Occupation Structure and the Boundary of (Internal) Labor Markets. Do we have the empirical facts right?

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Occupation structure and the boundary of (Internal) labor markets. Do we have the facts right?

Introduction

In their seminal work on internal labor markets, ILM (hereafter), Doeringer and Piore (1985) points to the existence of career ladders both within firms with limited "ports of entry" and within professional and craft communities. The relevant boundaries, they found, were established as an outcome of social group processes.[1]

Their study, however, was limited mostly to unionized blue-collar workers in manufacturing industries of the early 1970s. One might ask how relevant the empirical findings for workers in other industries and for manufacturing firms operating today and how significant are occupations relative to firm boundaries in determining the pool from which the firm fills its vacancies?

Career ladders and hiring practices making up the system for matching firms and workers has important implications for performance of the firm and of course in the long run for the performance of a country.

To resolve the empirical question of ILM boundaries, one needs unusual data that compares the recruitment from within the firm with recruitment from outside the firm. For example, to resolve questions about the importance of ports of entry, one might compare the extent to which openings are filled from within occupations (especially when this requires hiring from outside the firm) versus from within firms (especially when this means training a worker from a different occupations). To do so, we need to trace individuals from one occupation to another and from one firm to another. Only then can we compare the extent to which these different accounts of career ladders describe the facts.

Although case studies of single establishments shed some light on these issues (see Lazear 1992; Baker et al 1994a,b, LeGrand and Tåhlin 2002 see for a extensive overview Gibbons and Waldman 2002) there are few systematic studies of the detailed and encompassing extent needed to determine the existence of a labor market and its boundary. Firm matched data on a large scale capturing major part of the economy and the labor market are scarce.

In this study we present a comprehensive analysis of data from the private sector in Sweden. We look at how institutional settings influence firms' recruitment strategies and at the interaction between occupation boundaries and firm boundaries. And we focus on changes of a 20-year period.

The Swedish data encompasses entire populations of establishments in the private sector, including employee and occupation characteristics and information about wages and

[1] Se also work by Lindbeck and Snower (1988).

work hours. The data also covers entire subpopulations of workers in the private sector of a 20-year period. We analyze data from 1976 – 1990.

We focus on how firms fill new positions, asking the following questions: (1) What were the hiring patterns of Swedish private employers in 1978 and 1988? (2) How did these patterns affect the individual white-collar worker pay?

Our empirical analysis finds that employers commonly hire both from within and outside the firm to all the different ranks in the firm, contradicting simple theories that higher ranks are filled by promotion from within the firm. Smaller firms tend to hire more from outside and to higher ranks than the larger firms do. Large firms tend to fill job slots from different occupation but from within the firm. Filling jobs with outside hires (irrespective of within or outside occupation) is most common for the top ranks. White-collar workers' wages increase with occupation tenure and general labor market tenure, possibly reflecting the accumulation of occupation-specific and general human capital, but wages *decrease* with firm tenure. We generally find support for the hypothesis that hiring is restricted as much by occupation-specific and general human capital as by the boundaries of the firm. Occupation specific capital and general human capital have increased in importance over time for hiring and promotion decisions in Sweden.

The literature

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

Research pointes to some qualitative implications for movement within the wage distribution. Accumulating either general or specific human capital entails learning skills on the job, and therefore a worker's relative wage climbs over the life cycle.[2] Models of job matching imply that finding a good match increases the match-specific component of wages, contributing again to upward movement in the worker's relative wage.[3] Theoretical and empirical research has suggested a variety of possible explanations for within-firm wage increases: promotions (Lazear and Rosen, 1981), job assignment and human capital accumulation (Gibbons and Waldman, 1999) see also Gibbons Waldman for an overview 2002).

Finally, dual labor market models, segmentation theories, and career trajectories are all areas that have been heavily investigated by economists and sociologists. Most pertinent for this work is Doeringer and Piore (1985); we refer particularly to their formulation of internal labor markets as firms hiring from within the firm or from in particular crafts, port of entry. We do not cover the issue of turnover rates as an indication of the existence

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

of ILM (see Doeringer and Piore 1985, see also Spilerman 1977, 1986; Baron and Bielby 1980.)

Other research seeks to explain attainment (promotions and departures) in organizations (see Rosenfeld 1992; DiPrete and Soule 1986.) Yet another strand deals with career paths (see Rosenbaum 1984, 1980, 1979a,b) such as the effects of education on promotion prospects (see Spilerman and Lunde 1991). Turnover in high-tech organizations has been shown strong among senior managers (Baron, Hannan and Burton 2001) and there are effects of gender and race on careers (see Petersen et al 2000; Barnett, Baron and Stuart 2000).

Firm size, one of our key variables, is positively related to numerous organizational characteristics such as having an ILM, complexity and differentiation in jobs, and having full time employees (Kalleberg and Van Buren 1996.) Size is also argued to affect organizational rewards, even net of other factors associated with size. Kalleberg and Van Buren reported that organizational size was positively related to perceived promotion opportunities. Larger firms do not necessarily share their higher profits with their workers (see Sorensen 1983.) The sociological literature is not unified on this point: Kalleberg and van Buren do find empirical support for the link between firm size and higher levels of earnings and Ierulli and Meyersson Milgrom 2001 find that growing firms is positively correlated with earnings increase for the firm labor force.

One of our questions focus on how firm size affect the firms' choice of hiring strategies? Pfeffer and Cohen (1984) found no empirical correlation between ILMs 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 1997).

In the hiring strategies aspect of demographic mix of workers come into play. What determines the demographic mix in a firm? According to Stinchcombe, McDill, and Walker (1968) it is 'the past 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.) There are also analyses of determinants of demography (Baron, Mittman and Newman 1991). The implications of changes in demographic distribution have been studied, for example by Haveman (1995) who examines the entry rate, exit rate, average tenure, and dispersion in tenure for managers in saving and loans. Any explanation of an organization's tenure distributions must be rooted in job mobility because movement of employees into and out of the labor force and movement of employees between organizations drives individual tenure.

We limited the demographic characteristics of the workforce in our analysis because the focus of our study is the characteristics of firms that are related to increased wage

mobility. We include average age and percent female as descriptions of the workforce, since the education variable in this data was problematic.

The limits of the present research on ILMs

Doeringer and Piore (1985, page x) argued that careers develop mostly within particular job ladders, which exist within either the firm or the profession or craft (“occupation”), as determined by certain social processes. New entrants to the ladder arrive in particular “port of entry” jobs and the pricing of labor and changes to new work positions is governed by administrative rules and customs. These rules differentiate between the outsiders and the insiders (se also Lindbeck and Snower 1988).

According to Doeringer and Piore, the barriers to mobility created by these ladders contribute to the stability of the labor market, so low turnover would be a salient feature of the ILM. On the other hand low turnover could simply be a sign that the matching process is very successful and little movement of workers among job is needed. (Jovanovic 191979a,b)

Doering and Piore’s conceptual model is based on local labor unions. In Sweden, from which our data is drawn, local unions have importance but are restricted by the central wage bargaining system (see below for a description). Lazear and Oyer 2002 conclude that, in the Swedish evidence, there are port of entry jobs and that the main influx of workers is at the lowest job ranks.

Gibbs, Ierulli, and Meyersson Milgrom (2002) find that changes in occupation and rank are associated with wage increases, while Ierulli and Meyersson Milgrom (2001) finds that promotion rates and turnover are very low. These findings are all seemingly consistent with ILM story.

In order to detect the boundaries of ILM, we need data that not only matches firms and workers but also covers a sector of the economy linked together. Yet conclusions about ILMs are being drawn based on data that cannot make this comparison. The search calls up the image of looking for a lost key in the night, but only under the street lamp. The nonexistence of relevant data has limited the vision of the scholars.

Baker et al 1994a,b and Baker and Holmstrom 1995 point to the importance of the interplay between careers and wages. Lazear 1992 defines promotions as movements from a job title with a lower average pay to a job title with a higher average pay

In Baker et al 1994a,b they use yearly patterns of job transitions to infer promotions. In that way they can identify career ladders.

Studies of US data have mostly focused on careers rather than wages by for instance Osterman 1979, Rosenbaum 1984, Bruderl et al 1991. In contrast, both career and wages for the period 1970-1990 were studied in Gibbons, Ierulli, and Meyersson Milgrom

(2002) using the Swedish wage data. The findings are suggestive about worker incentives, showing that individuals moving between firms and getting a promotion at the same time generated the highest pay-off, moving with the firm to a higher rank within the same occupation generated the second highest pay-off, while moving between occupations generated the lowest pay off.

The existence of ports of entries and fast tracks have been identified as indicators of ILM. Doering and Piore identifies the presence of jobs where most entry and exit into the firm occur. Neither Lazear (1992) nor Baker et al (1994a,b), finds much evidence of ports of entry and exit. In both firms substantial number enter at each level. (25% in Baker et al 's firms.) Exits are also spread evenly across levels. On the other hand the data reveal a very distinct and stable hierarchy with clearly identified career ladders. There are few lateral moves and essentially no demotions in the studies of the two U S firms. Kwon (1999) use the personnel records of insurance claim processors in a large U S company and find strong evidence for ports of entry. He also finds that workers productivity growth rate drops temporarily when they get promoted to a new job, suggesting the existence job specific human capital.

