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ABSTRACT

The Glass Door: The Gender Composition of Newly-Hired Workers Across Hierarchical Job Levels*

This paper examines the gender composition of the flow of new hirees along the organizational hierarchy of jobs. We find that women have a reduced chance to be hired at higher hierarchical levels. We refer to this phenomenon as the "glass door". The glass door consists of an absolute and a relative effect. First, there is a reduced probability of women being recruited for jobs at higher hierarchical levels. Second, a larger fraction of jobs below the focal level of hiring within the firm reduces the relative inflow of female hirees. The latter component leads women moving to firms in which the job has a lower relative position in the hierarchical structure. We explain the glass door phenomenon by a theoretical model of the firm's decision to hire a woman. The model is based on two key assumptions. First, women have a higher probability of leaving due to their higher valuation of non-market activities. Second, a voluntary quit leads to a larger decrease in the production of lower level co-workers when the worker who leaves has a position in the upper tier of the hierarchy. The glass door implies that the value of women's outside option in the labor market is lower. It may provide an additional explanation of why a glass ceiling can be sustainable as an equilibrium phenomenon.

JEL Classification: J16, J23, J41, J63, M51

Keywords: hiring, hierarchies, glass door, gender, outside option

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1. Introduction

In the last decade, many studies have addressed the possibility that female employees face a "glass ceiling" from their position in the labor market (e.g. Baxter and Wright, 2000; Reskin and Padavic, 2002; Albrecht et al., 2003; Arulampalan et al. 2007; Bjerk, 2008). This paper describes and clarifies a novel and complementary phenomenon that we refer to as the "glass door." While the glass ceiling pertains to careers of employees within organizations (or firms), the glass door focuses on newly-hired workers. The glass ceiling is based on a hierarchy of job levels within firms, such that women have a smaller gain by a promotion to the higher layers within the firm, in terms of both its probability and the financial reward (Booth et al., 2003; Blau and DeVaro, 2007).[1] Similarly, the hierarchical job structures frame the glass door. Women are less likely to be hired externally in the upper tiers of the firm, and hence the value of the outside option is lower for female employees.[2] We argue that the glass door is the flip side of the glass ceiling of career opportunities that women may face from a within-firm perspective.[3]

This study relates gender differences in external hiring to the hierarchical structure of jobs.[4] For the glass door, we consider an absolute and a relative effect of the hierarchy. The absolute effect pertains to less women being hired at higher hierarchical levels. The relative effect pertains to jobs at a specific tier, having different importance across firms. Women are less likely to be hired when there are relatively many jobs below the level of the vacancy. Difference in importance of jobs at similar tiers across firms can be illustrated by a simple comparison of two two-tier firms. Both firms share tier 2, but firm *A* also has employees at tier 1 (the lowest level), and firm *B* includes jobs at tier 3. We claim that a job at tier 2 is more

[1] Studies have concentrated on the implications of gender differences in internal promotion as well as differences in the wage change upon promotion. Other empirical studies of the glass ceiling relate upper and lower deciles of the wage distribution to the existence of a glass ceiling and a sticky floor (Arulampalam et al., 2007; Kee, 2006). These differences are attributed to gender differences in internal promotion. However, both internal and external hiring shape the wage distribution.

[2] We consider the features of the employer that hired the employee, but abstract from the features of the firm from which the employee separated. The actual transitions between firms have been found to be lower for women than for men (Loprest, 1992).

[3] So far, the term "glass door" has been used by Pendakur and Woodcock (2009) only. Our concept differs from theirs, in that they define the glass door as poor access to high-wage firms for immigrant workers.

[4] There are a few empirical studies of the gender composition of hiring at the firm level (Konrad and Pfeffer, 1991; Cohen et al., 1998). Bender et al. (2005) and Kirsten and Heywood (2007) investigated the hiring composition with respect to age. Their approach differs from the more widely investigated matching function, in which the hiring flow results from matches between job seekers and vacant job positions. Pissarides and Petrolongo (2001) provide an overview of this literature.

important for the production process in firm *A* than in firm *B*, since in firm *A* there are more jobs below tier 2. Consequently, the external effects of a tier 2 job becoming vacant, in terms of lost production of the co-workers, will be the larger for firm *A*.

The explanation of the absolute effect is based on the assumption that women have a higher propensity to quit, because of a higher valuation of non-market activities (Lazear and Rosen (1990)). The costs of a resignation are higher at a higher level, when there is a loss of the costs of initial training. Consequently, women are less likely to be hired at the higher levels. The relative effect can be motivated by the dependence between jobs within a firm. It is in line with recent studies on various forms of interdependence among co-workers within firms, such as peer effects (Mas and Moretti, 2009), spans of control (Fox, 2009), and other social connections among workers (Bandiera et al., 2009). In our study, we focus specifically on the loss of production of the co-workers in case a worker quits. This loss of production may be considered as an external effect that is costly to the firm. Studies on labor demand usually relate external hiring to the cost of dismissal. In our study, external hiring is related to the cost of quitting. We assume that the external effects on the co-workers are higher at the higher tiers. When the job has a larger fraction of jobs at the tiers below, the ensuing costs will be larger, making it less likely that females are hired.

Hierarchies can be made comparable across firms if all of the jobs of the entire labor market can be classified into broadly defined hierarchical levels. At a higher tier, a job contains more attributes, so that employees must be more skilled to perform the job. The jobs together form a ladder. We based our interfirm comparison of hierarchies on a uniform classification of hierarchical job levels across organizations. A firm offers an array of jobs to its workers. Each job consists of a bundle of tasks and responsibilities that a worker needs to fulfill. The jobs within the firm can be ranked by level of complexity, ranging from simple, repetitive routines to complex, non-recurrent tasks. Following Lazear and Oyer (2004), we used job complexity as a measure to construct a hierarchy of jobs within a firm. Each additional level of complexity results in a higher hierarchical level. Job complexity had been measured uniformly across firms in our data set of Dutch firms. It enabled us to make a coherent

interfirm comparison of hierarchies.[5] Between firms, we found a surprising heterogeneity of the fraction of jobs below a specific job level.

