Gender-Wage Difference in Japanese Affiliated Subsidiaries in China, a Statistical Analysis Using Intra-firm Personal Data

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Abstract

This paper examines male-female wage determination and gender wage discrimination in Japanese affiliated subsidiaries in China using intra-firm personal data. It is found that female wages in a Japanese enterprise can be explained by the human capital model, but that gender wage gaps not explained by observed differences in productivity still exist, accounting for about 71% by the Oaxaca (1973) decomposition method. The estimated results of the wage equation indicate that female employees receive lower returns on experiences compared to their male counterparts and, similar to firms in Japan, marriage has a negative effect on female wages. But returns on tenure and education level seem to have no gender differences, considering that the proportion of female managerial staff in China is larger than most firms in Japan. It seems that Japanese firms make better use of female employees in China than they do in Japan.

Key words: Gender wage differences; Discrimination; Female employment

1. Introduction

Substantially lower wages are paid to female workers than to male workers in many countries, especially Japan. Among developed countries, Japan and Korea's gender wage gaps are the largest. The wage differential is caused by many factors, two of which stand out from the previous literature.

One, this paper's explainable component, is a difference in productivity; the other, this paper's unexplained component, is often referred to as discrimination. So called statistical discrimination is a major contributor to the large wage gap in Japan. Most Japanese females work in their twenties, resign when they marry or become pregnant around 30 years old, and then return to work later. This process makes the trend of the female labor supply similar to the shape of the letter M. Because of shorter female tenures compared to male employees, employers are not willing to investment in females since their returns are smaller. Compared to Japan, most female employees in China do not resign after marrying or becoming pregnant. They continuously work until retirement like males. For this reason, assuming that other conditions are the same, wage differences in China would be expected to be smaller than in Japan. However, because this is not the case, we can say that Japanese enterprises exploit female workers more in China than in Japan. We are interested specifically in gender differences in wage and treatment within Japanese enterprises embarking in China.

In this paper, we will research a Japanese firm embarking in China by interview and statistical analysis. We will examine the wage difference by estimating the wage function, and then decompose the two factors, the explained component and the unexplained component.

The rest of the paper is organized as follows. Section 2 lays out the previous studies on gender wage difference in Japan and China. Section 3 introduces the firm under investigation and the data. Section 4 discusses the research method. Section 5 shows the estimation results, and conclusions are discussed in Section 6.

2. Previous studies and hypothesis

There are many empirical studies that analyze gender wage differences in Japan and China. What is the cause of it? Can it be explained in terms of human capital, statistical discrimination, employer discrimination, or discrimination due to choice of occupation? (Abe 2005) The answer is different for each country.

To analyze the cause of gender wage difference in Japan, Kawaguchi (2005) tested the effects of marriage and children. It was found that marriage has a positive effect on male wage but no effect on female wage, while having children has a positive effect on male wage but a negative effect on

female wage. Sano (2005) and Kawaguchi (2007) tested the existence of employer discrimination using Japanese firm level panel data. Their results fail to reject the hypothesis that employer discrimination is a source of the male-female wage gap. However, the estimated effect on profit of female employees is one twentieth of the predicted coefficient, which they calculated based on the assumption that the gender wage gap is a product of gender discrimination. This result suggests that the large portion of the gender wage gap is due to differences in gender productivity. However, Nakada(1997) found that the gender productivity gap is due to the tenure gap between males and females. Most Japanese females retire after marriage or having children, which leads to shorter tenure compared to males. Thus, employers are more willing to invest in male employees than female employees. As a result, the accumulated productivity of females is smaller compared to males.

Yashiro (1980), classifying factors for the gender wage gap into level of education, size of firm, and length of tenure, found that tenure can explain 46.8% of the gap. Ogura (2004), researching a firm where the tenure of females had become as long as males, found that the gender wage gap had clearly decreased. However, the main factor in raising the average female wage was the birth of the high wage female employee. Wages of other female employees were still as low as before.

Regarding the cause of the gender wage gap in China, most studies discuss the effect of market liberalization on the earnings of Chinese females. For example, Meng(1998) examined male-female wage determination and gender wage discrimination in the newly developed rural industrial sector in China using survey data. It was found that since the labor market was liberalized, wage discrimination has accounted for all non-market gender wage differences, while accounting for only two thirds of differences within the market. Dong, Fiona, and Bowles (2004) argued that labor segmentation exists along gender lines in the newly privatized township and village enterprises in rural China. The result based on surveys indicates that there is a clear gender bias in favor of males.