Lazear and Oyer (2002), using the same Swedish data as in the present study, find that there are ports of entry, and that these are clearly positioned at the lower levels of the hierarchy in the organization even though some inflow of employees can be traced at the top of the hierarchy. The findings cannot discriminate between the two models, tournament and human capital but confirming the tournament explanation for the ILM.

The findings cannot distinguish between the tournament and the human capital theory but confirm the importance of internal mobility as an important source of labor for higher level jobs in most firms. The study points to the importance of ILM given by the firm boundaries.

Waldman and Gibbons 2002 in their study of cohort effects on promotion and wage growth show that it matters at what level the workers come in at for future wage growth. When an Internal Labor Market is effective, its boundaries affect the ways in which workers are matched to jobs. These boundaries may be more or less fluid over time. Influence activities (Milgrom and Roberts 1987) or the social group processes argued by Doeringer and Piori (1985) and Lindbeck and Snower (1988) may affect how sensitive the boundaries are to changes in the external environment.

In a world that is constantly changing and where technology changes needs quick adjustment of organizational forms, it is important to understand how the boundaries of the ILM limit matching and whether these boundaries benefit workers. For example, what effect do they have on wages? If there is a constant change of the boundaries of ILM in response to the need to hire qualified outsiders, that is quite different from a rigid ILM in which all hiring is from within.

Baker and Holmstrom 1995 points to the importance that firms play serving as an important and distinct labor allocation function sorting out worker skills over time without being able to actually test the alternative hypothesis: that occupation irrespective of firms may be an important internal labor market, that is instead of looking for indications for firm specific skills, there may be occupation specific or just general skill irrespective of firms.[4]

The restrictions with the above mentioned follow up seminal studies of Doeringer and Piore's work are that jobs get grouped into aggregates that are potentially quite heterogeneous, and/or the boundary is already set: the firm boundary, so the actual competing hypothesis is not tested by taking the firm boundaries as given, and they are restricted to only one firm.

So the relevant questions are of course the original one: What are the boundaries of the career ladders? Are the boundaries of the career ladders restricted by firm boundaries or something else?

If the boundaries of the ILM are the same as the boundaries of the firm, then there is no path to higher pay by moving to an outside job, so one would expect firm specific capital to generate relatively high payoffs. Accumulating either general or occupation specific human capital would generate less pay off. This pattern would fit well with the tournament theory, in which we expect to find that all hiring from outside would occur at the lowest ranking jobs, in order to minimize the cost of providing incentives as well as Human capital theory.

If the boundaries of the ILM are set primarily based on occupation (for example, within a professional or craft community), then a worker's job opportunities are determined in large part by her qualifications to take outside jobs. Firm-specific human capital, as measured for example by tenure at a firm, would then be expected to have a relatively lower return compared to occupation tenure or general human capital, as measured by time in the labor market.

The institutional setting

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

[4] Seniority plays a subordinate role in fact even a negative tenure effect after initial years. But fast tract is clear (fast track found in Rosenbaum 1984)

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 Milgrom, Petersen and Snartland 2001,) small gender productivity gap Petersen, Snartland and Meyersson 2000,) and small reached gender rank gap (Petersen and Meyersson 1999, Meyersson Milgrom and Petersen 2000, SOU 1998).

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).(see more details below)

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 a 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 (2003) 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. The wage drift was enforced in the 80s by the possibility of contracting that ex post references contracts achieved wage increase would lead to retroactive increasing the agreed upon contract.

After 1983 the central wage bargaining system started to dissolve 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 Forslund 1990).

The Wage Negotiation System 1970-1990
In the beginning of the period of 1970-1990 SAF, SIF SALF and CF are the parties involved in the agreement on salaried workers. So for 1970-1974 they negotiated centrally an agreement lasting for 5 years. Whereas SAF and HTF concluded a three year settlement for the period 1970-1972[5]. This serves as an illustration that the negotiated length of a central agreement may differ for different workers and years. After 1975 PTK became an umbrella labor union cartel consisting of the major labor unions for white collar workers.

When a national salary agreement has been approved by the parties, employer and employees sector organizations it assumes the force of a collective agreement for individual sectors and consequently that of a collective agreement for member companies. Companies and local union branches then negotiate on the allotment of individuals salary increase in what are generally referred to as local negotiations. The clauses in the salary agreement governing the size of the salary increase have generally involved allotting the total amount available for increases partly to across the board increases and partly to a variety of kitties for individual allotment among all salaried workers a or among salaried workers in a given category, such as women or salaried workers in a specific occupational group. The agreements also included clauses on supplements for age and qualifications. A promotion supplement can be disbursed in relevant cases.

The BNT Coding
SAF (Swedish Federation of the Employers', SIF (the Swedish union of clerical and technical employees in industry), SALF (The Swedish Union of Foremen and Supervisors) , HTF (The Swedish Commercial Salaried Employees) and the CF (The Swedish Association of Graduate Engineers CF-STF) have developed a system for classifying salaried occupation Position classification system BNT. To facilitate the enumeration of the salary levels for different types of salaried work. The first edition was published in 1955. [6]

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[5] SAF (Swedish Federation of the Employers', SIF (the Swedish union of clerical and technical employees in industry), SALF (The Swedish Union of Foremen and Supervisors) , HTF (The Swedish Commercial Salaried Employees) and the CF (The Swedish Association of Graduate Engineers CF-STF).
[6] Since 1980 the statistics include members of companies of the SFO (the SFO Employer's Association) KFO (The cooperative Employers' Association) and K.A.B (the

Responsibility for updating the nomenclature and monitoring the proper implementation of the system is vested in the Committee for the classification of Salaried occupation with membership drawn from the parties on the labour market. In its capacity as an aid to the compilation of salary statistics the position classification system is designed to produce salary statistics reflecting the salary level for occupations of similar job content and degree of difficulty The system promotes as they suggest meaningful comparisons of the salary levels of individual groups of salaried workers companies labor market sectors etc.

The position classification system is founded on two basic criteria. The first is work performed (read types of tasks) and the second is degree of difficulty. Work performed is defined as a variety of operations such as designing, manufacturing, buying, and selling. And degree of difficulty is defined as the sum total of the requirements for a given job such as knowledge experience , creative effort, management with supervisory and financial responsibility, the nature and extent of contacts, and the diversity of the work performed.

Salaried occupations are classified exclusively on the basis of the work performed by a given salaried workers. It is the job content and the difficulty that are classified. The manner in which the salaried worker performs his duties or in other words the performance and skill exhibited by the salaried worker in his work should not influence the classification. Nor should formal merits such as education, period of employment and similar factors affect the classification.

The BNT system, the position classification system, is an aid for salary statistics. Correct coding of occupations is argued to be of vital importance for ensuring that salary statistics reflect the salary levels. salary trends and similar feature of different groups of salaried workers. For this reason the parties publicly endorsed the importance of consultations between the company and the local salaried workers union in mattes of classification. The agreements on statistics concluded between the SAF and the SIF SALF HTF and the CF on joint salary statistics site the forms for consultation in matters touching on approach documentation and intervals at which consultations are held. It was publicly announced that…" it is of cardinal importance that occupations are classified on the basis of objective and factual information the parties are in full agreement that consultations should not take the form of negotiations." And so for this reason such consultations did not take place at the same time as local salary negotiations.

Inspection of the central wage negotiating system and the occupation coding system were carried out by parties regularly in order to ensure that the salary statistics are as accurate ass possible. Both the labor unions and the employer federation conduct random sample checks. Each year experts from the national headquarters of the SAF and the salaried worker unions attend a large number of national consultation meetings at the instigation of the partied local level. These meetings were held when companies and local union branches fail to reach agreement on classification at local consultations.

Negotiation Organization of the Cooperative and Public Utility Housing Corporations of Sweden) and TA (the Swedish Newspaper Employers Association).

Other institutional aspects
Other interesting features of the Swedish welfare system were of labor market regulations, and the tax system .

There are laws regulating the work time, terms of firing, and working environment. Between 70 to 89% of all employees in Sweden are unionised during the examined period. For a more extensive overview of the Swedish labor market (see Ekberg 2003).

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 according 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 (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.(U.S. passed the first such legislation in 1993).