The glass door phenomenon of external hiring has two features that were unexplored so far. First, it provides an additional reason for the gender difference in the value of the outside option. Recent studies have identified the specific features of organizations in the external labor market that reduce the value of the outside option of female employees.[6] Women were found to have a weaker response to merit pay schemes,[7] and to have more limited networks for informal job search.[8] Females are also more likely to be employed by female business owners or female supervisors.[9]

Second, the glass door may provide an additional explanation of why a glass ceiling is sustainable as an equilibrium phenomenon. Household-related factors were found to be a source of equilibrium for the glass ceiling. Women have a higher ability in non-market activities (Lazear and Rosen, 1990), and they are less flexible when the family needs to move as a result of a job offer (Booth et al., 2003). We claim that the more limited opportunities of females in the external labor market may reinforce the glass ceiling. A more limited scope of outside opportunities gives women a lower alternative wage, which results in a downward effect on their current pay (McCue, 1996; Manning and Swaffield, 2008; Barth and Dale-Olsen, 2009).

The structure of the paper is as follows. Section 2 explores the relationship between the hierarchy and the gender composition of hiring. Section 3 describes the data we used for our empirical analysis. Section 4 details the empirical model, and Section 5 presents its estimates. Section 6 concludes.

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[5] Interfirm comparisons of hierarchies are relatively scarce. Recent studies are e.g. Ortín-Ángel and Salas-Fumás (2002) and Pekkarinen and Vartiainen (2006). The latter study has measured job complexity across firms, although it did not interpret this measure in terms of hierarchies. There are relatively more case studies of single firms that investigate the hierarchical structure of the work force (e.g. Baker et al., 1994; Audas et al., 2004).

[6] To our knowledge, only Mortensen (2003) estimated the value of the outside option directly, although he did not distinguish between men and women. He considered the difference between the earnings distribution (the distribution of wage earned by workers currently in employment) and the wage offer distribution (the wage distribution of the workers hired from non employment) to infer the degree of monopsony power enjoyed by firms.

[7] It was demonstrated that women fare less in competitive environments when they compete against male counterparts (Gneezy and Rustichini, 2003; Price, 2008), and that women are less attracted to variable pay schemes (Dohmen and Falk, 2006).

[8] Women participate in narrower social networks that employers may use to find new hirees through informal search (Goos and Salomons, 2007). In other words, women's social networks are richer of strong ties, but less effective in generating job offers than men's networks (Granovetter 1995).

[9] It was found that women are relatively more employed with firms that have a female business owner (Carrington and Troske, 1995) or with firms that are managed by female supervisors (Carrington and Troske, 1998; Cardoso and Winter-Ebmer, 2007). Women have a higher job satisfaction when they have relatively more female colleagues (Bender et al., 2005).

2. Theoretical framework

2.1 Main assumptions

The model is based on two main assumptions. Assumption 1: men and women have equal ability distributions in the labor market, but women have better non-market activities. The consequence of this assumption is that women are more likely to quit. Lazear and Rosen (1990) introduced this assumption to explain differences in promotion between men and women. This assumption was further applied by Booth et al. (2003) and Pekkarinen and Vertiainen (2006) amongst others. Various empirical studies have addressed this assumption. Thus, Sicherman (1996) found for a US firm that quit rates of women are higher shortly after hiring, but that the difference becomes smaller as time on the job lengthens. Women are more inclined to quit for non-market-related reasons. Theodossiou and Zangelis (2009) showed for six European countries that men have higher job-to-job transitions, whereas women are more likely to exit to non-employment. They confirmed the finding of Hersch and Stratton (1997) that women are more inclined to quit for family related reasons.

Our second assumption concerns the consequences of a resignation for a firm in terms of lost production at various tiers. Assumption 2: the costs of a vacancy are higher at the upper tiers of a hierarchy. It can be motivated as follows. A vacancy leads to a costly reduction of production of the co-workers. It gives a temporal reduction in the output of other employees when production is organized in teams. Furthermore, there will be less monitoring of the workers who were supervised by the worker who left the firm. In this respect, the financial loss tends to be higher with a vacancy in the upper tier, because these vacancies usually take more time to fill (Barron et al., 1997; Russo et al., 2000). Consequently, potential disruptive effects of a resignation in terms of lost production will be larger at the upper levels.

2.2 Hierarchical effects

We consider hiring as an employer's job assignment mechanism. Basic to our model is that a firm has a vacant job with specific characteristics, for which it needs to recruit an applicant be it female or male. The position of the vacant job in the firm's hierarchy is known upon hiring as the level of ability the job requires. The firm also needs to take into account of the dependence between jobs within the firm, as reflected by the hierarchy. Our model of the gender composition of external hiring across job levels is based on Lazear and Rosen (1990), with the main difference that our model does not allow for promotion. We consider two periods after hiring, during

which the worker performs different activities. We abstract from time discounting. In the first period, the workers get costly firm-specific training. During this period of training, workers are less productive, but this loss is offset by an increase in productivity in period 2. As a result, training leads to a higher increase in productivity of more able workers.

$q_1 = \delta * \gamma_1$ period 1

$q_2 = \delta * \gamma_2$ period 2

with $\gamma_1 < 1 < \gamma_2$, and q_1 and q_2 referring to the worker's productivity in period 1 and 2, respectively. δ reflects ability. Workers may quit the firm in period 2. Let a woman, man, and the co-workers be denoted by the superscripts *F*, *M*, and *CW*, respectively. A worker resigns with a probability P in period 2. A resignation has the following two effects. First, it leads to a direct loss of production of the worker who resigned in period 2. Second, there will be external effects within the work force, since there is a temporary loss of productivity of the co-workers, which is referred to by q^{CW}.

Upon hiring, a firm is indifferent as to hire a woman or a man when their total expected production over both periods are equal:

(1) $\delta^F * \gamma_1 + (1 - P^F) * \delta^F * \gamma_2 - P^F * q^{CW} = \delta^M * \gamma_1 + (1 - P^M) * \delta^M * \gamma_2 - P^M * q^{CW}$

Thus, a resignation in period 2 leads to a decrease in production of $P^j * \delta^j * \gamma_2$ ($j = F, M$), and to temporal decrease in the co-workers' production of $P^j * q^{CW}$.

Equation (1) can be rewritten in terms of ability of the woman:

(2) $$\delta^F = \frac{\delta^M * \gamma_1 + P^F * q^{CW} + (1 - P^M) * \delta^M * \gamma_2 - P^M * q^{CW}}{\gamma_1 + (1 - P^F) * \gamma_2}$$

Due to better non-market opportunities, women are assumed to have a higher probability of resigning $(P^F > P^M)$, so that $\delta^F > \delta^M$. Thus, at equal job level, the female hirees have a higher ability than the male hirees. Consequently, women are less likely to be hired at a higher <u>absolute</u> hierarchical level.

