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SATO Kaori
University of Tokyo

HASHIMOTO Yuki
Kyushu University

OWAN Hideo
RIETI

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SATO Kaori
University of Tokyo

HASHIMOTO Yuki
Kyushu University

OWAN Hideo
RIETI, University of Tokyo

Abstract

Past literature has shown that job segregation by gender is one major cause of the widely observed gender pay gap and that there is also a gender difference in developmental job assignments for broader job experience. This paper examines how gender differences in job assignments are associated with the gender gap in pay and promotion using the personnel records of a Japanese manufacturing company. One of the major findings is that broader work experience through job transfers across establishments are associated with a higher promotion probability and future wages for employees of both genders, but this relationship is especially strong for women, which is consistent with the existence of statistical discrimination against them. Furthermore, according to our fixed effects model estimation of wage function, broader work experience leads to higher wages for men but not for women, implying that women accept promotions without pay raises much more often than men.

Keywords: Promotion, Gender wage gap, Job assignment
JEL classification: J16, J31, J71, M51

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1 Introduction

The gender difference in labor force participation rates of the OECD countries has been reduced substantially as the female participation rates have risen gradually since the 1970s. Despite such advancement toward equal employment opportunities, gender differences in wages and promotions to management positions still remain in many developed countries and this gap is especially large in Japan. In order to understand the sources of this gap, previous research has focused on gender differences in choice of industry and occupation (Macpherson & Hirsch, 1995; Petersen & Morgan, 1995). These studies suggest that women tend to find jobs in lower-paying industries, establishments, and occupations. Other works, however, have shown that gender wage differentials still remain after controlling for industry and occupation (Carington & Troske, 1998, for example). Bayard et al. (2003) focused on differential job assignment within firms by gender, and examined its contribution to the gender pay gap using representative US data.

The gender difference in job assignment within the firm, however, may reflect differences in career tracks or training provided through job assignment. Since statistical discrimination against women may limit them to career tracks with limited promotion probability or lead to differential provision of management training, focusing on jobs at one point in time to explain sources of gender pay gap may not be appropriate. Therefore, in this paper, we focus on job experience in the past based on the premise that broader work experience indicates greater management training, and thus a career track with higher promotion potential.

In fact, the previous literature finds that developmental job assignments are one of the most important training practices in preparing both women and men for upper-level management positions (Davies & Easterby-Smith, 1984; Hall, 1976; Kelleher, Finestone, & Lowy, 1986). There is also a gender difference in developmental job assignment for broader job experience that leads to future managerial positions (Ohlott et al. 1994). Although some previous research has examined the relationship between the history of job assignment and promotion (Matsushige, 1995), they studied male workers only. The effect of gender difference in job assignment on promotions and wages has not been fully examined.

Using personnel records of a Japanese firm, which allows us to exploit rich information on employee characteristics and job assignment histories, this study examines how “career differences” within the firm by gender are associated with a gender gap in pay and promotion while controlling for job types in a sample of college-graduate white-collar workers. By career, we specifically mean the history of developmental job assignments. Note that job rotations—the re-assignment to jobs of different functions or locations—are often used to train workers so that they acquire various problem-solving skills and the ability to coordinate across functions.

Job rotation, however, is costly for employers because a worker's productivity will temporarily decline while they are acquiring new skills on new jobs. Therefore, employers are expected to offer such training only to those whose ability is identified as high and those who are less likely to quit. This implies that firms set a higher standard for selecting management trainees from female workers (Lazear & Rosen, 1990). Since the average ability is higher for women than for men on the same career track, the odds of promotion may be higher for the former. Due to the perception that there is higher asymmetric information for women regarding worker commitment and resultant statistical discrimination, women may also have more incentives to signal their commitment by accepting job transfers, especially those involving relocations, for which they incur a private cost (Kato et al., 2016). Therefore, we predict that promotion might be more strongly associated with the level of management training for women than for men.

Data from a Japanese firm is suitable for this study because statistical discrimination is likely to be prevalent in Japan. Before the Equal Employment Opportunity Law was enacted in 1986, women were often excluded from the benefit of "lifetime employment"—one of the main features of the Japanese employment system—instead, they were offered a different career path, typically as administrative assistants. Although the Equal Employment Opportunity Law, subsequent amendments to the law, and the revised Labor Standards Act in 1999 have forced firms to offer the same work opportunities and conditions to both genders, and many women have entered traditionally male-dominant jobs, the job separation rate is still much higher for women than for men.

This paper is organized as follows: in Section 2, we briefly review recent literature on job segregation and promotion; Section 3 explains the dataset used in this study and provides a variety of descriptive statistics; Section 4 explains our empirical strategy; Section 5 presents estimation results from our analyses of wages and promotions; and we conclude in Section 6.

2 Previous Literature

2-1. Gender differences in job assignment

As pointed out in Section 1, much literature has examined the relationship between gender differences in allocation of workplace and the gender pay gap. Macpherson & Hirsch (1995) and Petersen & Morgan (1995) reveal that occupational and industrial segregation of men and women accounts for much of the gender wage gap. These results imply that if the gender composition in every occupation is equal, the gender pay difference will almost disappear. In fact, empirical literature shows that when women entered "men's work," the gender wage gap decreased (Blau, Simpson & Anderson,1998; Black & Spitz-Oener, 2010). Other works, however, have shown that gender wage differentials still remain after controlling for industry

and occupational effects, perhaps due to unobserved individual ability and discrimination by employers, and male workers still earn higher wages than female workers within the same occupation (Carington & Troske, 1998). Bayard et al. (2003) focused on gender differences in job assignment, and using representative US data, show that gender job segregation within a firm accounts for the remaining gender pay gap which industrial and occupational segregation by gender cannot explain.

Whether the pattern of job assignment differs between men and women in Japanese firms has been examined by sociologists. Using career history information from interviews with bank employees, Komagawa (2016) reports that male employees have been preferentially assigned to commercial loans and corporate customer relations, jobs which are advantageous for skill and network acquisition, whereas female workers have been assigned to teller and personal loan operations. Based on a similar study of real estate business employees, Horiuchi (2015) also finds that female workers are unlikely to be assigned to jobs that offer experiences advantageous for promotion to managerial positions, which is causing a delay in their promotion. Few studies, however, have examined the relationship between gender job segregation and the gender wage and promotion gap using a quantitative and statistical approach. We examine how gender differences in the pattern of job assignment within the firm are associated with the gender gap in wage and promotion using the personnel records of a Japanese firm.

As mentioned in the introduction, differences in job assignment within the firm may affect an employee's career outcome. According to McCauley et al. (1994), job transitions or job transfers offer developmental opportunities by inducing employees to experience unfamiliar situations and to learn new strategies and skills to handle a situation. They may also function as management training, enabling employees to accumulate firm-specific human capital. Some empirical evidence supports this view. Lazear (2010), as well as Frederiksen & Kato (2014) find that having broader work experience is associated with career success.

Although employees who acquire broad skills and develop their networks in several departments within the firm experience developmental challenges and acquire problem-solving skills, job transfers within firms are costly because workers' productivity temporarily declines until they become accustomed to the new job. Previous literature has suggested that there is a gender difference in developmental job assignment. Ohlott et al. (1994), for example, review several related studies and conclude that women may be denied access to some important developmental jobs. Based on a field survey of male and female managers, they also find that men experience greater task-related developmental challenges, but women experience greater developmental challenges stemming from obstacles they face in their jobs, a result consistent with the view that fewer developmental job opportunities for women may be an important reason why there are so few women in upper-level management positions.

2-2. The mechanism causing gender differences in job assignment

The differences in job assignment by gender can be explained in terms of statistical discrimination against women. Statistical discrimination in this context occurs because employers do not have enough information regarding employees' commitment to the job. Employers often make decisions in hiring, training, and promoting based on beliefs regarding employees' future behavior (such as quitting), beliefs which are formed through prior experience with the particular groups that the employees belong to. Previous research suggests that statistical discrimination of women may produce both the firm's sorting and the employee's signaling behaviors, which in turn induce gender differences in career outcomes.

