Gender Wage Gap in Urban China

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I. Introduction

The presence of gender discrimination in labor markets has attracted the attention of economists all over the world. Gender inequality affects the resource allocation and economic well being both within family and outside family. So the elimination of gender discrimination can improve both efficiency and growth of our society.

The importance of this issue has spurred considerable research on wage inequality due to gender in developed countries. For example, Gunderson (1989) and Reimers (1983), however, only research been carried on the situation in China. Knight and Song (1993), use the Oaxaca decomposition to measure the effect of the sex differences in characteristics on the mean urban wage differences. Less than half of the difference in pay can be explained by the inferior income-earning characteristics of women. Gustafsson and Shi (2000) show that the gender earnings gap in urban China has increased since post–1978 economic reforms in China, and the result of gender wage gap decomposition shows that the unexplained part dominate the gender wage gap in urban China. Meng and Zhang (2000) examine the change in the male-female wage differential in China during economic reform using data from Shanghai and Jian. They consider sectoral gender wage differential and decompose gender wage gap in public, collective and private sectors separately. It is found that marketization of economy in China leads to larger wage differentials between male and female in absolute terms, but it reduces the proportion of discrimination in the overall gender wage gap. All of the researches above use the decomposition method based on Blinder (1973) and Oaxaca (1973), separating gender wage differentials into explained and unexplained components. The explained wage gap is the part of the wage differential due to differences of various measurable productive characteristics. The unexplained gap is the part of gender wage discrimination. None of the studies, however, consider the possibility that the wage gap is affected by sectors in which male and female are employed.

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The last two decades have seen a gradual economic transformation from a centrally planned to a market oriented economy in China. Economic reform makes it easier for collectives and private households to set up their own firms outside of the state planning structure. As a result of economic reform, one of the main characteristics of the transitional Chinese economy is the coexistence of public (state-owned and other public), collective and private sectors. There can be no presumption that earning is determined by the same process in three sectors. So when we decompose the gender wage gap in China, we should consider the distinction between these three sectors.

In this study, we use the survey data in Fangshan, one district of Beijing, the capital of China, to investigate the gender wage gap in urban China, adopting the method developed by Appleton (1999).This approach addresses both the index number and sectoral decomposition problem. We address three questions: first, we investigate if labor market is characterized by differences in the monthly wage between male and female and identifies the determinant of wages; second, where wage disparities are observed, we divide gross gender wage gap into explained and unexplained components using traditional method developed by Oaxaca (1973) and Neumark (1988); third, we consider sectoral location and decompose the total gender wage gap into seven parts between male and female related intra-sector wage differences and inter-sector wage differences using the method developed by Appleton (1999).

The article is organized as follows: Section II describes the methodology employed; Section III discusses the data used in the analysis and presents the results obtained. In this part, first we calculate the returns to education in China by basic Mincer's wage equation. Second, we decompose the gender wage gap in urban China using the methods developed by Oaxaca. Then we use Appleton decomposition, which takes account in sectoral location to decompose gender wage gap into inter and intra sector differences; Section IV draws the conclusions and has some discussion.

II. Empirical Methodology

The earnings function has formed the basis for much empirical research concerning gender wage gap. A general Mincer (1974) type human capital earnings equation is specified as

$$\ln W = X\beta + u \tag{1}$$

where ln$W$ is the natural logarithm of monthly earnings; X is a vector of individual characteristics and β a vector of coefficients, u the random error term. The latter is assumed to be normally distributed with zero mean and constant variance.

The Blinder-Oaxaca (1973) decomposition is

$$\ln \widetilde{W}_m - \ln \widetilde{W}_f = \left(\overline{X}'_m - \overline{X}'_f\right)\hat{\beta}_m + \overline{X}'_f\left(\hat{\beta}_m - \hat{\beta}_f\right) \quad (2)$$

where $\ln \widetilde{W}_m$ and $\ln \widetilde{W}_f$ are the logarithm of geometric mean of male (m) and female (f) wages; $\overline{X}'_m$ and $\overline{X}'_f$ are the vectors of the arithmetic mean of regressors, and $\hat{\beta}_m$ and $\hat{\beta}_f$ are the vectors of the estimated coefficients for male and female, respectively. On the right hand side of (2), the first term is attributable to different productivity between male and female and the second term is the unexplained wage differential due to differences in coefficients, which is often attributed to discrimination. In equation (2), the current male wage structure would be adopted in the absence of discrimination.