Moreover, since $P^F > P^M$, we can infer from equation (2) that $\partial \delta^F / \partial q^{CW} > 0.$ In other words, females must have a higher ability to compensate for the co-workers' loss of production that results from their larger expected probability of resignation. The loss will be larger at a higher <u>relative</u> hierarchical position in the

firm (assumption 2). Consequently, fewer women will be hired when there are many jobs below the focal level of hiring within the firm.

Overall, the fact that women are more likely to quit after training renders two predictions with respect to the gender composition of the flow of hirees. Let the hiring composition be characterized as

(3) $F = g(J, \tilde{J})$

where F is an indicator for hiring a female worker and J refers to the hierarchical level of the job ladder, with level 1 being the lowest tier. The first prediction is that there is an absolute effect, $\partial F / \partial J < 0$, as firms want to recruit a woman of higher ability at equal job level, in order to compensate for the direct loss of expensive training that results from a quit. Second, there is a relative effect, $\partial F / \partial \tilde{J} < 0$, since resigning from an upper level job induces a larger loss to the firm's production. The absolute and relative effect together will be referred to as the glass door.

2.3 Implications

The glass door contributes to gender differences in both the value of the outside option and the revenue of internal promotion. The value of the outside option results from the distribution of possible wage offers by other employers in the external labor market. It is denoted by the density function $g(w)$, where w is the worker's wage. A worker stays with his current employer as long as the wage is larger than the value of the outside option in the labor market. The outside option equals the maximum wage of all possible offers in the outside labor market.

$$w > \tilde{w} \equiv \max_w g(w)$$

The glass door concerns the reduced probability of hiring a woman at higher values of J and $\tilde{J}$. The wage w depends on specific values of J and $\tilde{J}$, and Fox (2009) has demonstrated that w is increasing in both arguments. The reduced access of women to the jobs associated with the higher values of J and $\tilde{J}$ leads to a gender difference in the outside option in the external labor market. Women have a more limited access to the higher tier jobs, so that they benefit less from the higher wages associated with these tiers. As a consequence of the glass door, the cumulative function of the outside option in the labor market for women is dominated by that of men:

(4) $G^F(w) < G^M(w)$,

Next, we consider how gender differences in the outside option may affect the revenue of internal promotion, which depends on the probability of promotion and the wage increase upon promotion. Overall, it is smaller for women:

(5) $\Pr(im=1 \mid F=1) * \Delta w(F=1, im=1) < \Pr(im=1 \mid F=0) * \Delta w(F=0, im=1)$

where *im* is an indicator for internal promotion and Δw is the wage change upon promotion. However, Δw is such that w_{t+1} exceeds $\tilde{w}_{t+1}$, the value of the outside option. Because of (4), we argue that a reduced outside opportunity of women in the labor market gives them a lower revenue of internal promotion.

3. Data

We used the AVO data set for our empirical analysis. This data set was compiled by the Dutch Ministry of Social Affairs and Employment (Venema and Faas, 1999) from administrative records of employees of Dutch organizations from all economic sectors. Organizations and employees were sampled in a two-stage sampling process. In the first stage, the sampling probability of organizations was negatively related to their size. In the second stage, employees were sampled, with their probability of being sampled negatively related to firm size. We used two waves of the data set. In the first wave, information on workers of both October 1997 and October 1998 was registered (for workers who were employed with the firm over this period). For the employees who were hired (separated) during this period, the individual information pertains to October 1998 (1997) only. The second wave, with the same structure, concerns October 1999 and October 2000. Our selected sample consists of 15,422 hirees from 1,711 firms.[10] 348 firms were observed in both waves. Moreover, we applied a selected sample of 9,522 hirees (1,437 firms) who were employed with another employer before hiring.

<Table 1 about here>

Table 1 shows that the fraction of female incumbents[11] before hiring at *t*-1 is positively related to the fraction of female new hirees between *t*-1 and *t*. About 34 percent of the new hirees are females. Firms with a fraction of incumbents between 0

[10] We applied the following additional selection criteria. Entire sample: (wave 1) 48,939 employees, 1,857 firms; (wave 2) 52,385 employees, 1,838 firms. Selection of firms that have at least 10 employees: (wave 1) 45,702 employees, 1,145 firms; (wave 2) 49,302 employees, 1,184 firms. Selection of new hirees: (wave 1) 8,139 employees, 1,107 firms; (wave 2) 7,841 employees, 1,111 firms. No item non-response of incumbents at beginning of period: (wave 1) 7,999 employees, 1,102 firms; (wave 2) 7,768 employees, 1,108 firms. Each firms has at least two new hirees in either period: (wave 1) 7,937 employees, 1,040 firms; (wave 2) 7,680 employees, 1,020 firms.

[11] In our empirical analysis, incumbents at *t*-1 do not include the employees who were going to leave the firm between *t*-1 and *t*.

and 10 percent have on average 17 percent female hirees, which is to increase to 82 percent for firms with 90 – 100 percent of female incumbents. At the level of the firm, 23 percent (8 percent) of the firms have no female (no male) incumbents; the average fraction of females is 0.38 (median: 0.33); 25 percent of the firms have a fraction of females above 0.62. Evidently, the fraction of women is skewed to the left at the firm level.

<Tables 2 and 3 about here>

Table 2 gives the definitions of all nine job levels that were used for all firms of the sample. Corresponding to the level of complexity, we constructed seven tiers.[12] Table 3 gives the distribution of the hirees across the seven tiers for men and women separately. The table shows that women are hired externally at lower levels of the labor market. The first two columns include all new hirees, whereas the latter columns are based on the selection of job-to-job movers. Females are more likely to be hired in the lowest tiers 1 to 3, whereas males are more likely to be hired in tiers 4, 6, and 7. There is no difference in hiring for tier 5. The first two columns show that about 95 percent of the new hirees enter the firm up to and including tier 6. A comparison between the previously-employed hirees (last two columns) and all hirees (first columns) shows that job movers are less likely to be hired in tiers 1 and 2. About 14 percent (8 percent) of the female (male) job movers enroll tiers 1 and 2, whereas for all female (male) hirees it is 27 percent (18 percent).