The 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 unionised the name of the union, and a detailed description of job content, usually a four-digit code. We shall refer to this job content information as occupational codes, although it might also be described as job titles. The occupational codes for the blue-collar workers are industry-specific and detailed, typically corresponding to the titles used in collective agreements. The white-collar occupations are less detailed, covering altogether 276-285 positions. Ten occupation areas (for instance, construction and design), and 51 broad occupational groups (for instance. construction work), with detailed information about task content are included. Each of the 51 groups are labelled occupation family and each code consists of 3 digits. Within each group a further distinction is made with respect to the level of difficulty in the job, a code that runs from 2 (high) to 8 (low), for our present purposes we have recoded it as 7 (low) to 1 (high) which we refer to as ranks. Not all occupations span the entire 7 ranks, some start higher than rank 1 and some do not have the top ranks. 5-7. The cross-classification of 51 occupational groups and 7 ranks yields 276-285 occupation-by-rank groups, which we refer to as occupations for short.[7]

The titles in the present data do predominantly indicate content of work, including aspects of the amount of responsibility involved, such as whether the incumbent is in a position of leadership or supervision. Within the restaurant business, for instance, there are 14 job titles, among them cook, cold buffet manager, cutter, and cook assistant. It is naturally a question of judgment when titles are too fine or too coarse. The equal pay laws require that likes should be treated alike. As long as the titles delineate differences in content of work and responsibilities, they are treated as unlike jobs. Note, however, that we show in section 5 that the occupation titles are not so fine as to rule out all wage differences.

The data for blue- and white-collar workers covers practically the entire occupational spectrum, including managers and professionals. Chief executive officers and members of executive teams are excluded. The system of white-collar occupation coding is the

[7] The white-collar workers' code system for occupations, the BNT-code, was developed first in 1955 and has been revised several times since (SOU 1993, p. 204). Its main purpose was to aid in the collection of wage statistics, not for setting wages individuals. It is not unlike the salary grade level structure in use in many large U.S. organization (e.g., Spilerman 1986), where a salary grade level indicates such things as the level of responsibility and qualifications associated with the position, but without a strong tie between the grade level and the actual salary itself, though a clear correlation exists.

same across industries while it differs for blue-collar workers. Although we are focusing white collar workers in this paper the whole data base is described in the overview of the data in Table 1.

TABLE 1. Description of data for blue, and white-collar workers in Sweden. 1970 – 1990

	Number of employed	Number of women	Number of men	Percent women	Number of occupations	Number of establishments	Number of occupations-establishment pairs	Number of industries	Total average wage	Average wage women	Average wage men
Year	1	2	3	4	5	6	7	8	9	10	11
Blue-collar workers											
1990	643 349	188 540	445 809	29.7	1 849	23 544	87 640	23	64.10	58.99	67.69
1985	626 601	179 235	447 366	28.6	2 070	24 165	89 334	22	44.60	41.08	46.01
1980	676 323	185 648	490 675	27.4	2 482	24 916	95 917	22	29.15	26.70	30.07
1978	646 466	167 589	478 857	25.9	1 926	23 939	94 401	20	26.05	23.79	26.83
1975	644 540	171 183	473 357	26.6	1 832	19 290	86 227	18	19.02	17.21	19.68
1970	583 963	139 146	444 817	23.8	1 438	18 049	80 592	19	11.25	9.70	11.74
White-collar workers											
1990	391 997	135 581	256 416	34.6	280	22 031	146 940	32	92.71	74.63	102.27
1985	380 513	124 423	256 090	32.7	279	20 669	145 070	32	63.03	50.03	69.35
1980	381 702	117 798	263 904	30.9	281	19 769	148 461	31	44.06	34.56	48.30
1978	367 207	110 460	256 747	30.1	271	18 457	144 309	34	37.19	28.93	40.74
1975	351 459	100 050	251 409	28.4	345	15 894	135 340	36	29.09	21.83	31.98
1970	299 154	73 318	222 472	24.8	256	13 779	108 121	40	17.09	11.46	18.94

Note: In 1990 643 349 blue-collar workers worked at 1 849 different occupations at 23 544 different establishments within the SAF domain. (Each union has its own classification of occupations.) [i] In this table wages are reported as pay per hour and in Swedish Kronor SEK.

Focusing on 1990, we have information on 643 349 and 391 997 blue- and white-collar employees respectively. Among the white-collar workers there were 280 occupations, 22 031 establishments, and 146 940 occupation-establishment units.

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. For white-collar workers pay are given as monthly pay in full-time equivalents.

Wages and Positions

One issue requires attention before we present our results. In Sweden, as in most European countries, firm-internal wage structures are quite rigid: Unlike the US, a fixed wage or salary is often attached to each position. Thus, one may be concerned that job categories are defined so narrowly that the job determines the wage, rendering wage discrimination impossible.

To check whether this problem was present in our data, we computed the percentage range in wages separately for each occupation and each occupation-establishment unit. First, we computed the ratio of the highest wage to the lowest wage in each occupation and each occupation-establishment unit, subtracting one and expressing the result in percentage terms. Then, we took the average of this percentage across all occupations and all occupation-establishment units. The wage range could be computed in many different ways. For our practical purposes and for the sake

of using all available information, we have chosen the computation based on maximum and minimum extreme values. We have made the same type of computations for the standard deviation and the coefficient of variation, with no differences with respect to the point to be made here. Some cells however did not contain enough individuals and hence decreased the total of information available.

The results are reported in Table 2, for white-collar workers in panel A respectively, separately for each year.

TABLE 2. Average Sample Range (as Percentage) of Hourly Wages Within Occupation and Occupation-Establishment for All and for Integrated Units

	Sample range (Percent)				Number of units(*N*)			
	Occupation		Occupation-establishment		Occupation		Occupation-establishment	
	All	Integ.	All	Integ.	All	Integ.	All	Integ.
Year	1	2	3	4	5	6	7	8
Panel A Blue-collar workers								
1990	93.96	110.06	19.94	28.10	1 728	1 202	54 933	16 704
1985	70.69	83.67	16.19	23.49	1 911	1 247	54 870	14 554
1980	80.06	110.28	17.37	25.00	2 209	1 182	59 187	14 197
1978	90.44	118.71	17.09	25.89	1 762	990	57 647	12 532
1975	146.22	208.33	27.29	42.95	1 669	936	53 517	11 436
1970	128.48	159.07	29.74	49.46	1 329	745	50 116	8 529
Panel B White-collar workers								
1990	296.41	315.85	24.14	34.71	276	251	58 341	16 416
1985	195.81	206.79	21.17	30.65	275	246	56 431	13 628
1980	204.46	222.05	20.15	29.02	276	232	56 831	11 890
1978	211.81	229.09	20.59	29.08	271	225	54 546	10 971
1975	217.24	247.67	24.49	34.58	336	263	50 612	9 907
1970	274.68	316.24	31.82	53.27	256	191	40 747	7 733

Note: The figures represent the average percentage ranges of wages at the occupation and occupation-establishment levels, calculated for occupations and occupation-establishment pairs with two or more employees. Separately for all units and for integrated units. We first computed how many points the highest wage was above the lowest wage in each occupation and each occupation-establishment pair. Thereafter we took the average of this percentage across all occupations and all occupation-establishment pairs.

Let us first select a row from the table and interpret the result. The numbers among white-collar employees were 24 percent and 35 percent. This means that the best paid person on average earned 20-35 percent more than the lowest paid person, in the occupation and establishment, a considerable range, especially for an egalitarian state such as Sweden.

Among white-collar workers, the range at the occupation level declined from 1970 to 1985 but increased in 1990, when it reached a higher level than in 1970. At the occupation-establishment level, the range among white-collar workers, the range at the occupation-establishment level declined from 1970 to 1980 but increased in 1985 and 1990, when it reached a higher level than in 1975 but not as high as in 1970. At both levels and for the white collar workers there are thus first a decrease and then an increase in the range of wages.

Results

Table 3(1) Ports of Entry within Occupation and within Firm

(year=1988)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	2440	1928	558	0.624	0.457	0.167	0.658	0.457	0.201	0.093	0.082
2	15156	12403	2983	0.648	0.446	0.202	0.630	0.446	0.184	0.091	0.077
3	53237	43633	10776	0.615	0.405	0.210	0.589	0.405	0.184	0.092	0.109
4	109107	91639	24255	0.476	0.289	0.187	0.445	0.289	0.156	0.088	0.280
5	108208	94393	26300	0.343	0.177	0.167	0.284	0.177	0.107	0.074	0.475
6	60580	54039	16890	0.240	0.066	0.174	0.134	0.066	0.068	0.080	0.613
7	7357	6875	2316	0.122	0.033	0.089	0.063	0.033	0.031	0.055	0.792

(year=1978)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	2950	2590	486	0.615	0.399	0.216	0.498	0.399	0.099	0.027	0.259
2	14063	12132	2232	0.714	0.504	0.209	0.614	0.504	0.110	0.042	0.135
3	42777	36780	6877	0.726	0.495	0.230	0.601	0.495	0.106	0.040	0.128
4	95477	84177	14588	0.640	0.391	0.250	0.485	0.391	0.094	0.040	0.225
5	101159	91255	16413	0.498	0.280	0.218	0.351	0.280	0.071	0.034	0.397
6	71665	64896	13057	0.430	0.167	0.262	0.211	0.167	0.044	0.045	0.482
7	20850	19444	4380	0.241	0.041	0.200	0.071	0.041	0.030	0.050	0.679

Note : rank: 1(=highest) – 7(=lowest). Column 1.shows the number of white-collar employees (N), Column 2 shows number of employees who stay at the same job (stay) at the 4-digit level within the same occupation family and at the same firm compared to the previous year. Column 3 shows number of employees that have changed either their occupation or their firm compared to the previous year (Import). Column (6) can be read as follows, in 1988 16.7 % of new hiring into rank 1 from a particular occupation family was hired from within the same firm but from a different occupation family. Rank 1 in 1978 shows significant number of hiring from "new", defined as those who appeared in the dataset for the first time. This must be due to some "data problem".