Equation (2) could also be rewritten as

$$\ln \widetilde{W}_m - \ln \widetilde{W}_f = \left(\overline{X}'_m - \overline{X}'_f\right)\hat{\beta}_f + \overline{X}'_m\left(\hat{\beta}_m - \hat{\beta}_f\right) \quad (3)$$

In equation (3) it is assumed that in the absence of discrimination the female wage structure would prevail, so the coefficients of the female wage structure are used to weight the differences in characteristics.

The approach of Blinder-Oaxaca could be easily applied into practice, however, this approach poses a well-known index number problem given that we could, for example, use both the male or female wage structure as the non-discriminatory benchmark. This refers to the fact that the decomposition of the gender wage gap is not unique and the decomposition can be quite sensitive to which wage structure is used, but neither is preferable to the other *a priori*.

To solve the problem, Neumark (1988) proposes the decomposition as:

$$\ln \widetilde{W}_m - \ln \widetilde{W}_f = \left(\overline{X}'_m - \overline{X}'_f\right)\hat{\beta}^* + \overline{X}'_m\left(\hat{\beta}_m - \hat{\beta}^*\right) \quad (4)$$

where β^* would simultaneously capture both the fall in male wages and the rise in female wages that would occur in a non-discriminatory world. He provides the estimator of the non-discrimination wage structure β^* by first running regressions on the sub-samples to get fitted log wage values and then combing the fitted values of the log wages and then running a regression on the pooled sample. Those coefficient estimators will then give an estimate of β^*.

Both the methods of Oaxaca and Neumark do not take any account of differences in sectoral structures between male and female. However, sectoral disaggregations may be important. Appetlon (1999) proposes an approach that incorporates a separate model in different sectors into the analysis of wage differential as follows:

$$\ln \widetilde{W}_m - \ln \widetilde{W}_f = \sum_j p_{jf}\left(\hat{\beta}_{jm}\overline{X}'_{jm} - \hat{\beta}_{jf}\overline{X}'_{jf}\right) + \sum_j \hat{\beta}_{jm} X_{jm}\left(p_{im} - p_{jf}\right)$$

where $\hat{\beta}_{jm}$ and $\hat{\beta}_{jf}$ are the vectors of the estimated coefficients of wage equations for male and female in sector j; p_{jm} and p_{jf} are the proportion of male and female in sector j respectively. However, this formulation is subject to a problem similar to that of traditional Oaxaca decomposition. The index number problem can be overcome in an analogous way to the Neumark decomposition in equation (4).We assume that the probability of an individual i being in a particular sector j is determined by separate multinomial logits for the male and female. It is given as:

$$p_{ji} = \exp\gamma_j z_i \Big/ \sum_{k=1}^{J} \exp\gamma_k z_k \qquad i = 1, 2, \ldots, N;\ j = 1, 2, \ldots, J \tag{6}$$

where γ_j is the vector of coefficients corresponding to the jth sector.

$$\begin{aligned}\ln\widetilde{W}_m - \ln\widetilde{W}_m = &\sum_j \hat{p}_j\left(\overline{X}_{jm} - \overline{X}_{jf}\right)\hat{\beta}_j + \sum_j \hat{p}_j\overline{X}_{mj}\left(\hat{\beta}_{jm} - \hat{\beta}_j\right) + \sum_j \hat{p}_j\overline{X}_{jf}\left(\hat{\beta}_j - \hat{\beta}_{jf}\right)\\ &+\sum_j \hat{\beta}_{jm}\overline{X}_{jm}\left(\hat{p}_{jm} - \hat{p}_j\right) + \sum_j \hat{\beta}_{jf}\overline{X}_{jf}\left(\hat{p}_j - \hat{p}_{jf}\right) +\\ &+\sum_j \hat{\beta}_{jm}\overline{X}_{jm}\left(p_{jm} - \hat{p}_{jm}\right) + \sum_j \hat{\beta}_{jf}\overline{X}_{jf}\left(p_{jf} - \hat{p}_{jf}\right)\end{aligned}$$

where $\hat{p}_j$ is the proportion of employees in sector j under the structure that would prevail in the absence of gender differences in the impact of characteristics on sectoral choice. $\hat{p}_{jm}$ and $\hat{p}_{jf}$ represent the hypothetical proportion of male and female who would be in sector j if male and female face same sectoral allocation. The first three terms represent Neumark decompositions of the within-sector wage gap. The fourth and fifth account for differences in earnings due to gender differences in characteristics determining sectoral structure. The sixth term gives differences in earnings resulting from the deviation between men's predicted and actual sectoral composition not accounted for differences in characteristics. The seventh term is the analogous expression for women.