Lazear & Rosen (1990) consider a situation where the employer would not want to assign female workers to "good jobs" that make capable workers more productive but require extensive firm-specific training in the presence of statistical discrimination. Since the return to firm-specific training accrues later, firms prefer to offer such opportunities only to those who are committed to stay. Thus, firms maintain a higher ability threshold for women to be promoted than for men because female workers are assumed to have a lower attachment to work and a higher probability of quitting the firm. One of the implications induced from this model is that the average observed ability is higher for female workers than their male counterparts because female workers are held to higher standards. Several empirical studies support this implication (Pema & Mehay, 2010; Winter-Ebmer & Zweimuller, 1997; Jones & Makepease, 1996). Winter-Ebmer & Zweimuller (1997) extend Lazear & Rosen's model (L&R model) and examine gender differences in initial assignment and promotion. They find that women must have higher education than their male counterparts to reach higher-ranked positions. Pema & Mehay (2010) and Jones & Makepease (1996) also find that women face higher ability thresholds for promotion. When only female workers with higher ability are provided with management training, that is, there is positive selection of women for management training, promotion might be more strongly associated with the level of management training for women than for men.

Kato et al. (2016) depicted employees' signaling behavior, presenting a model and evidence for gender promotion differences due to positive selection for women. They suggest that firms apply a different promotion policy to men and women—revealing promotion prospects only to high ability women—and that only high ability women choose to work long hours to signal their commitment to work and receive management training. In their model, working hours and the amount of management training move in parallel. As a result, the correlation between working hours and promotion is higher for women than for men due to positive selection of women in signaling their commitment.

Following Kato's reasoning, we predict that since job rotation is an integral part of managerial training in many Japanese companies, it will be offered to a much smaller group of

women than for men. Moreover, we predict that women who wish to get promoted will also accept job transfers and relocations in order to signal their commitment to work. We plan to test these predictions in Section 6.

3 Data

We use the personnel records of a Japanese manufacturing company, Company A, which employs about 6,000 regular employees within Japan and (including affiliated firms) well over 20,000 employees worldwide. The records include all domestic employees who are regular workers and consist of (1) employee characteristics (gender, age, education and marital status etc.), (2) pay and benefit records, (3) "announcement of personnel change" records, which include information for job entry, separation, leave, transfers, and reassignment. A major advantage of this dataset is that accurate job assignment history since FY 1995 is available. We constructed job transfer variables using the entire sample, but we restricted our promotion analysis to the period between FY 2002 and FY 2014 because the firm's job system changed substantially in 2000, which makes it difficult to define promotion before FY 2002 in a consistent way. We also needed to restrict our wage analysis to the period between FY 2004 and FY 2014, because compensation information is only available from FY 2004.

In order to analyze the relationship between the number of transfers and wages or promotions, we organized the job assignment information as follows: we consolidated the original department codes from 30,000 classifications into about 500, based on levels typically called departments, business units or research centers. We also re-classified each original department code into six occupational function groups by designing an algorithm that judges the nature of jobs based on the title name assigned to the original department code. These occupational function groups are Administration, Production, R&D, Overseas (international related business), and Sales. Each of the 500 categories does not necessarily correspond to one of the six occupational functions because there could be multiple occupational groups in the same department. Some employees may experience more than two occupational functions in their career due to job rotation. This paper distinguishes two types of job transfers. One is job transfers within an establishment (*idō*) in which employees move to a new section within the same establishment location. The other is job transfers across establishments (*tenkin*) in which employees move to a new establishment location and might need to change their residence.

Company A has a job grading system where each job is given a specific job grade based on evaluation of the job content. Each job grade level corresponds to a certain pay range. Therefore, promotion in this paper means moving up to a higher level of job grade, and it is usually accompanied by an increase in wages. Figure 1 presents the job grade ladders documented in Company A. A solid path indicates a typical route for those who get promoted

and a dotted path represents atypical—but not unusual—cases of promotion. College graduates are usually assigned to J1 at the time of entry and promoted to J2 and then to SA almost automatically. G1-G6 refer to supervisory or managerial positions. There have been relatively few demotions among college-graduate employees in the past, thus, they are omitted from our analysis.

We restricted the sample to those with college degrees to examine only white-collar workers. We exclude those with previous work experience hired during our observation period, and those who experienced temporary transfers out to subsidiaries or affiliated companies for over four years to correctly measure the number of jobs experienced by the worker.

4 Descriptive Statistics

4-1. Basic Statistics

Table 1 shows the basic statistics of our dependent and control variables. Table 2 shows demographic and career outcome variables by gender and educational status. We dropped observations in the year when an employee received wages for less than 12 months when estimating wage equation. The average number of transfers across establishment (Trans Across) and the average number of transfers within establishment (Trans Within) in Table 1 and Table 2 represent the average number of transfers per five years during the observed employment spell. The common-sense view of the Japanese firm is that management-track white-collar workers typically experience a job transfer every three-to five years. Table 1 shows that the sum of the means of Trans Across and Trans Within is 1.14, which is consistent with this view.

Table 2 compares demographic and career outcome variables by gender and educational status. The average number of transfers across establishments is higher when employees have graduate or college degrees than when they have only technical college degrees. However, the average number of transfers within an establishment does not exhibit this tendency. There is little difference in the average number of transfers across establishments by gender for each educational level. On the other hand, the average number of transfers within establishments is higher for male employees than for female employees for each educational level. Although the proportion of women in management positions is smaller than that of men for each educational level, the gap is relatively higher for those with graduate degrees than for those with only college degrees, presumably due to the fact that the average age of women with graduate degrees is much younger than their male counterparts.

4-2. Trend in Job Segregation by Gender

Figure 2 shows changes in the degree of gender job segregation between 1995 and 2014. In this graph we used the model of the Lorenz curve, which is often employed to illustrate the

degree of income inequality in a country. First, we calculated the ratio of female employees in each department and sorted these departments in ascending order of the female ratio. Then we plotted the cumulative portion of female employees on the y-axis and the cumulative portion of male employee on the x-axis. If the gender distribution was perfectly equal, the cumulative ratio of female workers would always be equal with the cumulative ratio of male workers. Such a case would be depicted by a straight 45 degree line where y = x. In a perfectly unequal distribution where all male employees were assigned to one department and all female employees were assigned to another department, the curve would be at y = 0% for all x < 100%, and x = 100% when y = 100% (unequal line). The curve would always be plotted below the 45 degree line and the more segregated the job assignment of female employees is, the more skewed the curve toward the right bottom would be. Figure 2 shows that the job assignment of female workers became increasingly more segregated from FY 1995 to FY 2005, but this trend reversed from FY 2005 to FY 2014. These results presumably reflect a drastic change in Company A's hiring and job assignment policy. Company A used to hire many female employees with two-year college degrees for ancillary routine work and assigned them widely within the organization in supportive roles for men until the 1990s. But those administrative assistant positions have been substantially reduced since then, and the company's recruitment targets among female job candidates completely shifted from two-year college graduates for ancillary routine work to graduate school and four-year college graduates for professional work in the early 2000s. As a result, in FY 2005, young female workers were concentrated in R&D. In recent years, as more business functions have accommodated female college graduates, though, jobs have become less segregated by gender, shifting the Lorenz curve more toward the 45 degree line.