In order to capture the boundaries of career ladders and patterns by focusing on firm hiring strategies we can test the port of entry prediction from the ILM literature. We measure the source of import, that is the number of employees that have changed their occupation family and/or their firm compared to the previous year recruited for a particular occupation and rank. [8]

Table 3 shows that there are ports of entry both within an occupation and within a firm. In high ranks, when firms fill in a specific job, they import mainly from the same occupation family, and also from within their firm boundaries. However, the ports of entry are not as well defined as the textbook case. Even at the highest rank, in 1988, 38% are hired outside firms and 34% are hired outside occupation. (see Lazear and Oyer 2002 for similar results on outside hiring. Compared with 1978, "within firm"

[8] In the analysis we have excluded employees in firms that ceased to exist in the sample, or employees in firms that merged or were split, i.e. where a group of workers were taken over by a new legal owner as a separate entity.

hiring ratio (column [4]) has decreased in 1988. On the other hand, "within occupation" hiring ratio (column [7]) has slightly increased. This suggests that the importance of occupation boundary relative to firm boundary has increased over time.

"Within firm outside occupation" hiring ratio (column [6]) has its peak at rank 3. This suggests that the importance *firm-specific human capital* is highest at the middle ranks. This supports some of Zuckerman finding that the middle range employees are more loyal to the firm that the top and bottom rank employees (Philips and Zuckerman 2001).

"Within occupation and outside firm" hiring ratio (column [9]) increases significantly with rank. This suggests that the importance of *occupation-specific human capital* is more important at higher ranks. Thus, firms are relatively more willing to hire someone outside firm but within the same occupation family than hire someone within the same firm but from a different occupation family. This could suggest that occupation family bares some signaling information about the ability of the employee. If you hire someone from the outside one way of decreasing the uncertainty is to at least go for the occupation information that is know to everyone in the BNT coding system.

"Outside occupation outside firm" hiring ratio (column [10]) does not change much with ranks. This suggests that the relative importance of *general human capital* in hiring to different occupation and ranks are constant across different ranks.

Firms do not usually hire from "outside occupation outside firm". This suggests that most of the occupation changes happen within a firm boundary!

In Table 4 we do the same exercise as in Table 3 but for different sizes of firms. The results show that in large firms, the ports of entry within a firm boundary are very well defined. Furthermore employers in large firms fill in a job with their own employees, and they do not hesitate to recruit from different occupation families within the firm rather than hiring from outside the firm but within the occupation family. However, at the highest rank, even the large firms hire more from the "within occupation outside firm" than "within firm outside occupation".

Medium-sized firms hire much more outside their firm boundary than large firms. However, this tendency is mostly "outside firm within occupation family" hiring. This suggests that for medium-sized firms, the occupation boundary are more important than firm boundary .[9]

[9] From the workers' perspective, this table suggests that if they start their career in a small firm, they are more likely to get stuck with the starting occupation. The reason is as follows: within a small firm, it is difficult to change the occupation, because it would hire someone in the outside firm but within the same occupation family. Thus, to change occupation, workers have to move to a large firm. However, a large firm do not hire from the outside a firm. Therefore, if workers start from a small firm, it is difficult to change the occupation. This result may have some interesting implications for the gender effect on rank since women seem to end up where there are fewer top ranks and fewer top ranks are often associated with smaller firms..

Table 4(2) Ports of Entry and Firm Size

(year=1988, firm size>5000)

				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	301	265	37	0.730	0.541	0.189	0.757	0.541	0.216	0.027	0.027
2	1441	1233	211	0.900	0.583	0.318	0.640	0.583	0.057	0.028	0.014
3	5562	4735	866	0.814	0.524	0.290	0.611	0.524	0.087	0.054	0.045
4	10003	8594	1830	0.671	0.402	0.269	0.457	0.402	0.055	0.044	0.230
5	5979	5256	1466	0.433	0.188	0.245	0.214	0.188	0.025	0.035	0.507
6	2674	2386	542	0.476	0.100	0.376	0.118	0.100	0.018	0.037	0.469
7	387	370	95	0.168	0.011	0.158	0.011	0.011	0.000	0.011	0.821

(a) Large Firms

(year=1988, 500<firm size<1000)

				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	411	321	100	0.580	0.430	0.150	0.670	0.430	0.240	0.080	0.100
2	2235	1826	443	0.639	0.418	0.221	0.605	0.418	0.187	0.097	0.077
3	6807	5631	1313	0.619	0.406	0.213	0.590	0.406	0.184	0.092	0.104
4	14292	12098	3089	0.466	0.285	0.181	0.446	0.285	0.161	0.084	0.290
5	13099	11473	3114	0.361	0.170	0.191	0.269	0.170	0.099	0.062	0.478
6	7311	6543	1881	0.275	0.066	0.208	0.135	0.066	0.068	0.065	0.592
7	613	571	208	0.159	0.058	0.101	0.072	0.058	0.014	0.029	0.798

(b) Medium-sized Firms

(1978: firm size>5000)

				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	446	400	52	0.885	0.500	0.385	0.500	0.500	0.000	0.000	0.115
2	1864	1589	287	0.930	0.624	0.307	0.641	0.624	0.017	0.010	0.042
3	5729	4799	967	0.945	0.641	0.304	0.648	0.641	0.007	0.009	0.038
4	12159	10338	2135	0.816	0.468	0.348	0.489	0.468	0.021	0.016	0.147
5	7554	6439	1643	0.656	0.340	0.315	0.351	0.340	0.010	0.013	0.321
6	4574	3921	871	0.728	0.318	0.410	0.328	0.318	0.010	0.011	0.250
7	1652	1505	270	0.496	0.044	0.452	0.063	0.044	0.019	0.030	0.456

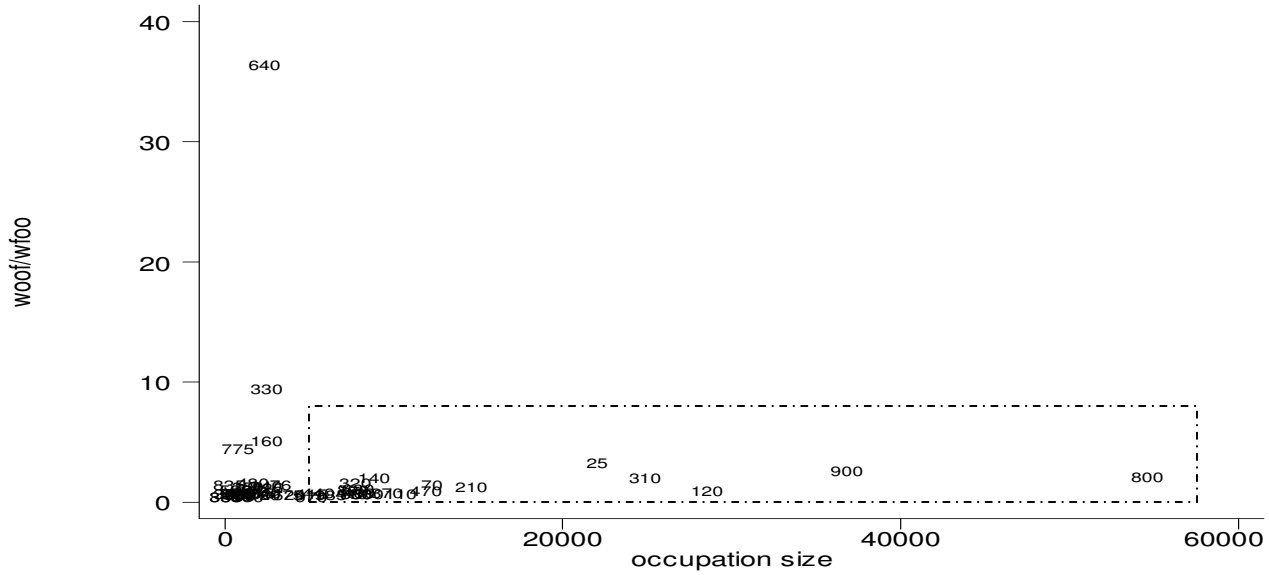
(c) Large Firms in 1978

(1978: 500<firm size<1000)

