in Sweden in In Richard B. Freeman, Robert Topel and Birgitta Swedenborg (Eds.) The Welfare State in Transition: Reforming the Swedish Model. Chicago and London: The University of Chicago Press

Petersen, T., and E. M. Meyersson. (1999), More Glory and Less Injustice: The Glass Ceiling in Sweden, 1970-1990. Pp

199-261 in The Future of Affirmative Action (Ed) K. T. Leicht. *Research in Social Stratification and*

Mobility V*ol 17.*

Petersen, T S. Spilerman and S-Å Dahl. 1989. The Structure of Employment Termination Among Clerical Employees in a Large Bureaucracy. *Acta Sociologica* 32(4): 319-338.

Pfeffer, J. 1997. New Directions for Organization Theory Problems and Prospects Oxford University Press New York

Pfeffer J. 1977. Toward an Examination of Stratification in Organizations *Administrative Science Quarterly* 22:553-567.

Pfeffer J. and Y. Cohen 1984. Determinants of internal labor markets in organizations. *Administrative Science Quarterly* 29 550-572

Pfeffer J. and Alison Davis- Blake 1990. Determinants of salary dispersion in organizations. *Industrial Relations* 29: 38-57.

Pfeffer J. and N. Langton. 1988. Wage inequality and the organization of work. The case of academic departments. *Administrative Science Quarterly* 33: 588-606.

Rosenbaum James, E. 1979a. Organizational Career Mobility: Promotion changes in a Corporation during Periods of Growth and Contraction *American Journal of Sociology* 85 July 21-48

Rosenbaum James. E. 1979b. Tournament Mobility: Career Patterns in a Corporation. *Administrative Science Quarterly* 24: 220-241.

Rosenbaum James. E. 1980. Hierarchical and Individual Effects on Earnings. *Industrial Relations* 19:1-14

Rosenbaum James E. 1984. Career Mobility in a Corporate Hierarchy, Academic Press Inc London

Rosenfeld Rachel A. 1992. Job Mobility and Career Processes. *Annual Review of Sociology* 18: 39-61.

Spilerman Seymore and Hiroshi Ishida 1996. Stratification and Attainment in Large Japanese Firm. Pp: 317-42 in Generating Social Stratification (ed) A.C. Kerckhoff. Boulder: West View Press.

Spilerman, Seymore 1977. Careers, Labor Market Structure, and Socioeconomic Attainment. *American Journal of Sociology* November 83:551-593.

Spilerman S. 1986. Organizational Rules and the Features of Work Careers Research. *Social Stratification and Mobility* 5: 41-102.

Spilerman S. and T. Lunde. 1991, Features of educational attainment and Job Promotion Prospects. *American Journal of Sociology,* 97:689-720.

Stewman S 1986. Demographic models of internal labor markets *Administrative Science Quarterly* 31: 212-247.

Stewman S 1988. Organizational demography. *Annual Review of Sociology* 14: 173-202

Stewman S and S. L. Konda. 1983. Careers and organizational labor markets: Demographic models of organizational behavior. *American Journal of Sociology* 88: 637-685.

Sorensen Aage B. and Arne. L. Kalleberg 1994 An outline of a Theory of the Matching of Persons to Jobs, pp. 362-369 in D. B. Grusky (ed) Social Stratification in Sociological Perspective Class, Race, & Gender West View Press S.F.

Sorensen Aage, B. 1983 Processes of Allocation to Open and Closed Positions in Social Structure. *Zeitchrift fur Sociolgie* 12 (July): 203-224.

SOU, 1993:7, Löneskillnader och lönediskriminering. Om kvinnor och män på arbetsmarknaden. Sveriges Offentliga Utredningar, Stockholm.

Stinchcomb, A.L., M.S.McDill and D. R. Walker 1968. Demography of organizations. *American Journal of Sociology* 74: 221-229.

Topel, Robert J. "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority." *Journal of Political Economy* 99 (1991): 145-176.

Topel, Robert J., and Ward, Robert. "Job Mobility and the Careers of Young Men." *Quarterly Journal of Economics* 107 (1992): 439-480.