<Table 4 about here>

Table 4 gives the distribution of the job levels across the different hierarchical structures for the incumbent workers. It shows that firms are very heterogeneous with respect to the lowest and highest tier. The lowest tier of the hierarchy is on the horizontal axis of the table; the vertical axis gives the highest tier. The table distinguishes all different combinations of the lowest tier and the upper tier for all firms of the sample. About 1 percent of the firms have 1 as lowest tier and 4 as upper tier, whereas about 5 percent of the firms have 4 and 7 as the lower and upper tier, respectively. The modus of all possible combinations are the combinations of tiers (3, 6) and (3, 7), with each 13 percent of the firms. A small proportion of the firms (2 percent) have the upper and lower tier at equal level. For each of the combinations, the table gives the average fraction of job levels ($\bar{J}$) between the lower to the upper

[12] We did not include job level 9, since this job level was absent in the sample of hirees. Levels 7 and 8 are grouped into one category.

tier. Thus for the combination of tiers 1 and 2, tier 1 has on average 64 percent of the jobs, and tier 2 has 36 percent of the jobs.[13]

<Table 5 about here>

Table 5 gives the gender distribution of the newly-hired workers across the tiers for each combination of upper and lower tier.[14] We refer to the lowest tier as *l* and the highest tier as *u*, and consider a change of $\overline{F}$ with respect to an increase of *l*, keeping *u* constant or with respect to a change of *u*, keeping *l* constant. A job at level *k* is more important at the *k*-th tier of the combination (*l*, *u*) than at the *k*-th tier of the combination (*l*+1, *u*). For all entries of Table 5, we checked the direction of the change of $\overline{F}$ while moving from (*l*, *u*) to (*l*+1, *u*). For 41 out of 54 changes there appears to be a decrease of $\overline{F}$. Weighting the entries of the table does not change the conclusion: Women appear to be hired externally by firms where the tier is less important, ceteris paribus on the focal layer of hiring.[15]

4. Empirical model

The firm's decision to hire a female applicant is explained by observed characteristics of the work force, the firm, and the individual job, and by the job's hierarchical position. Hence, we reformulate equation (3) as

$$(6) \qquad F_{ijt} = \zeta' \overline{Z}_{it-1} + \varphi' W_i + \gamma' X_{ijt} + \eta' H_{ijt} + \alpha_i + \varepsilon_{ijt}$$

$$i = 1,...,M;\ j = 1,...,N_i;\ t = 1999, 2001$$

Subscripts *i*, *j*, and *t* refer to the *i*-th firm, the *j*-th hiree, and year *t*, respectively. There are *M* firms and the *i*-th firm hires N_i employees. The dependent variable *F* is an indicator for hiring a female worker.[16] It is a flow variable as hiring takes place between *t*-1 and *t*.

The work force averages, $\overline{Z}_{ijt-1}$, are time-varying stock variables. They are allowed to change from year to year, as the composition of the work force may

[13] In individual firms there may be tiers with zero jobs between the upper and lower tier.
[14] The only difference is that in some firms workers are hired either below the lowest level of the incumbents or above the highest level of the incumbents.
[15] An unreported table for $\overline{F}$ in the incumbents at *t*-1 leads to the same conclusions.
[16] In doing so, we follow the literature in neglecting the impact of the gender composition of the pool of applicants on the probability of hiring a woman. The only exception we know is Holzer (1996). The neglect of the gender composition of the pool of applicants is not likely to have consequences in our particular case, since a study on the recruitment procedures of Dutch firms using a large sample of vacancies over the period 1991 – 1998 shows that the gender composition of the hired applicants tends to mirror the gender composition in the pools of applicants (Van Ommeren et al., 2005, Russo and Van Ommeren, 2009).

change. The work-force averages refer to the start of the period of hiring (t-1), and they exclude information about employees who left the firm between t-1 and t. In this way, there are no disturbing effects of hiring employees who may share some of the observed characteristics of the employees who separated.[17] W_i is a vector of time-invariant firm-specific variables. X_{ijt} is a vector of variables that refer to the attributes of the job. We apply the labor demand assumption that the firm determines the job attributes and the individual hierarchical level prior to posting the vacancy. These characteristics do not change upon hiring, that is the attributes of the vacant job do not change because of an unforeseen supply of specific skills of applicants.[18] H_{ijt} refers to the hierarchical position of the hiree. ζ, φ, γ, and η are vectors of parameters. Equation (4) is estimated by two estimators that differ in their assumptions about the firm-specific random error term α_i. First, the Linear Probability Model (LPM) with Newey-West clustered standard errors allows for dependence between α_i and the other time-variant explanatory variables. The effect of $\overline{Z}_{ijt-1}$ can be identified in this specification, since in our sample 348 panel firms are observed in both waves. The second estimator is a random-effect probit. It is based on the assumption that α_i is independent of all explanatory variables and the idiosyncratic error term ε_{ijt}.

We next discuss the explanatory variables of equation (6) in greater detail. The vector $\overline{Z}$ contains the fraction of female incumbents that picks up a so-called persistency effect[19] and the fraction of non-native incumbents. It also includes the averages of tenure (for women, non-natives, and all incumbents) that correct for gender differences in job turnover in the labor market. Furthermore, it has the logarithm of the contractual number of hours, the actual number of hours (relative to the contractual number of hours), and the logarithm of the hourly wage. Finally, $\overline{Z}$ includes the average fractions of the following categorial variables: age (4 categories), education (7 categories), job occupation (7 categories), pay scheme (9 categories), and

[17] In the Netherlands, about 65 percent of the flow of new hirees can be attributed to rehiring for an existing job (see Hamermesh et al. (1996)).
[18] Accordingly, we included only job-related variables of the hiree. To avoid endogeneity, characteristics of the hiree, such as age, education, and wage, were not included.
[19] The persistency effect implies that the gender composition of the external hirees mirrors the gender structure of the incumbents. In other words, the probability of hiring a female applicant depends on the fraction of female incumbents.

firm size (5 categories).[20] The vector *W* contains the remaining variables at the firm level, that is 4 indicators for the type of working agreement, and 13 indicators for economic sector. The vector *X* has 7 occupational indicators for the hiree and 8 indicators for individual pay components the hiree may receive.[21]

The vector *H* has two hierarchical variables. First, J_{ijt}^{k} (k=1,…,K) is an indicator for the k-th hierarchical level at which the employee is hired. Subscript k refers to the k-th hierarchical level. We define 1 and K as the lowest and highest hierarchical level in the labor market, respectively, although in individual firms the lowest and highest level may be anywhere between 1 and K (see Table 4). *H* also contains a variable that measures the relative number of jobs below. We introduce $\overline{J}_{it-1}^{k}$, which is the fraction of jobs at the k-th level relative to the total number of jobs within the firm at t-1. The relative position in the hierarchy is measured by $\tilde{J}_{it-1}^{k}$, which is defined as the fraction of jobs in firm i below job level k. More precisely,[22] [23]

$$\tilde{J}_{it-1}^{k} \equiv \overline{J}_{it-1}^{1} + \overline{J}_{it-1}^{2} + ... + \overline{J}_{it-1}^{k-1}$$

Overall, both hierarchical variables pick up the effects of the variables in equation (3). The existence of a glass door implies that both J_{ijt}^{k} and $\tilde{J}_{it-1}^{k}$ have a negative effect on *F*.