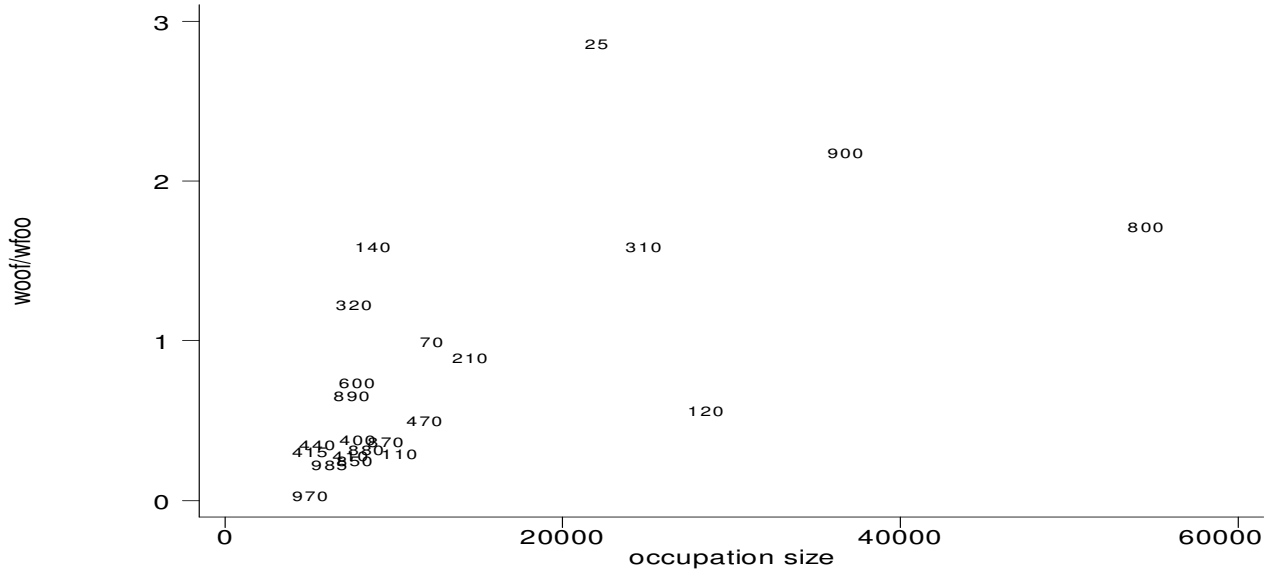
				within firm			within occupation			outside occup.	
rank	N	stay	import	total	within occup.	outside occup.	total	within firm	outside firm	outside firm	new
1	532	459	93	0.731	0.516	0.215	0.559	0.516	0.043	0.011	0.215
2	2403	2088	366	0.760	0.544	0.216	0.607	0.544	0.063	0.038	0.139
3	7106	6177	1061	0.793	0.539	0.254	0.585	0.539	0.046	0.037	0.124
4	13700	12147	1979	0.692	0.400	0.292	0.459	0.400	0.059	0.034	0.215
5	11807	10725	1721	0.557	0.288	0.269	0.331	0.288	0.043	0.028	0.371
6	8947	8232	1311	0.493	0.195	0.298	0.227	0.195	0.032	0.021	0.455
7	2122	1999	370	0.273	0.019	0.254	0.038	0.019	0.019	0.041	0.668

(d) Medium-sized Firms in 1978

Figure 1 "Within Occupation Outside Firm" or "Within Firm Outside Occupation" (Year=1988)



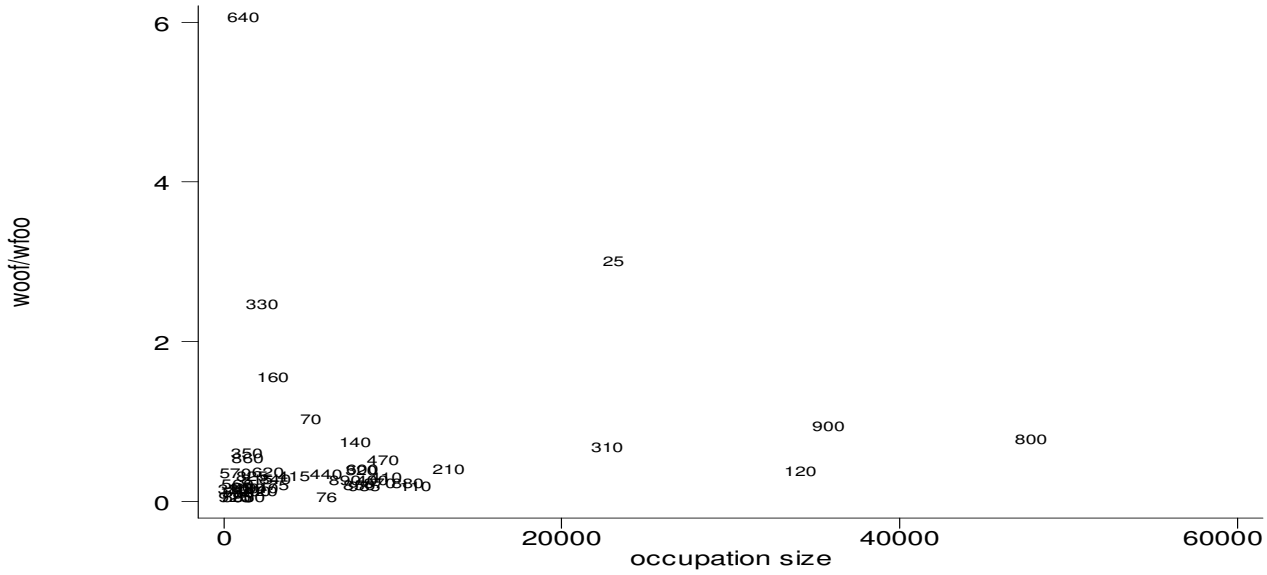
(a) For all occupations



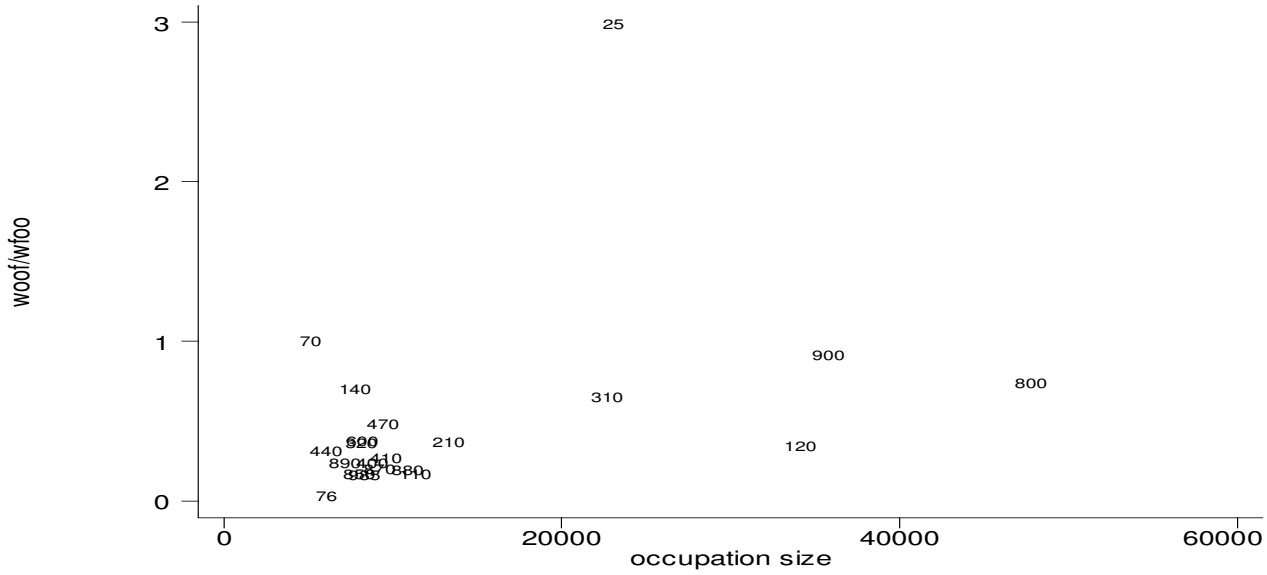
(b) For occupation size > 5000.

woof/wfoo= "within occupation outside firm hiring"/ "within firm outside occupation hiring" (average for the top four ranks)
Occupation size: Total number of employees in an occupation.

Figure 2 "Within Occupation Outside Firm" or "Within Firm Outside Occupation" (Year=1978)



(a) For all occupations.



(b) For Occupation Size >5000

woof/wfoo= "within occupation outside firm hiring"/ "within firm outside occupation hiring" (average for the top four ranks)
Occupation size: Total number of employees in an occupation.

It is clear from Table 3 and 4a and b that firm, occupation specific skill and general human capital is important when firm hires. Are some occupations more exclusive then others in the sense that some occupations determine the hiring practices?

In Figure 1 we present to what extent employers fill in a job (within the top 4 ranks) from "within occupation family but outside firm" or from "within firm but outside occupation family". There is large heterogeneity among occupation. For example, in occupation family 640 (Medical Care), hiring "within occupation family but outside firm" is 37 times more likely than "within firm but outside occupation family". In occupation family 330 (Architectural Work), it is 10 times more likely.

This suggests that the importance of the occupation-specific human capital is different depending on the occupations. That is, for some occupation, the occupation boundary is more important than the firm boundary. While in other occupations, the reverse is true.