The labor market in China is very complicated compared to Japan. The gender wage gap is related not only to differences in productivity, but also to region within China, type of occupation, size of firm, and type of firm. Furthermore, the size of the female labor supply is higher than in Japan. Mat-

sushige.,Xu (2002) found no gender gap in promotion opportunities or wages among managerial staff using survey data from four Japanese firms in Dalian. Ma (2007) estimated the causes of the gender wage gaps within Japan and China using survey data. It was found that the gender wage gap in Japan is larger than in China, the most important factor being the difference in length of tenure between Japanese and Chinese females.

However, there is still no data on female employees working at Japanese affiliated subsidiaries in China. Intra-firm personal data, although difficult to obtain, is necessary to study this issue. This study attempts to estimate the gender wage difference by intra-firm personal micro data from a Japanese firm in Shandong, China. First, the causes of gender wage gaps are tested by estimating the wage equation. Then, the composition of the gender wage gap is analyzed using the method of Oaxaca (1973), splitting the total gender wage differential into two components, an explained component and an unexplained component, by observed productivity characteristics.

3. Firm introduction and data

The firm under investigation is a Japanese capital enterprise in rural Qingdao, Shandong Province, China. It was established in April 2000 with $7,390,000, 92% of which is from a manufacturing firm and 8% from a trading company. The firm produces electronic parts and mainly supplies Japanese firms located in the area. There are 359 Chinese employees and 2 Japanese managers. The descriptive statistics of Chinese employees by gender is presented in Table 1. We can see that the mean hourly wage of females is 5.08 yuan (about 80 yen), which is less than the mean male hourly wage of 8.35 yuan (about 130yen). The age and length of tenure of males and females is similar, about 25 years and 2.5 years, respectively. But the mean education between genders is quite different. The mean level of education of females is about 1.64 years less than males. About 31% of males and 44% of females have been married. 31% of males and 33% of females have children. Finally, there are 287 female employees, and 72 male employees. Yet, regarding the managerial staff, 31 are female and 28 are male, which means that most female employees are working at the production lines.

To understand the method for female wage determination in the firm, it would be useful to first introduce the female child-care leave system. Like most firms in Shandong Province, female employees who become pregnant

can take a five-month vacation and enjoy one hour per day to nurse until the baby is one year old. In this firm, females are moved to a suitable position before their vacation and return to a reasonable position when the vacation ends. Although females are somewhat more complicated than males, the firm likes female employees and employs females as an aggressive means to a target.

The strategy of a firm usually affects its human resource management. The firm's chief embarkation target in China is to decrease production cost. As we can see from Table 1, the labor cost is by far cheaper than in Japan, where the hourly wage is about 700 yen. Following its embarkation strategy, this firm employs a starting pay of minimum wage. Therefore, employee attachment is not strong; the mean tenure is only about 2.5 years, which is shorter than the seven-year history of the firm. On the job training is not considered as important as it is in Japan; new recruits only receive basic skill training. Salary increases and promotions are not performed every year like they are in Japan. Instead, employees can be promoted at any time they are seen competent enough.

As explained by the general manager, the firm has been stagnant in recent years because the headquarters in Japan has not sent orders. At the same time, more and more plants and companies have been established in the area. This raises the demand of the labor market, making it difficult to sew up a large enough cheap labor force. People change jobs for higher wages, especially young males seeking work in the city to supplement their income; young females often remain in their hometowns to care for their families. This leads to a larger supply of females compared to males, which might decrease the wage level for females. In the following section, the gender wage difference will be analyzed.

The empirical analysis of this paper is based on personnel micro data collected from the firm in summer 2007; the data covers age, length of tenure at the firm, level of education, gender, job duties, monthly wage, monthly working hours, overtime working hours, marital status, numbers of children, various allowances, and deductions.