Table 1
Movement in White-Collar Wage Quartiles, 1970-90

	Percent of wage quartiles that rise		Percent of wage quartiles that fall		Percent of wage quartiles that stay the same
All	7.9900 (5.5071)		4.3943 (4.1121)		87.6155 (5.9030)
Quartile 0-1	2.7147 (2.2811)	Quartile 1-0	1.3930 (1.6036)	Quartile 0-0	20.4838 (2.6135)
Quartile 0-2	0.0945 (0.3373)	Quartile 2-0	0.0176 (0.1925)	Quartile 1-1	20.8683 (2.6336)
Quartile 0-3	0.1113 (0.1084)	Quartile 2-1	1.7267 (1.8409)	Quartile 2-2	22.1463 (2.3884)
Quartile 1-2	3.0697 (2.3314)	Quartile 3-0	0.0035 (0.0768)	Quartile 3-3	24.1169 (1.8259)
Quartile 1-3	0.0580 (0.2390)	Quartile 3-1	0.0150 (0.2549)		
Quartile 2-3	2.0418 (1.7459)	Quartile 3-2	1.2383 (1.5458)		
	N = 7389		N = 7389		N = 7389

Standard errors in parentheses in Table 1.

Table 2
Real Wage Changes and Quartile Movement, 1970-1990

QQ	N	Mean	Std Dev	Minimum	Maximum
Variable is real wage change by quartile in $(t,t+1)$				
00	9195	3.0249997	5.5993107	-34.2991372	174.8872387
01	8517	8.1347872	10.4132023	-8.3390828	640.5931416
02	1763	31.0481387	23.6928999	-2.5125046	345.3851613
03	333	106.6470532	113.1067822	3.6635276	1515.26
10	6894	-2.3237657	5.2773057	-66.9046060	15.1495899
11	9199	1.0793909	3.7217766	-11.8435606	47.9441556
12	8763	7.4172434	6.4588390	-7.7558169	150.3534000
13	1210	37.2523158	28.8563996	3.0003756	469.8351137
20	344	-28.7090671	15.0618142	-71.7244826	0.8388923
21	7407	-2.2482880	3.9461140	-70.8164455	11.5415583
22	9200	0.7162081	3.4764402	-11.0150285	15.6989330
23	8424	8.9184495	8.5681386	-7.6170214	287.0579880
30	138	-50.1057981	13.8898677	-96.2773953	-23.0471107
31	190	-28.5999895	12.7842642	-70.2483970	1.0493270
32	6959	-2.7399319	4.4263997	-52.7934239	10.3787373
33	9206	0.8126212	3.5572965	-9.8480258	22.7269163

Table 3
Summary Statistics for Selected Variables

	Mean	Standard Deviation	Minimum	Maximum	N
Fraction Female	.227	.1177	0	1	8716
Average Age in Firm	40.466	3.664	26.70	52.277	8716
Size of Firm	335.295	516.541	100	7745	8716
Change in Firm Size	3.814	104.410	-3824	3748	6974
Change in Percent Female	.0017	.0246	-.198	.5411	8716
Change in Average Age of Employees	.262	.8077	-6.802	7.325	8716

Table 4
Wage Mobility and Turnover[†]