<Table 6 about here>

5. Estimates

We estimated equation (6) with a LPM specification. See column 1 of Table 6. With respect to the main variables, the results are as follows. The job level has a negative influence on the probability of hiring a female applicant; the difference between the lowest and highest tier is about 28 percentage points. The estimated coefficient on $\tilde{J}_{i}^{k}$ equals –0.067, ceteris paribus on the other explanatory variables,

[20] We consider the fractions of the incumbents receiving the following pay components: personal bonus, tariffs and provisions, shift allowance, inconvenience allowance, overtime, wage in kind, extra payment, profit sharing, and other extra payments. The latter three components are low-powered group incentives and all of the other components are worker specific.

[21] We excluded an indicator of individual overtime payment.

[22] Apparently, $\tilde{J}_{i}^{1} = 0$.

[23] We also experimented with the fraction of jobs below the level of hiring ($\tilde{J}_{i}^{k}$) relative to the fraction of incumbents at level k ($\overline{J}^{k}$), but it gave an insignificant coefficient.

including the individual job level.[24] So, the probability of hiring a female worker decreases with 0.67 percentage points when the relative fraction of jobs below the vacant job increases with 10 percentage points.

All of the work-force characteristics are (jointly) statistically insignificant, except for relative hours, the log of the wage, and the pay components. The job characteristics of the hiree are jointly significant. The effects of the individual occupation are very substantial. The maximum difference is between administrative occupations and technical occupations. The probability of hiring a woman is about 47 percentage points higher for occupations in the former category. The probability of hiring a woman is 11 percentage points lower, if the individual pay has a bonus component; a shift allowance leads to a decrease of 3.4 percentage points; an inconvenience allowance leads to a decrease of 13.3 percentage points. Women are more likely (5.7 percentage point) to be hired if workers receive extra payment for collective agreements.[25]

Next, we consider the random effects probit estimate (Table 6, column 2) and we compare it with the estimate of column 1. It shows that the marginal effects of the job level variables hardly change. The marginal effect of $\tilde{J}_i^k$ becomes –0.135, which cannot be statistically distinguished from the fixed effect estimate.[26] The workforce variables tend to have a more substantial impact on the gender hiring in the random-effects specification. The most striking difference is the average fraction of women, which has an estimated marginal effect of 0.546 according to the random-effects specification.[27]

<Table 7 about here>

We performed various robustness checks. First, we re-estimated both specifications for a selection of external hirees who were previously employed elsewhere, since Table 3 indicates that this group is generally hired at higher tiers. See

[24] Less than 2 percent of the predicted dependent variable is outside the 0-1 interval.

[25] This is an agreement that holds for most of the workers inside a firm. The estimates give conflicting results for this variable. However, omitting this variable has no effect on the conclusions.

[26] The estimated coefficients of a LPM with random firm-specific error terms and Newey-West clustered standard errors give an estimated coefficient on $\tilde{J}_i^k$ of –0.117 (0.025). Also for the other probit estimates presented in Tables 6, 7, and 8, the differences between both estimates are minor. A Hausman test on the LPM-specification favors the fixed-effects specification.

[27] The firm-specific fixed-effects estimates hardly change when omitting $\overline{Woman}$. We also estimated a specification in which we substituted $\tilde{J}_{it-1}^k$ by 6 fractions $\overline{J}_{it-1}^k$ (k=2,…,7). The fixed effects estimate indicates that they are jointly significant at the 10-percent level (p-value: 0.058); the random effect estimate yields joint significance at the 5-percent level (p-value: 0.014).

Columns 3 and 4. There are no substantial differences with the estimates of the entire sample of hirees.

As a second robustness check, we allowed for a different impact of the relative number of jobs below the vacant job, for each of the seven tiers. Any difference may indicate that the relative hierarchical effect differs across the layers. See Table 7, columns 1 and 3. The fixed effects estimates yield no jointly significant effect of $\tilde{J}^k_{it-1}$ for the tiers jointly, although it seems to be individually significant for the third layer. The random effects estimates indicate that $\tilde{J}^k_{it-1}$ is jointly significant for the six layers. The marginal effects are smallest in the lowest tiers, indicating that the relative hierarchical effect pertains to the upper part of the hierarchy.

As a third robustness check, we classified the firms according to the highest tier, since the fraction of jobs below the level of hiring may be related to the highest tier. It may lead to a different effect for each of the different classes of firms. The fixed-effect estimate (Table 7, column 2) does not indicate a joint significant influence, whereas the random effect estimate (column 4) implies that the effect of $\tilde{J}^k_{it-1}$ varies with the upper tier. In firms with an upper tier up to 3, there is no indication of any relative effect, in contrast to the firms with an upper tier of 4 or more. Again, the result suggests that the relative hierarchical effect is related to the upper part of the hierarchy.

Fourth, we considered the effects of the relative number of jobs at the same tier and above, by re-estimating the regressions of Tables 6 and 7 for $(1-\tilde{J}^k_{it-1})$. Of course, the estimates of Table 6 did not change, except for the sign of the effect of the job mass variable. Also, our conclusions about the effects of Table 7 remain unchanged.

Finally, we re-estimated all specifications for a group of hirees who were hired for a full-time job. We did so to refute the argument that the glass door exists because women are more likely to have a part-time job, and part-time jobs are scarcer in the upper tiers of a hierarchy. Our conclusion about the existence of a glass door also holds for the group of full-time workers. We selected 7,672 external hirees (1,020 firms) who were employed for at least 32 hours per week. The job level has a negative effect on the probability to hire a woman. The estimated coefficient on $\tilde{J}^k_i$ becomes –

0.077 (0.042) for the fixed effect specification and for the random-effect specification the marginal effect becomes –0.199 (0.044).