5 Empirical Strategy

5-1. Estimating Promotion Probability

We estimate the following ordered logit model of promotion:

$$\begin{aligned} Y^* = \alpha_0 + \beta' X_{it} + \gamma_1 Female_i + \gamma_2 Marrital\ \ Status_i \quad + \gamma_3 Marriage \times Female_i \\ + \gamma_4 \text{TransAcross}_{i,t-1} + \gamma_5 \text{TransWithin}_{i,t-1} + \quad \delta_k \sum Function_k \\ + \gamma_6 \text{TransAcross}_{i,t-1} \times Female_i + \gamma_7 \text{TransWithin}_{i,t-1} \times Female_i \\ + \quad \eta_k \sum Function_k \times Female_i + u_{it} \qquad (1) \end{aligned}$$

$$Y = j \qquad \text{if} \qquad \alpha_j < Y^* \leq \alpha_{j+1} \qquad j \in \{0,1,\dots,6\} \qquad (2)$$

Y^* is a latent variable for *Y*, which denotes the ten-level job grades consolidated into seven groups（*Y*=0 for J1, J2, SA , Y=1 for SB, Y=2 for G6, Y=3 for G5, Y=4 for G4, *Y* =5 for G3, and *Y* =6 for G2 and G1. Promotions from J1 to J2 and J2 to SA are not counted as promotions here because college-graduate white-collar employees usually get promoted up to SA almost automatically. α_j is a cut off point or threshold parameter and it assumes that $\alpha_1 < \alpha_2 < \cdots < \alpha_6$. X_{it} represents a vector of control variables including age, tenure, educational level, selectivity of college worker *i* graduated [2](5 groups), annual working hours , the length of maternal and parental leave, and the interaction between female and marriage. $\text{TransaAcross}_{i,t-1}$ and $\text{TransWithin}_{i,t-1}$ represent individual *i's* average number of job transfers across and within establishments, respectively, as defined earlier. We use the lagged variables of job transfers in order to exclude a promotion involving movement across organizations from being counted in the number of job transfers on the right-hand side. We are most interested in testing whether the effect of job transfers as a proxy for management training for promotion varies by gender. To test this hypothesis we include the interactions between the female dummy and the two job transfer variables.

$Function_k$ represents occupational function *k* which could be administration, production, R&D, overseas, sales or nursing. u_{it} is the error term and follows logistic distribution conditional on all independent variables. The variables that interact with female (i.e. marriage, TransAcross, TransWithin, Function) are demeaned so that the coefficients of the female dummy in all models are comparable. Standard errors are clustered within the individual.

We also estimated the logit model of promotion conditional on the current job level using the same control variables for the purpose of graphically demonstrating the relationship between job transfers and promotion probability (Figure 3). These are discussed in the Appendix.

5-2. Estimating Wage Equation

Next, we investigate the size of the gender pay gap. We begin with estimating the following Mincerian wage function using OLS:

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2 We use the same category of Japanese university ranking in Kato, Kawaguchi, and Owan (2013), consisting of 5 groups, from Tier 1 to Tier 5. Tier 1 indicates top level national universities, Tier 2 indicates national universities, Tier 3 indicates top level private universities, Tier 4 indicates middle level private universities, and Tier 5 indicates other universities and technical colleges.

$$\begin{aligned}\ln\text{Wage}_{it} = \alpha_0 + \beta' X_{it} + \gamma_1 Female_i + \gamma_2 Marrital\ \ Status_i \\ + \gamma_3 Marriage \times Female_i \quad + \gamma_4 \text{TransAcross}_{i,t-1} + \gamma_5 \text{TransWithin}_{i,t-1} \\ + \quad \delta_k \sum Function_k + \gamma_6 \text{TransAcross}_{i,t-1} \times Female_i \\ + \gamma_7 \text{TransWithin}_{i,t-1} \times Female_i + \quad \eta_k \sum Function_k \times Female_i \\ + u_{it} \qquad (5)\end{aligned}$$

where the dependent variable $\ln\text{Wage}_{it}$ is the logarithm of total annual pay which includes bonus and excludes overtime premium for worker *i* in fiscal year *t*. Other notations of the variable are the same as for the promotion analysis. Standard errors are clustered within the individual.

6 Results

6-1. Promotion Probability: Ordered Logit Model

Table 3 shows the results from the analysis of promotion using an ordered logit model. Model 1 is the baseline model with the most parsimonious specification controlling only for age, tenure, marriage, the cumulated period for maternal leave and education. In Model 2, occupational function dummies are added to Model 1. The average number of transfers within establishment (TransWithin), the average number of transfers across establishments (TransAcross), and their interaction terms with the female dummy are additionally controlled for in Models 3-7. In Model 4, occupational function dummies, the two job transfer variables, and their interactions with *Female* are included. Model 5 allows the occupation effects to differ by gender. We add college selectivity group dummies in Model 6 and lagged working hours in Model 7. All modes control for year effects.

Table 3 shows that the promotion probability of female workers is significantly lower than that of male workers in all models. The coefficient of TransAcross is positive and significant and that of TransWithin is positive but not significant in any of Models 3-7. The result that experiencing transfers across establishments is associated with future promotion is consistent with previous research including Lazear (2012) and Frederiksen & Kato (2011) who find that workers who acquired broader work experience are more likely to get promoted to the level of executive managers.

Furthermore, the coefficients of the interaction terms between TransAcross and female dummy are all significantly positive. This finding that the relationship between the number of job transfers across establishments and the incidence of promotion is stronger for women is our major contribution. Even after controlling for employee's ability in Model 6 and lagged annual working hours in Model 7, this relationship continues to hold. This supports our prediction

mentioned in Section 2 and implies that a higher ability standard to qualify for management training—such as developmental job assignment to broaden the skill set—is set for women. Furthermore, we control for employees' average number of job transfers across establishments when in their twenties in order to examine whether job transfers in their early careers are especially revealing regarding future promotion. The ordered logit models are estimated with samples limited to employees 30 years old and older. The results, shown in Appendix 2 (Table A2), suggest that having broader job experiences in one's twenties is strongly associated with future promotion only for female workers.

As mentioned in Section 2, Lazear & Rosen's (1990) theory implies positive selection for able women. Job rotation is an effective training tool to develop managerial capacity but is costly for the firm because employees lose task-specific human capital. Since women typically have a higher rate of separation, the employer may not want to offer such training opportunities unless their ability is perceived to be very high. As a result, any female worker who receives job rotation may have a higher rate of promotion. Furthermore, similarly to the argument in Kato et al. (2016), able women might consider signaling their commitment to their job by accepting job transfers that require relocation. Transfers accompanied with relocation are costly for employees but especially so for those with family, partners, or aging parents. If the cost associated with transfers between establishments is higher for women, accepting such a request from the firm may work as a stronger signal of commitment to work for women than for men. The result that job transfers in their early careers have a strong relationship with future promotions only for female employees may imply that a firm's selection or a female worker's signaling can occur in the early stages of their careers. Both theories, building on the notion of statistical discrimination, imply the testable hypothesis that promotion might be more strongly associated with the number of job transfers, especially those across establishments, for women than for men. Our study confirms this prediction, offering new evidence for statistical discrimination.

In contrast, the coefficients of the interaction terms between TransWithin and female dummy are significantly negative in both Model 3 and 7. This may imply that job transfers within establishment are mostly not developmental for women—e.g., they need not be intended to broaden work experience and skill sets. If a majority of female workers engages in ancillary administrative work and tends to be perceived as substitutable, their job assignments will be commanded by workplace demand for manpower in ancillary administrative work. Job transfers within establishments are positively associated with later promotion for men while they are negatively associated for women simply because we cannot distinguish between developmental and non-developmental job transfers. In contrast, job transfers across establishments are likely to be mostly offered to those with high ability who have good promotion prospects.

For female workers who are assigned to production and R&D, the gender gap in promotion is significantly narrower. Jobs in R&D are less male-dominant and offer more equal opportunities to women presumably because they are specialist jobs whose tasks are well-defined and less interdependent (thus workers have more schedule control), and overtime working on the jobs is more predictable and thus easier to manage.

In order to graphically demonstrate the economic significance of the effect of gender differences in job assignments, we have estimated the logit model of promotion conditional on current job level and calculate the predictive probability for men and women separately in Figure 3. The estimation results are qualitatively the same as Table 3 and presented in Table A1 (see the Appendix for details). Figure 3 shows that the promotion probability for female workers is lower than that for male workers, and the promotion for neither gender looks correlated with the number of job transfers within establishments. In contrast, the promotion probability is positively associated with the number of job transfers across establishments very mildly for male and more remarkably so for female workers. Notably, the promotion probability for women exceeds that for men when employees experience job transfers across establishments 0.6 times in five years or higher on average.