	Upward Wage Mobility			Downward Wage Mobility			No Wage Mobility			Total (Upward+Downward)		
	Coefficient	t	Sig[††]	Coefficient	t	Sig	Coefficient	t	Sig	Coefficient	t	Sig
Constant	15.895	20.260	***	-1.139	-1.550		85.203	92.250	***	14.756	15.960	***
Full-time workers (in thousands)	-0.025	-0.400		-0.366	-6.080	***	0.397	5.250	***	-0.392	-5.170	***
New hires (%)	28.667	36.340	***	-0.692	-0.940		-28.028	-30.210	***	27.974	30.090	***
Exits (%)	-0.010	-0.020		3.126	7.240	***	-3.175	-5.850	***	3.116	5.730	***
Percent female	-0.893	-1.490		-0.433	-0.770		1.342	1.910	*	-1.326	-1.880	*
Average age	-0.308	-17.790	***	0.127	7.830	***	0.181	8.910	***	-0.181	-8.880	***
1971	0.606	1.830	*	-0.400	-1.290		-0.333	-0.850		0.205	0.530	
1972	-1.377	-4.230	***	1.197	3.930	***	0.210	0.550		-0.180	-0.470	
1973	dropped			dropped			dropped			dropped		
1974	1.646	5.130	***	-0.384	-1.280		-1.227	-3.250	***	1.262	3.340	***
1975	2.464	7.670	***	0.493	1.640		-2.922	-7.730	***	2.957	7.810	***
1976	1.548	4.910	***	1.231	4.180	***	-2.746	-7.410	***	2.779	7.480	***
1977	0.557	1.780	*	1.052	3.580	***	-1.642	-4.440	***	1.610	4.350	***
1978	0.098	0.310		0.423	1.440		-0.487	-1.320		0.521	1.400	
1979	1.102	3.470	***	-0.126	-0.430		-0.939	-2.520	**	0.975	2.610	*
1980	2.835	8.910	***	0.618	2.080	**	-3.417	-9.130	***	3.452	9.210	***
1981	1.662	5.250	***	0.553	1.870	*	-2.181	-5.860	***	2.215	5.940	***
1982	1.749	5.450	***	0.517	1.720	*	-2.233	-5.920	***	2.266	5.990	***
1983	2.786	8.710	***	1.790	5.980	***	-4.541	-12.060	***	4.576	12.130	***
1984	3.357	10.590	***	0.666	2.250	**	-3.987	-10.690	***	4.022	10.770	***
1985	2.812	8.880	***	0.054	0.180		-2.832	-7.600	***	2.866	7.680	***
1986	2.113	6.730	***	-0.192	-0.650		-1.885	-5.100	***	1.921	5.190	***
1987	2.525	8.010	***	0.399	1.350		-2.887	-7.790	***	2.924	7.870	***
1988	2.848	9.060	***	1.087	3.700	***	-3.896	-10.540	***	3.935	10.620	***
1989	3.747	11.790	***	1.457	4.900	***	-5.165	-13.820	***	5.204	13.900	***
1990	dropped			dropped			dropped			dropped		
N =	8511			8511			8503			8511		
F	F(23, 8455) = 148.02			F(23, 8455) = 15.91			F(23, 8447) = 102.67			F(23, 8455) = 102.03		
Prob>F	0.0000			0.0000			0.0000			0.0000		
R²	0.3048			0.0605			0.2454			0.2436		
Adjusted R²	0.3002			0.0544			0.2405			0.2387		

† Industry controlled for in all regressions.
†† * = Significant at 1% level, ** = significant at 5% level, * = significant at 10% level.**

Table 5
Correlations of Wage Mobility and Turnover

	New hires + exits (%)	Wage up in Quartiles (%)	Wage down in Quartiles (%)	Wage same in Quartiles (%)
New hires + exits (%)	1			
Wage up in Quartiles (%)	0.7183	1		
Wage down in Quartiles (%)	0.5148	-0.2267	1	
Wage same in Quartiles (%)	-1.00	-0.7183	-0.5183	1

Table 6
Characteristics of New Hires and Exits

New hires dummy[†]	N	Variable	Mean	Standard Deviation	Min	Max
0	3603468	Wage	20814.93	7131.57	797.50	107976.79
	3603466	Age	41.63	11.06	17.0	64.0
	3603466	Female	.204	.40	0	1
1	517651	Wage	17730.21	6856.35	184.11	129853.0
	517934	Age	33.14	10.40	16.0	64.0
	517934	Female	.314	.46	0	1
Exits dummy						
0	3596508	Wage	20545.37	7166.98	184.117	107976.79
	3597698	Age	40.63	11.06	16.0	63.0
	3178605	% Wage Growth[†]	2.281	8.611	-96.277	1577.07
	3597698	Female	.204	.403	0	1
1	550594	Wage	19275.93	7606.70	859.235	129853.00
	550963	Age	39.29	13.33	16.0	64.0
	468333	% Wage Growth	2.125	9.788	-91.843	721.099
	550963	Female	.288	.453	0	1

† Dummy variables are 1 if employee is a new hire or an exit, and 0 otherwise.

†† Wage growth cannot be reported for new hires, since they have only one year in the job and two successive years are required.

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[1] Sweden saw several changes in parental-leave policies and child-care provisions over the period 1970-1990 (see Rønsen and Sundström 1996).

[2] The Family and Medical Leave Act (FMLA) requires medium and large employers to provide 12 weeks of unpaid parental leave. Of course, many employers provided such benefits voluntarily and some states had such provisions, but nothing universal occurred before 1993, unlike most other industrialized countries.

[3] Education and age/experience are standard variables included in analysis of gender wage differentials. This would be the proper procedure if we were studying the question of whether men and women investing in the same type of human capital are assigned to the same jobs or earn the same

wages. However, the principal question posed in this paper is different: do employers in general give

equal pay to men and women working in the same job categories.