4. Methodology

1) Model 1

The following model is used to estimate the wage equation by OLS

method.

$$\log w_i = \alpha + \sum_{j=1}^{k} \beta_j x_{ij} + u_i \quad (i = 1, 2, \ldots, n) \qquad (1)$$

$\log w_i$	Natural log hourly wage
α	Constant term
x_i	Years of experience[i]
	Squared years of experience
	Cross term of experience and gender
	Years of tenure
	Squared years of tenure
	Cross term of tenure and gender
	Dummy variable of gender[ii]
	Dummy variable of high school education
	Dummy variable of university education
	Dummy variable of managerial position
	Cross term of managerial position and years of tenure
	Cross term of managerial position and gender
	Number of children
	Cross term of number of children and gender
	Dummy variable of marital status
	Cross term of marital status and gender
	Cross term of high school education and gender
	Cross term of university education and gender
β_i	Coefficients of x_i
u_i	Error term

The dependent variable $\log w_i$ is the log hourly wage derived by dividing the monthly wage by time worked per month. For the independent variables x_i years of experience and its square, years of tenure and its square, dummy variables of education level are used as observed productivity characteristics. Also, dummy variables of gender and its cross terms are used to test differences in the gender wage structure. This is to say that the wage structure is different between females and males in the firm if any coefficient of gender and its cross term has a significant result. A positive coefficient indicates that the estimate for females is lower than males, and a negative coefficient

indicates that it is higher than males.

2) Model 2

As shown in Table1, the mean hourly wage of females is about 3.27 yuan less than males. How did this gap occur? According to the human resource method (Becker 1973), it is due to the quantity gap in observed productivity characteristics: for example, age, years of tenure, years of experience and education level. The more human capital an employee has accumulated, the higher that person's wage is. The lower average education level of females might be one of the factors leading to lower wages for females. At the same time, different evaluations of the same human capital could also lead to a wage difference. Therefore, the respective importance of the two factors must be investigated.

Here the procedure developed by Oaxaca (1973) to analyze the composition of the gender wage gap, which splits the total gender wage differential into two components, is employed. One part of the differential is attributable to gender differences in observed productivity characteristics, and the other is the residual gap attributable to differences in male and female returns to these observed characteristics. This residual, or unexplained, component of the wage gap is generally attributed to discrimination, but it could be due to differences in unobserved productivity characteristics. In this analysis, decompositions of the gender wage gap calculated using the Oaxaca (1973) method under the assumption that the male wage structure would be the nondiscriminatory wage structure, as is likely in Chinese labor market, are presented. In the first step, the wage equation is regressed by gender using OLS method like model 1, except for the dummy variable of gender and its cross terms, to get the evaluation of male and female human capital.

$$\log w_i = \alpha^f + \sum_{j=1}^{k} \beta_j^f x_{ij} + u_i \quad (i \in F) \qquad (2)$$

$$\log w_i = \alpha^m + \sum_{j=1}^{k} \beta_j^m x_{ij} + u_i \quad (i \in M) \qquad (3)$$

Where F is female employees set and M is male employees set. $F \cap M = \phi, F \cup M = \{1,2,...,n\}$.

In the second step, the two factors of explained component and unexplained component are calculated based on the male employees using regressed results as following.

$$\overline{\log w^f} = \hat{\alpha}^f + \sum_{j=1}^{k} \hat{\beta}_j^f \overline{x_j^f}$$

$$\overline{\log w^m} = \hat{\alpha}^m + \sum_{j=1}^{k} \hat{\beta}_j^m \overline{x_j^m}$$

Where

$$\overline{\log w^f} = E\left[\sum_{i\in F} \log w_i\right] , \overline{\log w^m} = E\left[\sum_{i\in M} \log w_i\right], \overline{x_j^f} = E\left[\sum_{i\in F} x_{ij}\right] , \overline{x_j^m} = E\left[\sum_{i\in M} x_{ij}\right]$$

Then

$$\overline{\log w_i^m} - \overline{\log w_i^f} = \alpha^m + \sum \beta_i^m \bar{x}_i^m - \alpha^f - \sum \beta_i^f \bar{x}_i^f \qquad (4)$$

$\overline{\log w_i^m}$ and $\overline{\log w_i^f}$ are the average male and female hourly wages, respectively. $\bar{x}_i^m$ and $\bar{x}_i^f$ are the average observed productivity characteristics for males and females, respectively. Equation (4) could be rewritten as follows:

$$\overline{\log w_i^m} - \overline{\log w_i^f} = [\sum \beta_i^m \left(\bar{x}_i^m - \bar{x}_i^f\right)] - [\sum \bar{x}_i^f (\beta_i^m - \beta_i^f) + \alpha^m - \alpha^f] \qquad (5)$$

The first term on the right side of equation (5) is the differential attributable to gender differences in observed productivity characteristics, while the left terms yield the unexplained component: the wage gap due to differences in male and female returns on these observed productivity characteristics, which is generally attributed to discrimination. There is an index number issue regarding the possibility that equation (5) could also be written base on the female standard, which would yield different results for the two components.