6-2. Wage Equation

Table 4 shows the results of wage equation estimation using pooled OLS. The description of each model is the same as that of the promotion analysis. The coefficient of the average number of job transfers across establishments and the coefficient of the interaction term with female dummy are significantly positive in Model 4-7. As in the promotion analysis, broader experience has a positive effect on wages and this relationship is stronger for women. The coefficients of the interaction terms between Production/R&D and female dummy are significantly positive. That is, female workers assigned to production and R&D can expect much smaller differences in wages with their male colleagues than those in administrative jobs. In fact, for those in production and R&D, the coefficients of the interaction terms are almost comparable with the absolute value of the coefficient of the female dummy, implying that women in those functions earn as much as male workers with the same characteristics.[3]

6-3. Robustness Check: Separating the effect of human capital from ability

As mentioned above, the results of Tables 3 and 4 can be explained in terms of the positive selection of women and women's signaling to the employer. However, it can also be interpreted as the effect of accumulated human capital through job experience. We conducted an additional

3 We added department fixed effects, which are the smallest unit for jobs within the firm, to all models of wage equation and got the same results as those of Table 5.

analysis in order to separate the effect of accumulated human capital from the effect of the worker's unobserved ability and commitment. We estimated fixed effect models for a linear probability model of promotion and a linear model of wage determination in order to account for unobserved heterogeneity including ability and commitment. Model specifications are the same as in the previous estimation except for that most parsimonious model is excluded in the estimation for fixed effect models.

Table 5 shows the results. For both male and female employees, the effect of job experience entirely disappears. This implies that the employer selects male and female employees with higher ability and motivation and induces them to experience managerial training through job transfers. The above results reveal that the effect of accumulated human capital on promotion is relatively small, if any.

We next examine whether having broader job experience increases an employee's wage after accounting for unobserved worker ability and commitment. Unlike the results for promotion probability, Table 6 shows that broader job experience significantly increases wages for only male employees when controlling for unobserved heterogeneity. If female employees experience job transfer, they tend to have lower wages than otherwise. This result contradicts our earlier result in Table 5, which implies that the positive relationship between job transfer across establishments and the incidence of promotion for female employees in the OLS estimation can be the result of the selection of higher-ability women for broader work experience. Table 6 instead shows that, although job transfer across establishments itself can increase wages, female employees who experience job transfer across establishments have lower wages than male employees who experience job transfer across establishments. This may imply that female employees accept promotions without pay raises much more often than male workers. Booth, Francesconi & Frank (2003) use the data from British Household Panel Surveys and finds that full-time women are promoted as often as men, but receive lower wages as a result of promotion. Our result is consistent with their finding.

In sum, the results show that the employer selects male and female employees with higher ability and motivation and makes them experience broad job assignments, but the causal relationship is ambiguous—there is no clear indication that job transfers help accumulate human capital. Additionally, job transfers increase wages only for the male employees.

7 Conclusion

In this paper, we examined gender differences in job assignment and their relationship with the gender gaps in wages and promotions using the personnel records of a Japanese manufacturing company. As expected, there exist substantial gender wage and promotion gaps and gender segregation within the organization. One important implication of our analysis is

that gender differences in career tracks—whereby most men are on the management trainee track where they receive developmental job assignment to acquire broad skills while only a portion of women receive such intensive training—play more important roles than the differences in occupation or job type. Primarily due to this selection effect, job rotation measures are more closely associated with promotion for women than for men.

Our analysis may have implications for the recent trend among Japanese firms to create a new job category called *limited regular employees* for whom job assignments are confined to a particular region or occupation. In contrast, *regular employees* have been thought to be *unlimited* in the sense that they are expected to accept any job transfers involving relocation or occupational change in exchange for job security under a relational contract. This shift may be just the formalization of an observed bipolarization of female employment to jobs that require acceptance of job transfers and long working hours in exchange for the chance of promotion, and those exempted from relocation and overtime but with no chance of promotion. If the majority of female workers choose the confined employment program, the gender pay gap will persist due to the compensation differential (Imano 2017, Tsuru 2016). If we could eliminate high returns to relocations or long working hours, the distinction between *regular employees* and *limited regular employees* would become irrelevant.

Ninety-five percent of female employees with post-graduate degrees in this firm had majored in science and most of them were assigned to R&D-related divisions. According to our analysis, female employees in production and R&D are not as disadvantaged in terms of wage earnings. Female employees in those functions also get promoted to managerial positions more frequently than in other functions. This may reflect the fact that jobs in R&D are considered to have greater autonomy and discretion and need much less coordination with co-workers. Such jobs are likely to allow for a more flexible working style than other occupations. Goldin (2014) reveals that the gender pay gap tends to shrink in occupations that have lower costs of flexibility, both in theory and empirical analysis. Our results are consistent with Goldin's argument. By contrast, Smith, Smith, and Verner (2013), using Danish employer-employee data, show that vice presidents of R&D have significantly lower chances of being promoted into CEO positions than CFOs and vice presidents of Sales or Production. Therefore, it is not clear whether female workers in R&D can get promoted to the top management positions.

Our analysis also shows that once we control for unobserved worker ability and commitment, experiencing job transfers across establishments does increase wages for men, but does not affect the probability of promotion for either men or women. This might imply that developmental job transfers are offered only to men, and their wages reflect this accumulated human capital. It seems that female employees accept job transfers without pay raises more often than men.

In order to fully reveal how management training is provided differentially to men and women and how it contributes to the gender pay gap, we need to use more precise and extensive measurements for human capital investment, including off-the-job training programs, because job transfers are only one part of the human capital investment a firm can offer its employees.

Appendix

We estimated the following logit model of promotion conditional on the current job level as a function of a number of explanatory variables for the purpose of creating Figure 3. The details on the model and estimation results are discussed below.

$$
\begin{aligned}
Y^* = \alpha_0 + \beta' X_{it} + \gamma_1 Female_i + \gamma_2 Marrital\ \ Status_i \quad + \gamma_3 Marriage \times Female_i \\
+ \gamma_4 \mathrm{TransAcross}_{i,t-1} + \gamma_5 \mathrm{TransWithin}_{i,t-1} + \quad \delta_k \sum Function_k \\
+ \gamma_6 \mathrm{TransAcross}_{i,t-1} \times Female_i + \gamma_7 \mathrm{TransWithin}_{i,t-1} \times Female_i \\
+ \quad \eta_k \sum Function_k \times Female_i + \gamma_8 \mathrm{Joblevel}_{i,t-1} + u_{it} \qquad (3)
\end{aligned}
$$

$$
\mathrm{Y} = \begin{cases} 0, & Y^* < 0 \\ 1, & Y^* \geq 0 \end{cases}
$$

Explanatory variables except for $\mathrm{Joblevel}_{i,t-1}$ are the same as those in equation (1). Y is a binary response variable which takes 1 if the employee's job level in year *t* is higher than that in year *t* -1 and zero otherwise. $\mathrm{Joblevel}_{i,t-1}$ is added in order to account for different evaluation standards across job levels, which was not necessary in the ordered logit model where the thresholds for promotion take care of such differences. Standard errors are clustered within the individual.

The results are almost the same as that of Table 3 for the ordered logit model and they are presented in Table A1.[4] Broader work experience, such as job transfer within and across establishments, is associated with higher promotion probability, but this relationship is especially strong for female workers. Furthermore, female workers engaged in R&D are more likely to get promoted than those in administrative jobs.

[4] The interaction term between dummy variable Overseas and the female dummy is omitted from the logit model but not from the ordered logit model. This is because only one female worker was assigned to international-related business unit in the data used in promotion analysis. Therefore, the coefficient of this interaction term is not reliable.