6. Conclusions

The main finding of his study is that women are less likely to be hired at higher job levels. In addition, after controlling for the individual job level of hiring, a larger fraction of jobs within the firm below the focal level of hiring decreases the probability of hiring a woman. It points to a particular type of sorting in the labor market: Women are more likely to be hired by firms for a job with a lower relative position in the firm's hierarchy. As a consequence, women have a lower value of the alternative wage in the outside labor market. It may induce a gender wage gap, since workers in higher hierarchical positions get better paid (Fox, 2009). Our results are in line with findings in recent studies on the gender wage gap across the wage distribution (e.g. Arulampalam et al., 2006; Meyersson Milgrom and Petersen, 2008).

What makes the glass door different from the glass ceiling? The glass ceiling refers to gender differences in internal promotion, whereas the glass door is about gender differences in external hiring. Both phenomena build upon the assumption of females having a higher value of non-market activities. However, external hiring dominates internal promotion for most of the firms (e.g. for the Netherlands, Hamermesh et al., 1996). An interesting implication of the glass door is that it may reinforce the glass ceiling, so that the glass ceiling can be sustainable as an equilibrium phenomenon.

This study opens new avenues of further research. First, this study shows that hierarchies are extremely heterogeneous across firms, using a coherent interfirm measure of jobs. We classified the organizations' hierarchy on the basis of two criteria: 1. the span of layers (that is, the lowest and highest level of job present in the organization) and 2. the structure of the hierarchy (that is, the relative abundance of jobs at any given level of job complexity). Firms were found to be heterogeneous for both criteria. This is a remarkable finding, as most studies focus on a single hierarchy of a representative firm, so that any differences across organizations remained unnoticed. These studies consider a hierarchy as a tournament inducing extra effort of the employees (Lazear and Rosen, 1982). Alternatively, it was modeled as an assignment mechanism relating the worker's ability to the job's span of control (Ortín-Ángel and Salas-Fumás, 2002). Even the Internal Labor Market theory (Lazear

and Oyer, 2004) has so far remained silent about differences in hierarchies across firms.

Second, this study gives a different perspective on the wage distribution. Usually, gender differences in wage are related to (unobservable) characteristics of the worker and the firm. The implication of this study is that the gender differences in the current wage may be due to differences in opportunities in the external labor market, which in turn are related to differences in hierarchical structures across firms.

Third, our analysis of the glass door phenomenon suggests that the glass ceiling could be quite low. In fact, the glass door is present already at low level positions, so that they can sustain a glass ceiling at a relatively low level in the organizational hierarchy of jobs. The implication is that the concept of the glass ceiling, originally introduced to explain the paucity of women in managerial positions (positions quite high in the organizational hierarchy), could be extended to cover jobs at a lower level.

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Table 1 – Average of female hirees (*F*) by class of female incumbents

Fraction of female incumbents in firm [a]	$\overline{F}$ [b]	Number of new hirees
0	0.15 (0.36)	1,245
0 – 0.1	0.17 (0.38)	2,358
0.1 - 0.2	0.26 (0.44)	2,644
0.2 - 0.3	0.34 (0.47)	1,966
0.3 - 0.4	0.41 (0.49)	1,620
0.4 - 0.5	0.44 (0.50)	1,347
0.5 - 0.6	0.56 (0.50)	841
0.6 - 0.7	0.58 (0.49)	1,124
0.7 - 0.8	0.68 (0.47)	820
0.8 - 0.9	0.74 (0.44)	741
0.9 - 0.1	0.82 (0.37)	440
1.0	0.79 (0.41)	276
All firms	0.34 (0.28)	15,422

a) Observed at *t*-1.

b) Indicator *F* for hiring of female applicant. Average of *F* over all hirees and all firms within the specific class of female incumbents. New hirees observed between *t*-1 and *t*.

Table 2 – Definition of job level

Job level	Description
1	Very simple and repeated tasks, which do not require any particular education or experience, and are carried out under direct supervision.
2	Simple and repeated tasks, which require some basic administrative or technical knowledge or some working experience. Some autonomy is required, but the tasks are carried out under supervision.
3	Less simple tasks, of a repetitive nature, which require low administrative or technical knowledge or some working experience. The tasks involve a degree of autonomy.
4	Less simple tasks, of different natures, which require low administrative or technical knowledge with completed vocational education in a given technique or profession. The tasks involve a degree of autonomy.
5	Difficult tasks, of many different natures, which require an intermediate level of administrative or technical knowledge and a high level of autonomy.
6	Composite tasks within an occupation, which require a high level of administrative or technical knowledge and a high level of autonomy.
7	Directive and managerial tasks, which require analytical, creative and personal communication skills. Tasks carried out on the basis of autonomous decision-making and require an academic education.
8	Management of mid-size firms and participation in the strategic decision-making.
9	Management of large firms and participation in the strategic decision-making.

Table 3 – New hirees across job level by gender[a)]

Job level	All new hirees [b)]		New hirees, previously employed	
	Male	***Female***	***Male***	***Female***
1	0.039 (0.002)	0.084 (0.004)	0.012 (0.001)	0.031 (0.003)
2	0.136 (0.003)	0.182 (0.005)	0.067 0.003)	0.105 (0.005)
3	0.228 (0.004)	0.271 (0.006)	0.199 (0.005)	0.273 (0.008)
4	0.211 (0.004)	0.154 (0.005)	0.236 (0.005)	0.181 (0.007)
5	0.222 (0.004)	0.212 (0.005)	0.268 (0.006)	0.276 (0.008)
6	0.131 (0.003)	0.079 (0.003)	0.173 (0.005)	0.108 (0.005)
7, 8	0.033 (0.002)	0.019 (0.002)	0.045 (0.003)	0.026 (0.003)
Number of observations	9,532	6,085	6,352	3,347

a) Standard error of mean in parentheses.
b) Job level of new hiree between *t*-1 and *t*.