Figure 1(b), focusing on occupation with more than 5000 employees in the sample, shows more details. Again we see large heterogeneity regardless of the size of occupation. For example, in occupation family 900 (Financial Administration), 800 (Marketing and Sales), 310 (Mechanical and Electrical Design Engineering), the occupation boundary appears to be relatively more important than the firm boundary. On the other hand, in occupation family, 110 (Administration of Local Plants), 870 (Buying), 400 (Production Engineering), the firm boundary appears to be more important than the occupation boundary.

The figures above can be misleading, however, because they do not control for firm size. That is, small firms have to hire more from the outside even if they hire randomly. Also the figures do not control for ranks.

In Table 5 we present results from a multinomial regression with the variables firm size, occupation size, ranks, occupation families, industry. This regression estimates the relative probability of different combination of hiring practices against the bench mark the "within firm outside occupation" hiring. That is for a specific job j, the relative probability of using a hiring strategy is

$$\ln\left[\frac{P_{jk}}{P_{j0}}\right] = \beta_{k0} + \beta_{k1} firmsize_i + \beta_{k2} occupationsize_i + \beta_{k3}^{'} rankdummy_i + \beta_{k4}^{'} occupationdummy_i$$

(k 0= "within firm outside occupation", 1= "within firm within occupation" , 2="outside occupation outside firm", 3 "outside firm within occupation", 4 = "new entrants".
Column [1] shows that conditional on within firm hiring, the relative probability of within occupation hiring over outside occupation hiring. If this probability becomes larger, one can interpret that the occupation-specific human capital becomes more important relative to general human capital but still under the condition that it is firm bounded.
The results show that given within firm hiring: (i) Larger firms are less likely to hire within occupation. (ii) If the occupation size is large, it is more likely to hire from the same occupation. (iii) At higher ranks, it is more likely to hire from the same occupation.
Thus conditioned on within firm hiring, the occupation-specific human capital is more important in smaller firms and at higher ranks, consistent with the results in table 3 and 4.

In Table 5 Column [2] we present the results from the comparison where conditional on outside-occupation hiring, the relative probability of outside-firm hiring over within- firm hiring. If this probability becomes larger, one can interpret that the firm-specific human capital becomes *less* important (relative to general human capital).

We find that conditioned on outside occupation hiring: (i) Large firms are less likely to hire outside firm. (ii) If the occupation size is large, it is less likely to hire from outside the firm. (iii) At higher ranks, it is more likely to hire from outside the firm.
Thus, the firm-specific human capital is more important in larger firms and at lower ranks.

Column [3] shows the probability of "within occupation outside firm hiring" relative to "within firm outside occupation hiring". If this probability becomes larger, one can interpret that the occupation-specific human capital becomes relatively more important than firm-specific human capital.

We find that: (i) Large firms are more likely to hire "within firm outside occupation". (ii) If the occupation size is large, it is more likely to hire "within occupation outside firm". (Signalling and information quality goes up) (iii) Employers hiring to higher ranks, are more likely to hire "within occupation outside firm".

Thus, the occupation specific human capital is relatively more important than the firm-specific human capital in smaller firms and at higher ranks. The occupation boundary becomes relatively more important that the firm boundary in higher ranks and in smaller firms. The results do differ from year 1978 and 1988. The openness toward hiring from outside the firm and outside the occupation and especially to top ranks have increased over time. The results are consistent with the results in Table 3

Table 5 Hiring Strategy
(multinomial regression)

Comparison Group="within firm outside occupation"

	within firm within occupation	outside occupation outside firm	outside firm within occupation	new entrants
	[1]	[2]	[3]	[4]
firm size	-0.0000231	-0.0002243	-0.0002383	-0.0001084
	(5.21e-06)	(0.0000112)	(0.0000097)	(0.00000539)
occup size	0.0004693	-0.0000935	0.0002853	-0.0001137
	(0.0000384)	(0.0000425)	(0.0000499)	(0.0000306)
rank=1	2.947361	-0.1772031	1.781516	-3.015898
	(0.1895806)	(0.2142904)	(0.2064345)	(0.2003802)
rank=2	2.534875	-0.3990887	1.312501	-3.221039
	(0.1491616)	(0.1416348)	(0.1563103)	(0.1122369)
rank=3	2.266279	-0.4425882	1.163831	-3.221039
	(0.1424322)	(0.1261102)	(0.1469907)	(0.0876209)
rank=4	1.917298	-0.3660958	1.0184	-2.239546
	(0.1407882)	(0.1220815)	(0.1447368)	(0.0813076)
rank=5	1.398729	-0.4374904	0.7052812	-1.472422
	0.1399998	(0.1206083)	(0.1438556)	(0.0795854)
rank=6	0.2041904	-0.420515	0.1491211	-1.094481
	(0.1407125)	(0.1197128)	(0.1441272)	(0.0785774)

(a) Year=1988

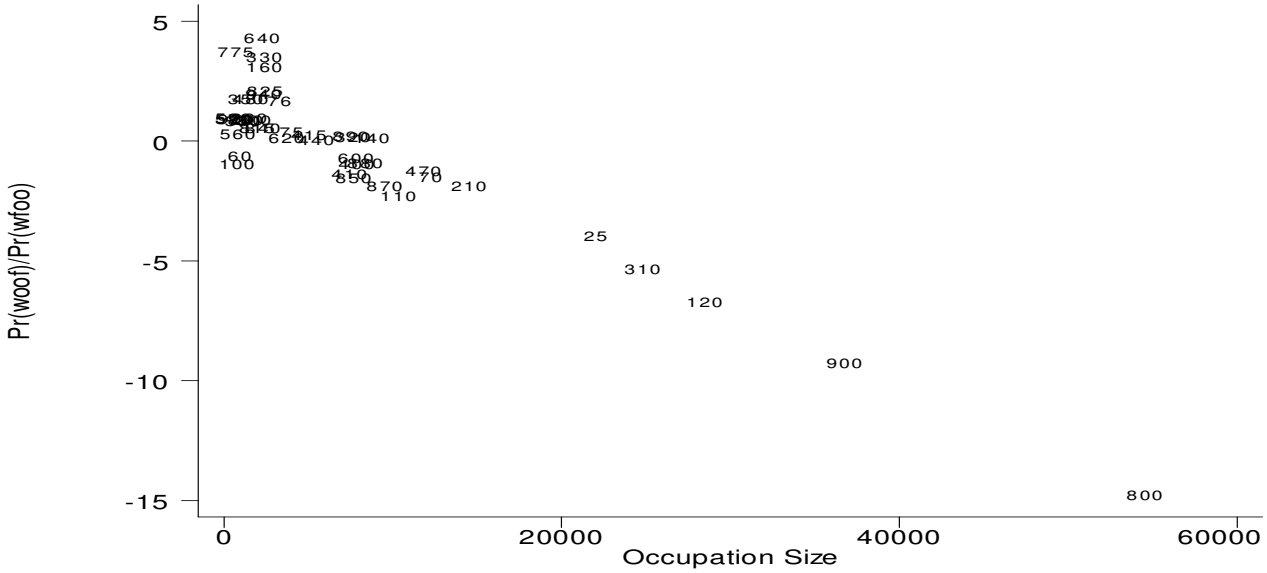
Comparison Group="within firm outside occupation"

	within firm within occupation	outside firm within occupation	outside occupation outside firm	new entrants
	[1]	[2]	[3]	[4]
firm size	-0.0000214	-0.0002665	-0.0002518	-0.0001202
	(0.00000436)	(0.0000112)	(0.0000151)	(0.00000498)
occup size	0.0003179	0.0002839	-0.0000451	0.0000297
	(0.0000258)	(0.0000435)	(0.0000421)	(0.0000218)
rank=1	3.151636	1.983722	-0.6746968	-0.8210483
	(0.1556294)	(0.2106102)	(0.3129496)	(0.1457934)
rank=2	3.212446	1.88942	-0.2467825	-1.610709
	(0.1062332)	(0.13447)	(0.1500634)	(0.0906787)
rank=3	2.974731	1.629984	-0.3848225	-1.847037
	(0.0941732)	(0.1157169)	(0.1146515)	(0.0649778)
rank=4	2.506228	1.330952	-0.4496882	-1.475473
	(0.0907203)	(0.1097154)	(0.1015294)	(0.053607)
rank=5	2.170712	1.073558	-0.4875138	-0.7731818
	(0.0895733)	(0.1076204)	(0.0979201)	(0.0500058)
rank=6	1.360929	0.3004288	-0.3933237	-0.6297751
	(0.0883299)	(0.1073009)	(0.0918988)	(0.0469172)