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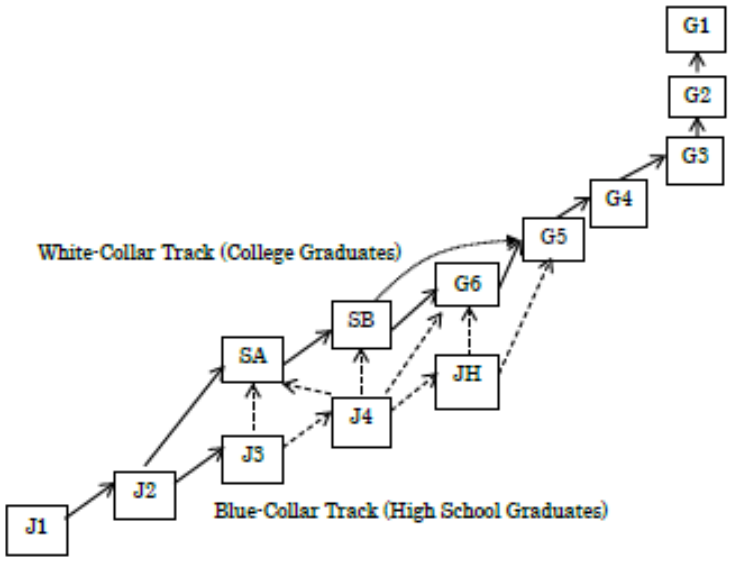
Figure 1. Job Grade System in Company A



Source: Figure 4 in Kato, Ogawa & Owan (2016)

Table 1. Basic Statistics of Dependent and Control Variables

Variable	Obs	Mean	Standard Deviation	Min	Max
Age	15021	36.757	8.224	21	61
Tenure	15021	11.380	8.510	1	40
Marriage	15021	0.691	0.462	0	1
Graduate School	15021	0.533	0.499	0	1
College	15021	0.344	0.475	0	1
Technical College	15021	0.123	0.329	0	1
University Level (Tier 1)	15021	0.241	0.428	0	1
University Level (Tier 2)	15021	0.162	0.369	0	1
University Level (Tier 3)	15021	0.104	0.305	0	1
University Level (Tier 4)	15021	0.076	0.265	0	1
University Level (Tier 5)	15021	0.417	0.493	0	1
Trans Across	15021	0.252	0.428	0	3.333
Trans Within	15021	0.892	0.753	0	4.000
Hours Worked	12974	1896.386	576.963	0	3556.500
Manager	15021	0.549	0.498	0	1
Administration	11936	0.206	0.405	0	1
Production	11936	0.474	0.499	0	1
R&D	11936	0.269	0.444	0	1
Overseas	11936	0.002	0.039	0	1
Sales	11936	0.048	0.213	0	1
Leave Period(Month)	15021	0.271	2.218	0	38
Job Grade 0(J1-SA)	15021	0.262	0.439	0	1
Job Grade 1(SB)	15021	0.189	0.392	0	1
Job Grade 2(G6)	15021	0.135	0.342	0	1
Job Grade 3(G5)	15021	0.196	0.397	0	1
Job Grade 4(G4)	15021	0.157	0.364	0	1
Job Grade 5(G3)	15021	0.054	0.225	0	1
Job Grade 6(G2,G1)	15021	0.008	0.088	0	1
Annual Wage	12657	7561451	2619388	436489	1760000

Table 2. Demographic and Career Outcome Variables by Gender and Educational Status

	Men								
	Graduage School Graduate			College Graduate			Technical College Graduate		
	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation
Age	7380	37.443	7.98	4377	35.580	7.94	1794	40.042	9.04
Tenure	7380	10.711	8.01	4377	10.953	7.90	1794	18.228	9.28
Marriage	7380	0.701	0.46	4377	0.698	0.46	1794	0.787	0.41
Trans Across	7380	0.274	0.44	4377	0.277	0.44	1794	0.100	0.23
Trans Within	7380	0.951	0.79	4377	0.847	0.73	1794	0.907	0.63
Administration	5706	0.126	0.332	3544	0.354	0.478	1652	0.073	0.261
Production	5706	0.458	0.498	3544	0.448	0.497	1652	0.803	0.398
R&D	5706	0.394	0.489	3544	0.299	0.299	1652	0.118	0.323
Overseas	5706	0.002	0.049	3544	0.034	0.034	1652	0.000	0.000
Sales	5706	0.020	0.141	3544	0.296	0.296	1652	0.006	0.078
Manager	7380	0.634	0.482	4377	0.487	0.499	1794	0.608	0.488
Annual Wage	6242	8060655	2547572	3729	7146948	2690922	1559	7996317	2408165

	Women								
	Graduage School Graduate			College Graduate			Technical College Graduate		
	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation
Age	622	31.334	4.357	788	34.539	8.192	60	25.533	2.728
Tenure	622	4.707	4.204	788	10.275	8.301	60	3.750	2.716
Marriage	622	0.564	0.496	788	0.466	0.499	60	0.333	0.475
Trans Across	622	0.271	0.487	788	0.251	0.501	60	0.110	0.373
Trans Within	622	0.596	0.742	788	0.820	0.723	60	0.562	0.793
Administration	343	0.181	0.385	652	0.475	0.499	39	0.026	0.160
Production	343	0.140	0.347	652	0.080	0.287	39	0.744	0.442
R&D	343	0.609	0.489	652	0.313	0.464	39	0.231	0.427
Overseas	343	0.003	0.054	652	0.000	0.000	39	0.000	0.000
Sales	343	0.067	0.250	652	0.121	0.327	39	0.000	0.000
Manager	622	0.257	0.438	788	0.232	0.423	60	0.000	0.000
Annual Wage	474	5591401	1405369	606	5673652	1919164	47	3933842	775308