5. Empirical results

This study first examines the wage profile difference between males and females. Table 2 reports the results of the wage equation estimated. As Becker's human resource method indicates, the rates of return on experience, length of tenure, and education level are all statistically significant for a positive value. This indicates that wage increases with a lot of experience, a long tenure, or a high level of education for both males and females, and the positive effect of tenure and experience decreases as time goes by. It can also be estimated that the wages of managers are higher than the wages of workers. However, the rates of return on the observed productivity charac-

teristics are not all the same between males and females. As can be seen, the results of gender cross terms, cross terms of experience and gender and cross terms of marital status and gender are statistically significant for negative values, indicating that the returns on experience and marital status for females are lower compared to males, and the coefficient of the cross terms of length of tenure and gender is negative even though it is not statistically significant at the 10% level. Cross terms of managerial position and gender, cross terms of number of children and gender, and cross terms of education level and gender were also not statistically significant at the 10% level. It seems that female employees receive similar treatment inside this firm.

Nevertheless, the female employees are exploited as there is still a gender wage gap. As can be seen from the estimated results, the female employees receive lower returns compared to males. The next estimate determines how much the female penalty is. Table 4 shows the results from a decomposition analysis following Oaxaca's (1973) procedure. The total predicted gender wage differential of 0.4364 (as calculated in the natural logarithm) was divided into an explained and unexplained component. The explained component was estimated to add up to 0.1240, about 29% of the total gender wage gap, and the unexplained component summed up to 0.3104, about 71% of the total gender wage gap.

6. Conclusions

This paper examines male-female wage determination and gender wage discrimination in a Japanese affiliated subsidiary in China using intra-firm personal data. First, the wage difference is examined by estimating the wage equation. Then, the factors of the explained and unexplained components are decomposed.

From the wage regression by the OLS method, it appears that compared to males, returns on experience is lower for female employees. This result corresponds with other studies about China's gender wage gaps. Considering that the firm examined is located in a new town that was in the countryside before the economic reform, the lower returns perhaps proceed from the character of the regional labor market. Males seek work in the major cities to supplement their income, while females remain in their hometowns to take care of their families. Thus, there is a larger female labor supply.

Employers in the region might have a special bias against female employees, paying lower wages to them than to male employees. Considering that Chinese females do not resign after marrying or becoming pregnant as Japanese females, statistical discrimination might be weaker compared to Japan. However, as said by the personal department manager during an interview, female employees on maternity leave or nursing babies are given positions that make it easy for them to care for their children according to the labor law. This period might cause female employees to increase their productivities, making their returns on tenure lower than male employees. However, the estimate coefficient is not statistically significant at the 10% level. Other factors that might influence different returns are marital status, number of children, and level of education. It was found that female married employees receive lower wages than male married employees, but level of education and the number of children have no gender difference.

The gender wage gaps were also decomposed according to the Oaxaca (1973) decomposition method for the explained and unexplained components. About 71% of the wage gaps could not explain by observer productivity characteristics.

From these results, it appears that female employees receive poor treatment compared to male employees when entering the firm. However, estimated results of the wage equation fail to support that there is gender discrimination inside the firm. Considering that there are 31 female managers and 28 male managers, as presented in Table 1, it seems that the Japanese firm takes advantage of its female employees in China.

Finally, all the conclusions are based on estimated results from cross-section data. There might be a bias regarding latent personal ability that could not be controlled for, which may influence the value and statistical significance of the coefficients. Panel data is necessary to obtain a better estimate in the future. In addition, this paper researched only one enterprise. The results cannot be interpreted as representative for all possible cases. More studies are expected to analyze the gender wage different in Japanese affiliated subsidiaries in China in the future.