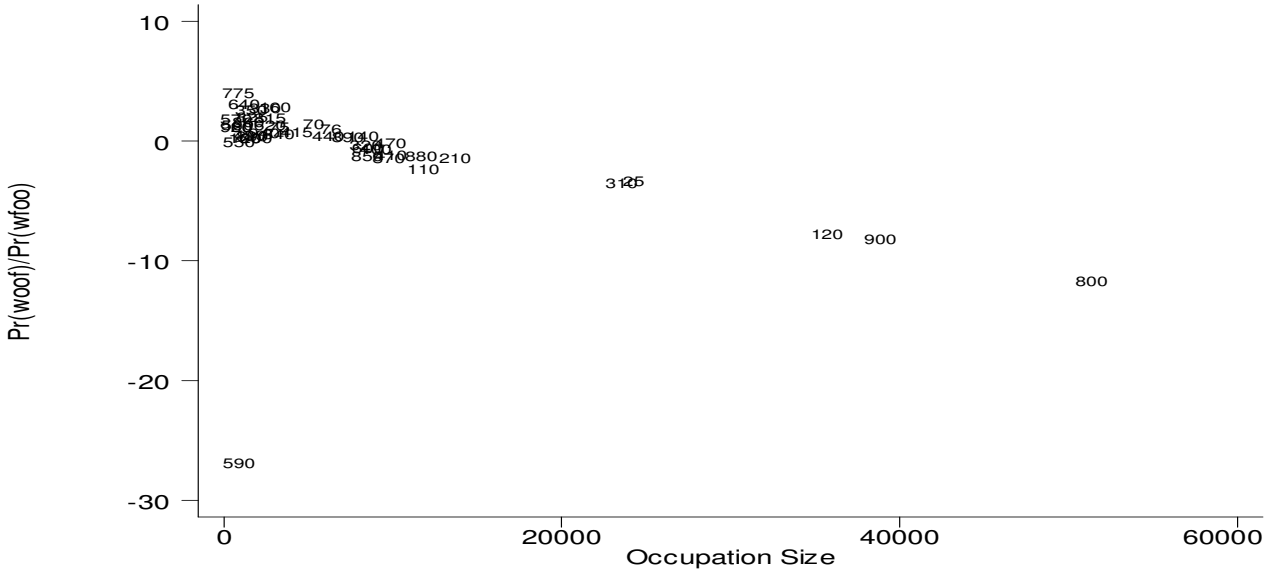
(b) Year=1978

Note: All regressions include occupation dummies. How to read the tables, Column [1] shows, conditional on within firm hiring, the relative probability of within occupation hiring over outside occupation hiring. If this probability becomes larger, one can interpret that the occupation-specific human capital becomes more important (relative to general human capital?).

Figure 2a,b "Within Occupation Outside Firm" or "Within Firm Outside Occupation"



(a) Year=1988



(b) Year=1978

Figure 2a,b show the coefficients of the occupation dummies from regression [3] in Table 5 with its occupation size. This figure is comparable to Figure 1. Unlike Figure 1, in this figure we control for firm size and ranks.

The occupation groups 640, 775, 330, are occupation family that employers would hire from "outside firm but within occupation" rather than hire then from "within firm outside occupation". However, after controlling for firm size and ranks, the occupation 800 and 900 have the least such a tendency. (We are a bit troubled by the apparent linear relationship with the occupation size in the graphs, even though the regression controls for the occupation size. We will look into that.)

Even when a firm hires from outside an occupation, if it hires only a small fraction from the outside does this mean that the occupation-specific human capital is not important for that particular occupation? To capture the exclusiveness in hiring strategy for a particular occupation family, we consider the occupation composition of new hirings into each occupation group and measure the distance of such a composition from the economy average occupation composition. We construct an "exclusiveness" measure for occupation family j at time t, defined as $S_{jt} = (s_{1jt},...,s_{51jt},s_{52jt})$ where s_{ijt} is the number of workers who moved from occupation i to occupation j at time t divided by the total number of workers who moved to occupation j at time t, that is, $s_{ijt} = \frac{import_{ijt}}{import_{jt}}$. There are 51 different occupation families (i=1,..,51) and new entrants (i=52). Also define $S_{ot} = (s_{1ot},...s_{51ot},s_{52ot})$ where s_{iot} (i=1,..,51) is the occupation i's share of (white collar) employees in the economy at time t except for new entrants, and s_{52ot} is the share of the entrants at time t. Then, we define the hiring exclusiveness measure as follows:

$$\text{Hiring Exclusiveness} = \left\| S_{jt} - S_{ot} \right\| = \sum_{i=1}^{52} (s_{ijt} - s_{iot})^2$$

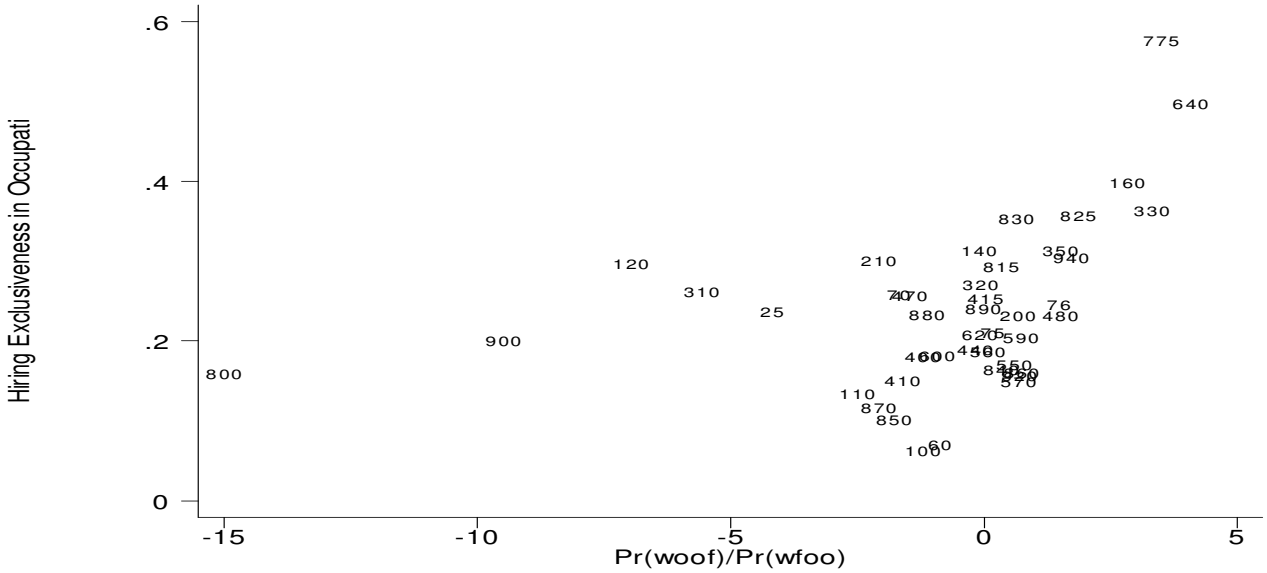
If a firm hires randomly regardless of the occupation, then this measure should be zero. If a firm's hiring is concentrated in a few occupation families, then this measure increases.

Figure 3 shows that the occupations with large probability of within occupation outside firm hiring (woof) relative the probability of within firm outside occupation hiring(wfoo) Pr(woof)/Pr(wfoo) in general, have larger exclusiveness in hiring. One can say that the occupation-specific human capital is important in an occupation with high degree of exclusives and large Pr(woof)/Pr(wfoo) ratio.

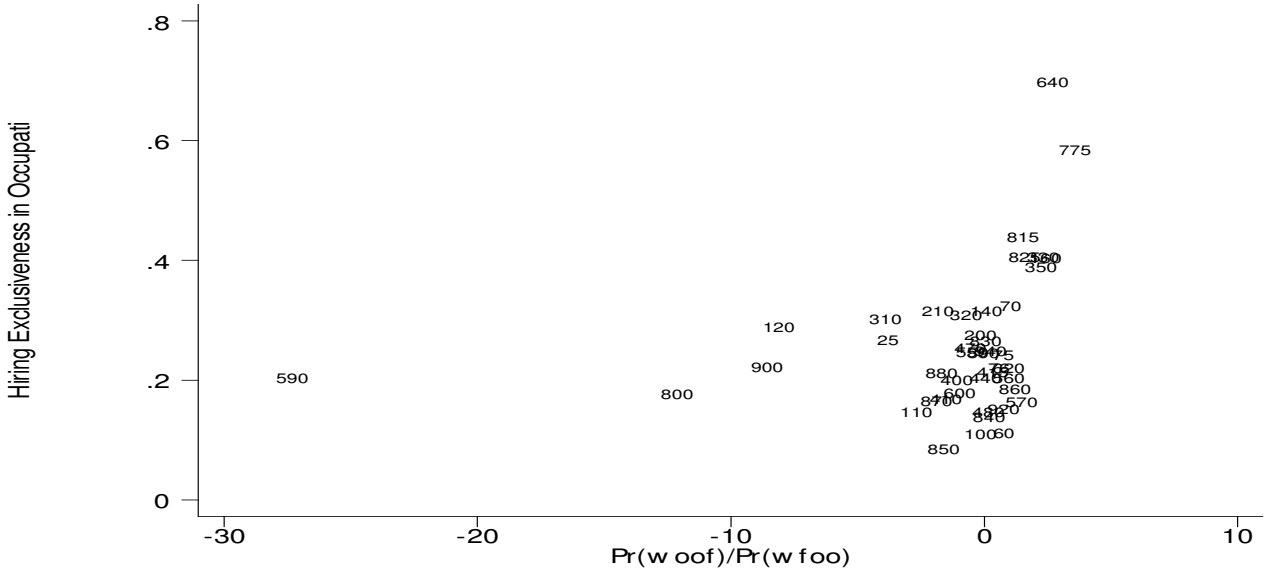
Figure 3 also shows that there is large heterogeneity in degree of exclusiveness between occupation families even after controlling for Pr(woof)/Pr(wfoo) ratio. For example, both occupation family 210 (laboratory work) and 870 (purchasing) have the similar Pr(woof)/Pr(wfoo) ratio. Occupation family 210 has higher exclusiveness measure, implying that occupation 210 imports workers from a small group of occupation families, while occupation 870 imports workers from a larger pool of occupation families.