Figure 2. Lorenz Curve of the Distribution of Women within the Organization

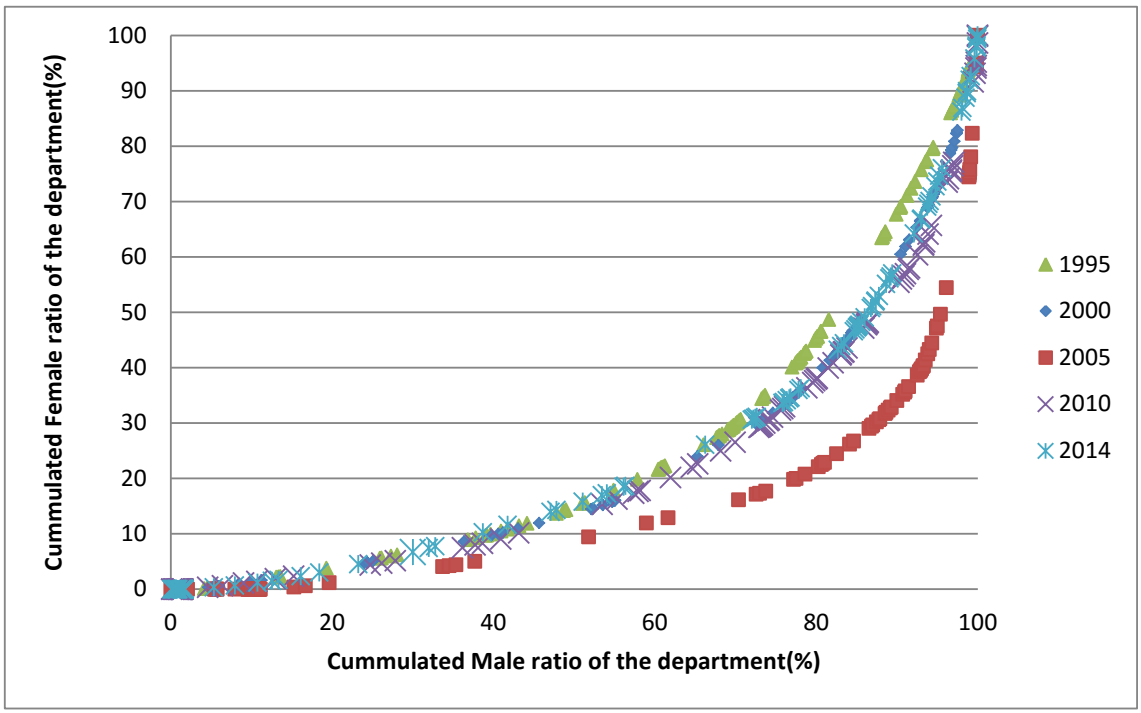


Table 3. Estimation for Promotion Probability: Ordered Logit Model

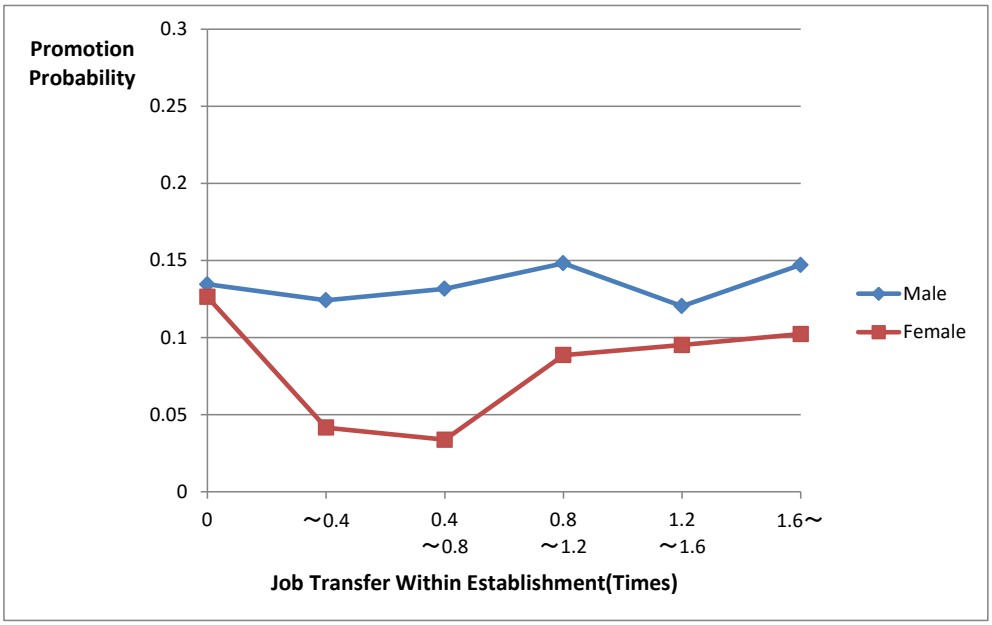
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Graduate School	1.4714 ***	1.9311 ***	1.4729 ***	1.8976 ***	1.9507 ***	1.8980 ***	2.0272 ***
	0.1240	0.1543	0.1253	0.1558	0.1578	0.1595	0.1720
Technical College	−2.3811 ***	−1.8929 ***	−2.2887 ***	−1.8975 ***	−1.8732 ***	−1.3591 ***	−1.0563 ***
	0.2326	0.2538	0.2406	0.2583	0.2592	0.2798	0.3016
Marriage	0.6441 ***	0.6071 ***	0.6050 ***	0.5796 ***	0.5772 ***	0.1587 ***	0.5673 ***
	0.0885	0.1007	0.0906	0.1028	0.1037	0.1043	0.1111
Gender	−1.0282 **	−1.5124 **	−1.1195 ***	−1.6684 ***	−3.0607 ***	−2.7309 ***	−2.6254 ***
	0.4045	0.6435	0.3975	0.6629	1.0936	0.9182	0.0121
Marriage × Gender	0.4144	0.6449	0.3462	0.5429	0.5311	0.3285	0.4468
	0.4899	0.7189	0.4673	0.7036	0.6748	0.6404	0.6196
Leave Period	−0.1077 ***	−0.1009 **	−0.1009 ***	−0.0926 **	−0.0971 ***	−0.0902 **	−0.0683 **
	0.0412	0.0396	0.0362	0.0368	0.0338	0.0312	0.0310
Univ_Ties1						1.2015 ***	1.2093 ***
						0.1294	0.1364
Univ_Ties2						0.9901 ***	1.0135 ***
						0.1387	0.1431
Univ_Ties3						1.2686 ***	1.3545 ***
						0.1792	0.1956
Univ_Ties4						1.0796 ***	1.1472 ***
						0.1956	0.2090
Trans Within(t−1)			0.1486 ***	0.0783	0.0944	0.0726	0.0658
			0.0554	0.0611	0.0616	0.0638	0.0712
Trans Within(t−1) × Female			−0.4349 ***	−0.1748	−0.4944	−0.5397	−0.8562 **
			0.2084	0.3434	0.3372	0.3198	0.3496
Trans Across(t−1)			0.4071 ***	0.2817 ***	0.2733 ***	0.1883	0.3067 ***
			0.0806	0.0914	0.0914	0.0934	0.0976
Trans Across(t−1) × Female			0.9540 ***	1.3040 ***	1.9925 ***	1.9349 ***	1.6056 ***
			0.2422	0.3857	0.6069	0.5177	0.4775
Hours Worked(t−1)							0.0004 ***
							0.0001
Production		−1.2631 ***		−1.1575 ***	−1.2482 ***	−0.9546 ***	−1.0752 ***
		0.1280		0.1289	0.1264	0.1250	0.1413
R&D		−0.9361 ***		−0.8498 ***	−1.0389 ***	−0.9363 ***	−0.9881 ***
		0.1297		0.1329	0.1272	0.1274	0.1414
Overseas		0.0461		0.0635	0.0437	0.3351	0.3100
		0.3733		0.3436	0.3611	0.4410	0.4869
Sales		−0.3759 **		−0.3541 **	−0.1867	−0.2738	−0.2561
		0.1835		0.1804	0.1400	0.1453	0.1728
Production × Gender					1.1593	0.8577	0.9656
					1.0066	0.8855	0.8454
R&D × Gender					2.4402 **	2.3041 ***	2.0558 **
					0.9612	0.8326	0.7622
Overseas × Gender					−11.1823 ***	−10.8775 ***	−11.0422 ***
					1.6334	1.5454	1.4181
Sales × Gender					−1.4878	−1.3267	−1.3973
					1.4664	1.2651	1.1867
Department FE	No	No	No	No	No	No	No
Year, Age, Tenure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15296	12209	15296	12209	12209	12209	9656

Note: The reference group is College Graduate for education, Tier 5 for university levels, and Administration for function.

* p<.1; ** p<.05; *** p<.01

Figure 3. Probability of promotion for each range of average number of job transfers