Table 4 – Fraction of jobs by hierarchy at *t*-1; Selection of incumbent workers[a)]

Highest Layer within firm	Layer	Lowest layer within firm											
		1		2		3		4		5		6	
		$\bar{J}$	% firms	$\bar{J}$	% firms	$\bar{J}$	%firms	$\bar{J}$	% firms	$\bar{J}$	%firms	$\bar{J}$	% firms
1	**1**	1.00	0.1										
2	**1**	0.64	0.6		0.6								
	2	0.36		1.00									
3	**1**	0.36											
	2	0.38	0.6	0.69	1.2		0.9						
	3	0.26		0.31		1.00							
4	**1**	0.24											
	2	0.23	1.1	0.36	1.8		1.4		0.2				
	3	0.32		0.36		0.42							
	4	0.21		0.28		0.58		1.00					
5	**1**	0.24											
	2	0.17		0.27									
	3	0.20	3.6	0.34	6.3	0.38	4.7		1.5		0.2		
	4	0.20		0.20		0.32		0.67					
	5	0.19		0.19		0.30		0.23		1.00			
6	**1**	0.14											
	2	0.15		0.19									
	3	0.18	7.1	0.23	11.7	0.27	13.1		4.4		2.0		0.2
	4	0.19		0.23		0.23		0.35					
	5	0.23		0.22		0.33		0.44		0.52			
	6	0.11		0.13		0.17		0.21		0.48		1.00	
7	**1**	0.09											
	2	0.09		0.11									
	3	0.15		0.20		0.16							
	4	0.20	5.1	0.19	10.3	0.21	13.0	0.19	5.0		2.5		0.2
	5	0.26		0.28		0.31		0.39		0.36			
	6	0.16		0.15		0.22		0.29		0.48		0.83	
	7	0.06		0.07		0.10		0.13		0.16		0.17	

a) One organization with lowest and highest level of 7 is not included. $\bar{J}$ is the fraction of jobs at a specific layer.

Table 5 – Fraction of female hirees ($\overline{F}$) by position in hierarchy[a)]

Highest Layer within firm	Layer	Lowest layer within firm					
		1	**2**	**3**	**4**	**5**	**6**
		$\overline{F}$	$\overline{F}$	$\overline{F}$	$\overline{F}$	$\overline{F}$	$\overline{F}$
1	**1**	0.67					
2	**1**	0.75					
	2	0.64	0.42				
3	**1**	0.45					
	2	0.59	0.54				
	3	0.33	0.54	0.45			
4	**1**	0.60					
	2	0.58	0.52				
	3	0.50	0.34	0.23			
	4	0.52	0.17	0.14	0.27		
5	**1**	0.59					
	2	0.40	0.55				
	3	0.49	0.38	0.40			
	4	0.32	0.29	0.23	0.06		
	5	0.27	0.16	0.25	0.28	0.41	
6	**1**	0.61					
	2	0.47	0.45				
	3	0.54	0.42	0.36			
	4	0.42	0.29	0.28	0.26		
	5	0.48	0.36	0.26	0.28	0.44	
	6	0.38	0.25	0.22	0.22	0.20	0.00
7	**1**	0.36					
	2	0.47	0.37				
	3	0.53	0.47	0.44			
	4	0.45	0.40	0.33	0.31		
	5	0.55	0.42	0.40	0.32	0.51	
	6	0.43	0.30	0.28	0.23	0.30	0.22
	7	0.38	0.31	0.29	0.25	0.40	0.00

a) Highest and lowest layer refer to the distribution of the incumbents at *t*-1. New hirees are observed between *t*-1 and *t*.

Table 6 – Estimates of equation (6); dependent variable: Indicator female hiree[a)]

	All Hirees		Hirees. previously employed	
	LPM Fixed effects[a)]	**Probit, random effects[b)]**	**LPM Fixed effects[a)]**	**Probit, random effects[b)]**
Job mass below, $\tilde{j}^{k}$ [c)]	-0.067 (0.031)**	-0.135 (0.030)***	-0.070 (0.035)**	-0.156 (0.034)***
Characteristics of work force[c)]				
$\overline{Woman}$	-0.096 (0.059)	0.546 (0.037)***	-0.069 (0.063)	0.491 (0.042)***
$\overline{Nonnative}$	0.092 (0.081)	0.062 (0.061)	0.078 (0.106)	0.075 (0.069)
$\overline{Tenure\ woman}$	-0.002 (0.001)	-0.004 (0.002)**	-0.002 (0.002)	-0.005 (0.002)***
$\overline{Tenure\ nonnative}$	-0.002 (0.002)	-0.002 (0.003)	-0.002 (0.003)	0.0002 (0.004)
$\overline{Tenure}$	0.003 (0.002)	0.002 (0.002)	0.007 (0.003)**	0.004 (0.002)*
$\overline{\log(hours)}$	0.272 (0.136)	-0.005 (0.087)	0.120 (0.143)	-0.050 (0.105)
$\overline{relative\ hours}$	-0.618 (0.315)**	-0.055 (0.193)	-0.155 (0.350)	0.037 (0.230)
$\overline{\log(wage)}$	-0.023 (0.026)**	0.018 (0.028)	-0.010 (0.038)	-0.021 (0.035)
Fractions $\overline{age}$ (4)	1.70	1.33	2.09*	2.33
Fractions $\overline{Education}$ (7)	1.65	12.23*	1.67	8.94
Fractions $\overline{Occupation}$ (7)	1.09	58.19***	2.26**	34.71***
Fractions $\overline{Pay\ Component}$ (9)	3.89***	17.83**	1.99**	20.22**
Characteristics of firm				
Indicators working agreement (4)	-	6.35	-	3.23
Indicators economic sector (13)	-	336***	-	211***
Indicators firm size (5)	1.35	10.46*	0.70	4.85
Characteristics of job of hiree				
Indicators individual job level [d)] (6)	10.91***	112***	7.94***	74.80
*J*2	-0.047 (0.031)	-0.046 (0.023)**	-0.045 (0.063)	-0.026 (0.043)
*J*3	-0.059 (0.032)**	-0.075 (0.023)***	-0.096 (0.061)	-0.099 (0.039)**
*J*4	-0.151 (0.034)***	-0.181 (0.022)***	-0.173 (0.063)***	-0.183 (0.034)***
*J*5	-0.197 (0.039)***	-0.213 (0.024)***	-0.224 (0.066)***	-0.216 (0.037)***
*J*6	-0.272 (0.047)***	-0.243 (0.024)***	-0.309 (0.072)***	-0.236 (0.031)***
*J*7 [e)]	-0.279 (0.055)***	-0.232 (0.028)***	-0.339 (0.078)***	-0.223 (0.027)***
Indicator individual occupation [f)] (7)	157***	1355***	122***	960***
Administrative	0.474 (0.015)***	0.589 (0.013)***	0.473 (0.017)***	0.620 (0.017)***
IT	0.076 (0.025)***	0.125 (0.038)***	0.089 (0.031)***	0.165 (0.045)***
Commercial	0.281 (0.022)***	0.415 (0.019)***	0.282 (0.023)***	0.443 (0.025)***
Care	0.258 (0.017)***	0.342 (0.016)***	0.262 (0.019)***	0.373 (0.021)***
Creative	0.216 (0.032)***	0.372 (0.034)***	0.218 (0.039)***	0.410 (0.041)***
Executive	0.127 (0.020)***	0.169 (0.034)***	0.150 (0.022)***	0.225 (0.037)***
Unknown	0.218 (0.072)***	0.427 (0.051)***	0.314 (0.085)***	0.512 (0.060)***
Indicators individual Pay component (8)	6.31***	66.60***	7.27***	47.11***
Personal bonus	-0.026 (0.027)	-0.052 (0.035)	-0.035 (0.031)	-0.069 (0.035)**
Tariffs and Provisions	-0.110 (0.034)***	-0.114 (0.032)***	-0.106 (0.036)***	-0.111 (0.032)***