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Appendix

Table 1. descriptive statistics of the firm

	Variable	Obs	Mean	Std. Dev.	Min	Max	manager
Male	hourly wage	72	8.35	4.38	3.78	23.98	28
	age		25.71	6.62	17.00	53.00	
	education years		11.32	1.91	9.00	16.00	
	tenure		2.42	2.13	0.08	6.92	
	married person		0.31	0.46	0.00	1.00	
	kids		0.31	0.55	0.00	2.00	
Female	hourly wage	287	5.08	2.33	0.00	24.53	31
	age		25.06	4.83	16.00	49.00	
	education years		9.68	1.43	9.00	16.00	
	tenure		2.61	2.39	0.08	7.17	
	married person		0.44	0.50	0.00	1.00	
	kids		0.33	0.51	0.00	2.00	
Total		315					59

Table2. Result estimates of the wage equation

dependent variable: natural log hourly wage

	Coef.	Std. Err.	Sign.level
Experience	0.0371	0.0111	***
Squared years of experience	−0.0006	0.0002	***
Cross term of experience and gender	−0.0207	0.0095	**
Tenure	0.1035	0.0341	***
Squared years of tenure	−0.0060	0.0030	**
Cross term of tenure and gender	−0.0391	0.0350	
female dummy	0.0208	0.0837	
Manager dummy	0.2478	0.1061	**
Cross term of manager and gender	0.0714	0.1401	
Cross term of tenure and manager	0.0250	0.0254	
Kids dummy	−0.3532	0.2172	
Cross term of kids and gender	0.3515	0.2189	
Marriage dummy	0.3511	0.2215	
Cross term of marriage and gender	−0.4074	0.2232	*
High school dummy	0.1431	0.0696	**
University dummy	0.7451	0.1055	***
Cross term of High school and gender	−0.0085	0.0767	
Cross term of university and gender	0.0222	0.1245	
Constant term	1.1877	0.0931	***
Adjusted R-squared : 0.7624			
Number of obs: 358			

t-statistics reported in parentheses are calculated using heteroskedasticity-constant standard errors.

*** Significant at the 1% level,* *Significant at the 5% level,* Significant at the 10% level

High school dummy and University dummy are based on middle school

Table3. Result estimates of the wage equation by gender

		Coef.	Std. Err.	Sign.level
	Experience	0.0116	0.0063	*
	Squared years of experience	−0.0004	0.0002	*
Female	Tenure	0.0755	0.0178	***
286	Squared years of tenure	−0.0076	0.0027	***
	Manager dummy	0.4967	0.0462	***
	Cross term of tenure and manager	−0.0056	0.0019	***
	Kids dummy	0.0035	0.0263	
	Marriage dummy	−0.0580	0.0323	*
	High school dummy	0.1347	0.0394	***
	University dummy	0.7471	0.0972	***
	Constant term	1.2159	0.0519	***
	Adjusted R-squared : 0.729			
	Number of obs: 286			
	Experience	0.0411	0.0153	***
	Squared years of experience	−0.0008	0.0004	**
	Tenure	0.0034	0.0783	
	Squared years of tenure	0.0119	0.0123	
	Manager dummy	0.3240	0.1076	***
Male	Cross term of tenure and manager	−0.0006	0.0131	
72	Kids dummy	−0.2715	0.2188	
	Marriage dummy	0.2568	0.2220	
	High school dummy	0.1448	0.0800	*
	University dummy	0.6857	0.1386	***
	Constant term	1.3795	0.3131	***
	Adjusted R-squared : 0.6707			
	Number of obs: 72			

t-statistics reported in parentheses are calculated using heteroskedasticity-constant standard errors.

*** Significant at the 1% level,* *Significant at the 5% leve,l* Significant at the 10% level

High school dummy and University dummy are based on middle school

Tble4. Detail decomposition of the wage differential

	Explained component	Unexplained component	Total
Experience	0.2000	0.1692	−0.0307
Squared years of experience	−0.0314	−0.0382	−0.0068
Tenure	−0.1886	−0.1892	−0.0007
Squared years of tenure	0.2449	0.2187	−0.0262
Manager dummy	−0.0187	0.0724	0.0910
Cross term of tenure and manager	−0.1077	−0.1075	0.0003
Kids dummy	−0.0901	−0.0841	0.0060
Marriage dummy	0.1393	0.1041	−0.0352
High school dummy	0.0016	0.0518	0.0502
University dummy	−0.0026	0.0735	0.0761
Constant term	0.0000	0.1636	0.1636
Total	0.1240	0.3104	0.4344
%	29%	71%	100%

[i] Experiences=age-educated years-tenure-6
[ii] Female is 1,male is 0

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