<Job Transfer Within Establishment>



<Job Transfer Across Establishments>

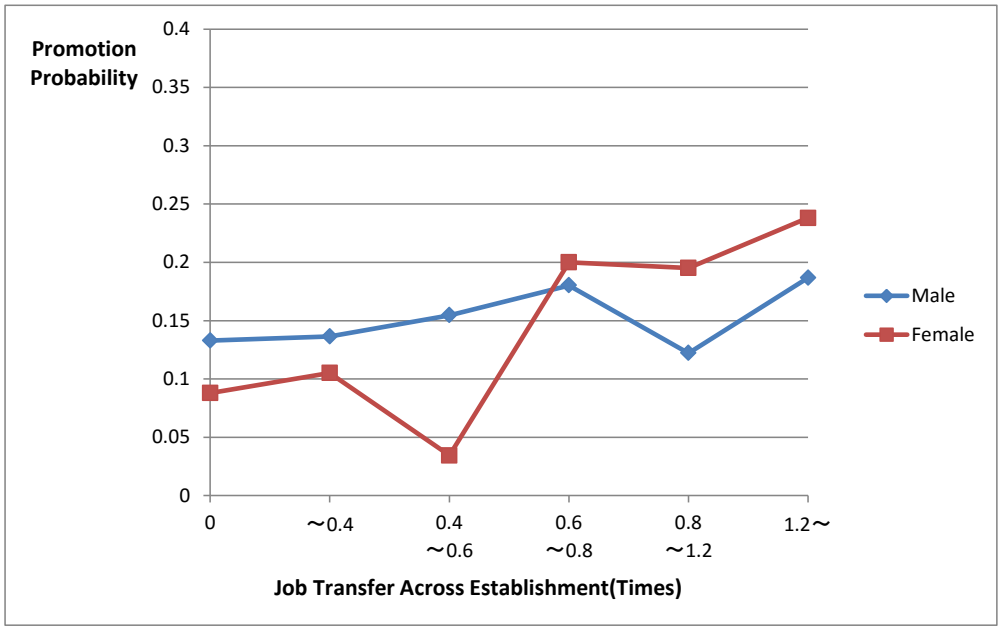


Table 4. OLS Estimation for Wage Equation

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Graduate School	0.1393 ***	0.1749 ***	0.1398 ***	0.1723 ***	0.1735 ***	0.1590 ***	0.1643 ***
	0.0098	0.0118	0.0101	0.0121	0.0120	0.0111	0.0112
Technical College	−0.0991 ***	−0.0747 ***	−0.0947 ***	−0.0747 ***	−0.0738 ***	−0.0400 ***	−0.0440 ***
	0.0126	0.0148	0.0130	0.0150	0.0148	0.0154	0.0162
Marriage	0.0722 ***	0.0694 ***	0.0683 ***	0.0664 ***	0.0658 ***	0.0643 ***	0.0620 ***
	0.0079	0.0093	0.0077	0.0091	0.0090	0.0084	0.0087
Gender	−0.0302	−0.0661 **	−0.0531 **	−0.0806 **	−0.1663 ***	−0.1554 ***	−0.1521 ***
	0.0184	0.0261	0.0232	0.0318	0.0433	0.0384	0.0384
Marriage × Gender	−0.0644 **	−0.0706 *	−0.0557 *	−0.0675 *	−0.0638 *	−0.0714 **	−0.0711 **
	0.0292	0.0419	0.0311	0.0442	0.0394	0.0361	0.0341
Leave Period	−0.0197 ***	−0.0196 ***	−0.0184 ***	−0.0186 ***	−0.0198 ***	−0.0187 ***	−0.0774 ***
	0.0030	0.0037	0.0031	0.0038	0.0034	0.0032	0.0151
Univ_Ties1						0.0870 ***	0.0896 ***
						0.0101	0.0098
Univ_Ties2						0.0810 ***	0.0805 ***
						0.0100	0.0102
Univ_Ties3						0.0973 ***	0.1055 ***
						0.0147	0.0154
Univ_Ties4						0.0765 ***	0.0774 ***
						0.0147	0.0151
Trans Within(t−1)			0.0178 ***	0.0095 *	0.0101 *	0.0071 **	0.0033
			0.0047	0.0051	0.0051	0.0049	0.0053
Trans Within(t−1) × Female			−0.0357 **	−0.0160	−0.0329 *	−0.0296	−0.0304
			0.0149	0.0213	0.0221	0.0203	0.0217
Trans Across(t−1)			0.0560 ***	0.0447 ***	0.0421 *	0.0320 ***	0.0331 ***
			0.0066	0.0074	0.0073	0.0072	0.0073
Trans Across(t−1) × Female			0.0196	0.0466 *	0.0681 ***	0.0692 ***	0.0649 ***
			0.0187	0.0269	0.0256	0.0238	0.0233
Hours Worked							0.0001 ***
							0.0000
Production		−0.0968 ***		−0.0878 ***	−0.1002 ***	−0.0695 ***	−0.0822 ***
		0.0097		0.0100	0.0096	0.0093	0.0097
R&D		−0.0567 ***		−0.0525 ***	−0.0729 ***	−0.0584 ***	−0.0625 ***
		0.0107		0.0111	0.0100	0.0096	0.0103
Overseas		0.0063		−0.0123	−0.0111	0.0218	0.0332
		0.0559		0.0472	0.0528	0.0514	0.0599
Sales		−0.0060		−0.0044	0.0116	0.0054	0.0037
		0.0165		0.0163	0.0106	0.0112	0.0129
Production × Gender					0.1542 ***	0.1395 ***	0.1430 ***
					0.0443	0.0414	0.0391
R&D × Gender					0.1707 ***	0.1730 ***	0.1743 ***
					0.0513	0.0469	0.0450
Overseas × Gender					−0.0130	0.0011	−0.0169
					0.0689	0.0654	0.0711
Sales × Gender					−0.0765	−0.0562	−0.0458
					0.0667	0.0579	0.0584
Department FE	No	No	No	No	No	No	No
year,age,tenure,edu	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15296	12209	15296	12209	12209	12209	8282

Note: The reference group is College Graduate for education, Tier 5 for university levels, and Administration for function.

* p<.1; ** p<.05; *** p<.01

Table 5. Estimation for Promotion Probability: Linear Probability Fixed Effect Model

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Marriage	0.0368 **	0.0513 ***	0.0372 **	0.0373 **	0.0311 *
	0.0179	0.0161	0.0179	0.0179	0.0204
Marriage × Gender	0.0929	0.0549	0.0746	0.0783	0.0809
	0.0473	0.0425	0.0495	0.0496	0.0509
Leave Period	−0.0065 **	−0.0078 ***	−0.0064 **	−0.0062 **	−0.0033
	0.0027	0.0024	0.0027	0.0027	0.0031
Trans Within(t−1)		0.0071	0.0077	0.0077	0.0215
		0.0094	0.0102	0.0102	0.0118
Trans Within(t−1) × Female		−0.0269	−0.0085	−0.0088	−0.0329
		0.0261	0.0304	0.0304	0.0332
Trans Across(t−1)		0.0099	0.0128	0.0126	0.0209
		0.0128	0.0156	0.0156	0.0178
Trans Across(t−1) × Female		0.0332	0.0502	0.0561	0.0594
		0.0310	0.0380	0.0384	0.0404
Hours Worked(t−1)					0.0000
					0.0000
Production	0.0243		0.0259 *	0.0218	0.0080
	0.0151		0.0152	0.0156	0.0188
R&D	0.0134		0.0153	0.0105	0.0122
	0.0171		0.0171	0.0179	0.0217
Overseas	0.1220		0.1193	0.1161	0.1640
	0.1060		0.1060	0.1061	0.1185
Sales	0.0154		0.0148	0.0116	0.0237
	0.0268		0.0268	0.0288	0.0356
Production × Gender				0.0791	0.0848
				0.0725	0.0778
R&D × Gender				0.0653	0.0619
				0.0638	0.0666
Overseas × Gender				−	−
				−	−
Sales × Gender				0.0464	0.0353
				0.0815	0.0849
Department FE	No	No	No	No	No
Year, Age, Tenure	Yes	Yes	Yes	Yes	Yes
N	11936	15021	11936	11936	10390

Note: The reference group is College Graduate for education and Administration for function.

* p<.1; ** p<.05; *** p<.01

Table 6. OLS Estimation for Wage Equation – Fixed Effect Model

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Marriage	0.0244 **	0.0276 ***	0.0295 ***	0.0298 ***	0.0255 ***
	0.0050	0.0050	0.0054	0.0054	0.0062
Marriage × Gender	−0.0524	−0.0507	−0.0418	−0.0411	−0.0495
	0.0128	0.0134	0.0152	0.0152	0.0158
Leave Period	−0.0278 ***	−0.0240 ***	−0.0275 ***	−0.0275 ***	−0.0309 ***
	0.0011	0.0010	0.0011	0.0011	0.0012
Trans Within(t−1)		0.0053 *	0.0057 *	0.0057 *	0.0000
		0.0030	0.0032	0.0032	0.0037
Trans Within(t−1) × Female		−0.0278 ***	−0.0410 ***	−0.0410 ***	−0.6318 **
		0.0088	0.0101	0.0101	0.0110
Trans Across(t−1)		0.0129 ***	0.0126 ***	0.0127 ***	0.0111 **
		0.0041	0.0048	0.0048	0.0055
Trans Across(t−1) × Female		−0.0126	−0.0176	−0.0167	−0.0279 **
		0.0104	0.0125	0.0126	0.0133
Hours Worked					0.0001 ***
					0.0000
Production	−0.0024		0.0001 *	−0.0006	0.0035
	0.0046		0.0046	0.0047	0.0055
R&D	0.0032		0.0046	0.0016	0.0102
	0.0052		0.0052	0.0054	0.0063
Overseas	0.0488		0.0482	0.0469	0.0244
	0.0309		0.0319	0.0319	0.0345
Sales	−0.0015		−0.0002	−0.0018	0.0627
	0.0083		0.0084	0.0090	0.0108
Production × Gender				−0.0127	−0.0680 ***
				0.0233	0.0256
R&D × Gender				0.0498 **	0.0347
				0.0211	0.0222
Overseas × Gender				−	−
				−	−
Sales × Gender				0.0266	0.0188
				0.0258	0.0270
Department FE	No	No	No	No	No
year,age,tenure,edu	Yes	Yes	Yes	Yes	Yes
N	11936	15021	11936	11936	8283

Note: The reference group is College Graduate for education and Administration for function.