Shift allowance	-0.034 (0.016)**	-0.070 (0.017)***	-0.045 (0.020)**	-0.060 (0.020)***
Inconvenience Allowance	-0.133 (0.027)***	-0.165 (0.026)***	-0.152 (0.030)***	-0.166 (0.027)***
Wage in kind	-0.099 (0.059)*	-0.052 (0.045)	-0.058 (0.077)	-0.043 (0.052)
Extra payment collective agreement	0.057 (0.025)**	-0.036 (0.017)**	0.093 (0.025)***	0.009 (0.021)
Profit sharing	0.021 (0.030)	0.007 (0.026)	0.001 (0.031)	0.007 (0.027)
Other extra Payments	0.001 (0.022)	0.001 (0.017)	0.015 (0.026)	0.010 (0.018)
Indicator 2001	0.002 (0.023)	-0.004 (0.011)	0.015 (0.026)	0.006 (0.013)
σ_α	0.279	0.412	0.314	0.382
$\frac{\sigma_\alpha^2}{\sigma_e^2+\sigma_\alpha^2}$	0.337	0.145	0.403	0.127
(Pseudo) R-squared	0.147	0.195	0.139	0.227
Number of explanatory variables	63	80	63	80
Number of hirees	15,422	15,422	9,699	9,699
Number of firms	1,711	1,711	1,578	1,578

a) Fixed firm-specific effect; Newey-West clustered standard errors in parentheses.
b) Random firm-specific effect. Marginal effects at averages of explanatory variables; Standard errors in parentheses.
c) Based on averages of incumbents at *t*-1, so that it may differ across years for the panel firms. For joint hypotheses the *F*-statistic (for random effects: Chi-square statistic) is presented. The number of restrictions under the null is mentioned behind the explanatory variable.
d) Reference group: *J*1.
e) Category 7 includes job levels 7 and 8.
f) Reference group: technical.
*) Statistically significantly different from zero at the 10-percent level; **) at the 5-percent level; ***) at the 1-percent level.

Table 7 – Estimates of equation (6) for all hirees; dependent variable: Indicator female hiree[a)]

	LPM Fixed effects[b)]		Probit, random effects[c)]	
Job mass below, $\tilde{j}^k$ [d), e)] (6)	0.94	-	21.55**	-
Layer = 2	0.031 (0.153)	-	-0.100 (0.128)	-
Layer = 3	-0.071 (0.066)	-	-0.102 (0.060)*	-
Layer = 4	-0.082 (0.047)*	-	-0.146 (0.053)***	-
Layer = 5	-0.063 (0.040)	-	-0.128 (0.042)***	-
Layer = 6	-0.069 (0.060)	-	-0.186 (0.063)***	-
Layer = 7,8	-0.010 (0.166)	-	-0.181 (0.155)	-
Job mass below, $\tilde{j}^k$ [d), e)] (6)	-	0.82	-	22.90***
Firm's highest layer = 2	-	-0.004 (0.103)	-	-0.075 (0.130)
Firm's highest layer = 3	-	0.010 (0.100)	-	0.001 (0.092)
Firm's highest layer = 4	-	-0.102 (0.071)	-	-0.136 (0.064)**
Firm's highest layer = 5	-	-0.044 (0.038)	-	-0.107 (0.040)***
Firm's Highest layer = 6	-	-0.060 (0.031)*	-	-0.142 (0.032)***
Firm's Highest layer = 7,8	-	-0.051 (0.039)	-	-0.095 (0.037)***
Indicators individual job level [f)] (6)	9.28***	14.33***	89.04***	142***
*J*2	-0.055 (0.033)*	-0.050 (0.031)	-0.048 (0.024)**	-0.049 (0.023)**
*J*3	-0.062 (0.034)*	-0.065 (0.032)**	-0.079 (0.024)***	-0.080 (0.023)***
*J*4	-0.151 (0.037)***	-0.159 (0.034)***	-0.180 (0.024)***	-0.188 (0.021)***
*J*5	-0.202 (0.040)***	-0.208 (0.037)***	-0.215 (0.025)***	-0.223 (0.022)***
*J*6	-0.274 (0.058)***	-0.288 (0.043)***	-0.223 (0.035)***	-0.258 (0.021)***
*J*7 [g)]	-0.330 (0.154)**	-0.303 (0.051)***	-0.210 (0.081)***	-0.255 (0.022)***
σ_α	0.279	0.279	0.412	0.414
$\frac{\sigma_\alpha^2}{\sigma_e^2+\sigma_\alpha^2}$	0.336	0.336	0.145	0.147
(Pseudo) R-squared	0.148	0.148	0.195	0.195
Number of explanatory variables	68	68	85	85

a) 15,422 workers; 1,711 firms. All further variables are unreported, as they do not differ appreciably from the first and second column of Table 6.
b) Fixed firm-specific effect; Newey-West clustered standard errors in parentheses.
c) Random firm-specific effect. Marginal effects at averages of explanatory variables; Standard errors in parentheses.
d) For joint hypotheses the *F*-statistic (for random effects: Chi-square statistic) is presented. The number of restrictions under the null is mentioned behind the explanatory variable.
e) $\tilde{J}^k \equiv \bar{J}^1 + \bar{J}^2 + ... + \bar{J}^{k-1}$.
f) Reference group: *J*1.
g) Category 7 includes job levels 7 and 8.
*) Statistically significantly different from zero at the 10-percent level; **) at the 5-percent level; ***) at the 1-percent level.