We find very little changes in degree of exclusiveness comparing the stability of occupation degree of exclusiveness for 1978 with 1988. There are some exceptions group 986 for instance has increased its exclusive given a certain within occupation hiring ratio.

Figure 3 Hiring Exclusiveness in Occupation



(a) Year=1988



(b) Year=1978

Table 6 Wage Regression I
(dependent variable=log(wage))

	[1]	[2]	[3]	[4]
age	0.0080941	0.0054507	0.0083182	0.005423
	(0.0000581)	(0.0000383)	(0.0000556)	(0.0000383)
tenure	0.0268526	0.0099108	0.0232634	0.0095305
	(0.0003398)	(0.0002243)	(0.0003168)	(0.0002172)
otenure	0.0034082	0.0018121	0.004035	0.0018012
	(0.0003095)	(0.0002019)	(0.0002894)	(0.0001965)
ftenure	-0.0191419	-0.0089298	-0.0160731	-0.008021
	(0.000311)	(0.0002039)	(0.0002898)	(0.0001974)
fsize	0.00000165	-0.00000369	0.00000151	-0.00000215
	(0.000000308)	(0.000000201)	(0.000000289)	(0.000000197)
female	-0.2140508	-0.089814	-0.1885569	-0.0768281
	(0.0011579)	(0.0008083)	(0.0013081)	(0.000925)
exclusiveness	-0.4754883	-0.1930221		
	(0.0079617)	(0.0052261)		
rank=1		1.179455		1.139493
		(0.0064068)		(0.006251)
rank=2		0.91582		0.8790123
		(0.0031817)		(0.003208)
rank=3		0.6461288		0.6103561
		(0.0024838)		(0.0025647)
rank=4		0.3906374		0.3586115
		(0.0023106)		(0.0023898)
rank=5		0.2199793		0.1925438
		(0.0022631)		(0.002319)
rank=6		0.0816843		0.0655012
		(0.0022976)		(0.0022866)
rank=7				
occupation dummy	no	no	yes	yes
industry dummy	yes	yes	yes	yes
town dummy	yes	yes	yes	yes
adjusted R-squ	0.356	0.726	0.449	0.746

Note: Employees who have entered the dataset before 1976 are excluded.
Otenure=occupation tenure
Ftenure=firm tenure. This measure is adjusted for merger and split. Using unadjusted firm tenure does not change the qualitative results.

The second explanation for ILM and firm boundaries for career ladders are the tournament idea. The idea being that firms do hire from within in order to create incentive for employees at all different hierarchical levels. The predictions from this theory is that firm specific capital would generate better pay than general human capital or occupation specific human capital.

In Table 6 we exhibit a following regression capturing the relative influence of occupation family tenure (3-digit) to firm tenure and work force tenure (defined the number of years in the sample starting at 1976 as the base year) on pay.

$$\ln(wage) = \beta_0 + \beta_1 age + \beta_2 tenure + \beta_3 otenure + \beta_4 ftenure + \beta_5 fsize + \beta_6 exclusiveness + (rankdummies) + (occupationdummies) + (industrydummies) + (towndummies)$$

The results of the wage regression suggest that the labor market tenure (a proxy for the general human capital) is the most important factor determining the pay. The second most important variable is the occupation tenure (a proxy for a occupation-specific human capital). The firm tenure (a proxy for the firm-specific human capital) has negative coefficient.

The positive and significant coefficient of occupation tenure (even after controlling for the age and the general tenure) points to the relative importance of occupation-specific human capital.

The negative coefficient of firm tenure is not surprising because the firm does not have to compensate for the firm-specific human capital. Recall that the firm specific human capital is not useful for the other firms. Thus, it does not raise the employee's market wage.

The negative coefficient of the firm tenure (when we do not control for the ranks) is consistent with the firm-specific human capital story of internal labor markets, but it is not consistent with the tournament story of the internal labor market. In order to provide incentives firm tenure should be positive not negative.

The degree of exclusiveness measure has a negative and significant coefficient. One interpretation could be that since workers in an exclusive occupation do not have much outside options, they are paid less. This suggests that the employers have more bargaining power. If the employees would have had more bargaining power, then this coefficient should be positive.

Does firm size influence the effect of occupation tenure, firm tenure and general labor market tenure on pay? We have seen that hiring practices differ between large and smaller firms. In Table 7 we show how firm size interact with the relative importance of occupation, firm and general labor market tenure.

In Table 7 Column [1] we have included the interaction terms between firm size and occupation tenure, labor market tenure and firm tenure. The results show that the effect of general tenure (number of years in the sample, 1976 as starting year) on pay increases with firm size. On the other hand, the effect of firm size on occupation tenure and firm tenure is not significant. Thus, the occupation-specific human capital becomes relatively less important in a large firm. This is consistent with our previous results based on the hiring strategy.

Column [2]-[5] in Table 7 include only the top four ranks. The size of the occupation tenure coefficient relative to the size of the general tenure coefficient has increased when we look at the

top four ranks only. This suggests that the occupation-specific human capital becomes relatively more important at higher ranks. This is also consistent with our previous results. [10]

Table 7 Wage Regression II

	[1]		[2]		[3]		[4]		[5]	
	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.	coef	s.e.
age	0.008322	5.56E-05	0.008313	8.96E-05	0.008308	8.96E-05	0.00525	6.65E-05	0.005249	6.65E-05
tenure	0.022263	0.000345	0.014859	0.000413	0.013747	0.000458	0.008454	0.000303	0.008311	0.000336
otenure	0.004425	0.000323	0.003276	0.000378	0.003457	0.00043	0.001463	0.000277	0.001607	0.000315
ftenure	-0.016494	0.000315	-0.011022	0.000364	-0.011027	0.000399	-0.007744	0.000266	-0.007706	0.000293
tenure*fsize	1.21E-06	1.97E-07			1.24E-06	2.30E-07			1.52E-07	1.69E-07
otenure*fsize	-1.78E-07	1.47E-07			1.92E-08	1.75E-07			-1.22E-07	1.28E-07
ftenure*fsize	2.06E-07	1.96E-07			-2.98E-07	2.22E-07			-7.14E-08	1.62E-07
fsize	-4.84E-06	5.00E-07	-4.09E-07	3.78E-07	-6.16E-06	7.37E-07	-1.43E-06	2.77E-07	-1.36E-06	5.40E-07
female	-0.188425	0.001307	-0.116585	0.002221	-0.11652	0.00222	-0.067214	0.001636	-0.067227	0.001636
rank=1							0.768066	0.006159	0.768084	0.00616
rank=2							0.509025	0.002401	0.509025	0.002401
rank=3							0.242721	0.001255	0.242715	0.001256
rank=4										
occupation dummy	yes		yes		yes		yes		yes	
industry dummy	yes		yes		yes		yes		yes	
town dummy	yes		yes		yes		yes		yes	
adjusted R-square	0.45		0.31		0.31		0.63		0.63	

Column [2]-[5] includes only those in the top four ranks.

Conclusions

In the present paper we study the employers' hiring strategies and how these influence white-collar workers' wages in Swedish privately held firms for the two years 1978 and 1988. We evaluate the extent to which employers hire from within the firm and/or within a occupation family. The results from the analysis show the following findings.

Interpreting years of experience within a firm, occupation, or career as measures of firm-specific, occupation-specific, and general human capital, we find (in Table 3(1)) that occupation-specific and firm-specific capital are of similar importance for explaining hiring decisions. Occupation-specific skills are more important in smaller firms (Table 4) than in larger ones, and become more important at higher ranks (Table 5). Occupation-specific skills were more important for explaining hiring decisions in 1988 than in 1978. (Table 5)

[10] Including part time workers and using a part time dummy did not change the result (not reported here)

There is also heterogeneity among occupation families in the relative importance of occupation specific capital. Occupation specific skills are very important for the groups: medical, architecture and restaurants. We call such occupations "exclusive."

The data show that the more exclusive a particular profession, the lower the pay (Table 6). One explanation for this correlation could be that the employer has all the bargaining power, the employee very few outside options. Worker within the private medical have few options but the government controlled sector where pay on average is lower than in the private sector.

Occupation tenure has a positive and significant effect on the pay, controlling for age, general human capital and firm tenure firm, firm size, gender, occupation family and rank, industry and year (Tables 6 and 7). In contrast firm tenure has a negative effect on pay. In some industries, such as the restaurant industry, general human capital has a larger effect on wage rather than occupation specific capital. This finding can be due to the cut of point of 1976 as the starting point for generating general human capital in the sample.

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