* p<.1; ** p<.05; *** p<.01

Table A1. Estimation for Promotion Probability: Logit Model

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Graduate School	0.8990 ***	1.0430 ***	0.9093 ***	1.0432 ***	1.0728 ***	1.0612 ***	1.1903 ***
	0.0783	0.0975	0.0789	0.0987	0.0996	0.1051	0.1112
Technical College	−0.5433 ***	−0.2836 *	−0.5553 ***	−0.3189 **	−0.3212 **	−0.0434	−0.0234
	0.1381	0.1459	0.1395	0.1465	0.1465	0.1617	0.1762
Marriage	0.3397 ***	0.3386 ***	0.3187 ***	0.3223 ***	0.3206 ***	0.3337 ***	0.3246 ***
	0.0601	0.0692	0.0610	0.0701	0.0709	0.0719	0.0789
Gender	−0.4295 ***	−0.7272 ***	−0.8300 ***	−1.0406 ***	−1.4784 ***	−1.2445 ***	−1.2395 ***
	0.1599	0.2278	0.2186	0.2896	0.3427	0.2999	0.3267
Marriage × Gender	0.1431	0.2450	0.1865	0.2330	0.2407	0.2038	0.3267
	0.2192	0.3053	0.2133	0.2893	0.2836	0.2816	0.2741
Leave Period	−0.0726 ***	−0.0585 ***	−0.0655 ***	−0.0551 ***	−0.0587 ***	−0.0539 ***	−0.0329 **
	0.0178	0.0189	0.0168	0.0183	0.0174	0.0162	0.0161
Univ_Ties1						0.7854 ***	0.7104 ***
						0.0917	0.0937
Univ_Ties2						0.6526 ***	0.5470 ***
						0.0935	0.0977
Univ_Ties3						0.7548 ***	0.6575 ***
						0.1154	0.1226
Univ_Ties4						0.6451 ***	0.6832 ***
						0.1225	0.1233
Trans Within(t−1)			0.0641 *	0.0569	0.0607	0.0533	0.0349
			0.0377	0.0434	0.0437	0.0438	0.0463
Trans Within(t−1) × Female			−0.4490 **	−0.2936	−0.3440 *	−0.3925 **	−0.5224 ***
			0.1470	0.1985	0.1923	0.1915	0.1932
Trans Across(t−1)			0.1890 ***	0.1086	0.1010	0.0376	0.0899
			0.0512	0.0664	0.0670	0.0696	0.0712
Trans Across(t−1) × Female			0.4251 ***	0.6424 ***	0.7742 ***	0.8484 ***	0.7668 ***
			0.1558	0.1874	0.2104	0.2014	0.2073
Hours Worked(t−1)							0.0004 ***
							0.0001
Production		−0.7557 ***		−0.7146 ***	−0.7735 ***	−0.6191 ***	−0.6720 ***
		0.0872		0.0898	0.0918	0.0933	0.1033
R&D		−0.5207 ***		−0.4888 ***	−0.5804 ***	−0.5348 ***	−0.5852 ***
		0.0926		0.0943	0.0976	0.0998	0.1059
Overseas		−0.2389		−0.2241	−0.1885	0.0647	0.1529
		0.5579		0.5496	0.5557	0.6247	0.6730
Sales		−0.1780		−0.1577	−0.0589	−0.0838	−0.0868
		0.1379		0.1325	0.1261	0.1263	0.1461
Production × Gender					0.6844 ***	0.5642	0.6817
					0.3608	0.3660	0.3574
R&D × Gender					0.8335 ***	0.8692 ***	0.8503 ***
					0.3209	0.3084	0.2980
Overseas × Gender					−	−	−
					−	−	−
Sales × Gender					−0.5443	−0.5445	−0.5685
					0.5033	0.4749	0.4657
Department FE	No	No	No	No	No	No	No
Year, Age, Tenure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15021	11936	15021	11936	11935	11,936	9430

Note: The reference group is College Graduate for education, Tier 5 for university levels, and Administration for function.

* p<.1; ** p<.05; *** p<.01

Table A2. Estimation for Promotion Probability (The number of job transfers across establishments in twenties is added): Ordered Logit Model

Variable	Model 1		Model 2		Model 3	
Graduate School	2.4306	***	2.3851	***	2.3995	***
	0.2085		0.2073		0.2139	
Technical College	−2.0720	***	−1.6135	*	−1.2926	***
	0.3153		0.3350		0.3500	
Marriage	0.6584	***	0.6556	***	0.6336	***
	0.1255		0.1250		0.1333	
Gender	−4.0027	***	−3.4996	***	−3.3163	***
	1.2748		1.1301		1.1345	
Marriage × Gender	0.5097		0.2626		0.2441	
	0.9047		0.8987		0.8771	
Leave Period	−0.0840	**	−0.0783	**	−0.0558	
	0.0404		0.0372		0.0365	
Univ_Ties1			1.3991	***	1.4498	***
			0.1596		0.1658	
Univ_Ties2			1.1872	***	1.2293	***
			0.1717		0.1770	
Univ_Ties3			1.5274	***	1.5818	***
			0.2237		0.2392	
Univ_Ties4			1.2315	***	1.3038	***
			0.2271		0.2420	
Trans Within(t−1)	0.1024		0.0706		0.0722	
	0.0758		0.0783		0.0857	
Trans Within(t−1) × Female	−0.2440		−0.3898		−0.8081	
	0.5261		0.5003		0.5054	
Trans Across(t−1)	0.2762	*	0.2197		0.3479	**
	0.1495		0.1563		0.1652	
Trans Across(t−1) × Female	1.5481	*	1.5600	**	1.2644	***
	0.9307		0.7831		0.7956	
TransAcross_20	−0.2912		−0.9487		−1.2715	*
	0.7107		0.7225		0.7259	
TransAcross_20 × Gender	6.2843	*	6.0061	**	5.5856	**
	3.2689		2.8378		2.6587	
Hours Worked					0.0004	***
					0.0001	
Production	−1.5837	***	−1.1738	***	−1.3059	***
	0.1649		0.1653		0.1807	
Production × Gender	1.6615		1.1897		1.1733	
	1.2286		1.1023		1.0952	
R&D	−1.4695	***	−1.2886	***	−1.3902	***
	0.1625		0.1621		0.1779	
R&D × Gender	3.2747	***	3.0067	***	2.7978	***
	1.1933		1.0487		0.9842	
Overseas	−0.6447		−0.3724		−0.7174	
	0.5435		0.6891		0.5874	
Overseas × Gender	−		−		−	
	−		−		−	
Sales	−0.2239		−0.3305	*	−0.3865	*
	0.1782		0.1905		0.2282	
Sales × Gender	−2.2959		−2.0659		−2.1056	
	1.6009		1.4535		1.3434	
Department FE	No		No		No	
Year, Age, Tenure	Yes		Yes		Yes	
N	7692		7692		6190	

Note: The reference group is College Graduate for education, Tier 5 for university levels, and Administration for function. “TransAcross_20” is the number of transfers across establishments in twenties.

* p<.1; ** p<.05; *** p<.01