III. Empirical results

In this part, we first examine the descriptive trends of wages, comparing those of men and women by age, years of schooling, potential experience, education level, ownership. These figures will give us the raw wage gap between men and women. Next, we seek to decompose the gap, proceeding by constructing an empirical model of wage determination and using the Oaxaca (1973) and Neumark (1988) procedures to examine how much the wage gap can be explained and how much can not be explained. The unexplained part of the wage gap is thought to be attributable to discrimination. Third, we use Appleton (1999) decomposition, which takes account in sectoral location to decompose gender wage gap into inter and intra sector differences.

Data Description

The data set used here is a survey conducted by Fangshan Education Section in the early of 2004.The survey gathered detailed individual information about parents of the primary-school students randomly selected in Fangshan, one of districts of Beijing, China. The age of the individuals in our sample is 30—45 years old, because they are parents of primary-school students. For our analysis, we make an unrealistic but convenient assumption that within-household clustering is negligibly small. Combined with other criteria excluding respondents with missing or incomplete data, this procedure yields a sample of 1084 cases.

Male employees account for about 60% of the total sample. The mean values and standard deviations of variables for the pooled sample and the gender groups are shown in Table 1.

The average wage in the sample is 1248.9 Yuan and men tend to earn more than their women counterparts for nearly 250 Yuan.

The average age of a worker in the sample is 36.6 years old whose average year of schooling is 11.2 years. However, the average year of schooling of women is 11.5 years, which is slightly higher than men. This indicates that 9-year compulsory policy has been carried out perfectly in urban China and gender differences in education are negligible.

Only 4% of workers in the sample have just received education in primary school. But 24.5% of workers in the sample had been educated in universities for at least 2 years. 27.4% of women in the sample have received 2 or more than 2 years education at universities, which is 4.9% higher than men. Workers in the sample have approximately 18.4 years of potential experience and women's potential experience is on average 1.3 years less than men's. While one out of five male workers is a member of the Communist party, the proportion is smaller among female.

Table 1.

Descriptive Statistics

Variables		Notations					
		Female Mean	S.D.	Pooled Mean	S.D.	Male Mean	S.D.
Age	AGE	36.62362	2.927634	36.95672	2.941322	36.13043	2.839581
Potential experience	EXP	18.3893	3.944176	18.90881	3.897213	17.62014	3.891576
Potential experience squared	EXPSQ	353.7085	148.8712	372.7079	149.6165	325.5789	143.3703
4-year college or more	ED1	0.137454	0.344485	0.131376	0.338072	0.146453	0.353965
2-year college	ED2	0.107934	0.31044	0.094281	0.292446	0.128147	0.334636
Professional school	ED3	0.073801	0.261567	0.064915	0.246566	0.086957	0.282094

Variables		Notations					
		Female Mean	S.D.	Pooled Mean	S.D.	Male Mean	S.D.
Senior secondary school		0.214022	0.410332	0.200927	0.401003	0.233410	0.423486
Junior secondary school	ED4	0.428044	0.495024	0.46677	0.499281	0.370709	0.483548
Primary school or less	ED5	0.038745	0.193077	0.041731	0.200129	0.034325	0.182271
Party member	PARTY	0.218635	0.413511	0.247295	0.431774	0.176201	0.381428
State-owned sector	OWN1	0.063653	0.244247	0.07728	0.267241	0.043478	0.204165
Other public sector	OWN2	0.247233	0.431602	0.217929	0.413158	0.290618	0.454568
Collective sector		0.249078	0.432678	0.234930	0.424283	0.270023	0.444802
Private sector	OWN3	0.440037	0.496621	0.469861	0.499477	0.395881	0.4896
Years of schooling	SCH	11.23432	2.891782	11.04791	2.935191	11.5103	2.806939
Gender	GENDER	0.596864	0.490754	1	0	0	0
Wage	WAGE	1248.937	1008.892	1345.278	1004.902	1106.3	998.9678
Natural logarithm of monthly wage	LWAGE	6.92389	0.618267	7.020387	0.588157	6.78102	0.634568

Note: Potential experience is defined as age less years of schooling less 7.

Mean level of education varies widely among sectors, pointing to different requirements for education level in different parts of the labor market. In public sectors (state-owned and other public sector) both men and women tend to be well educated. Among the collective sector, in contrast, average level of education is low. 56.6% of men workers and 32.2% of women workers have received junior-high school education respectively. Among private sector employees, the educational attainments of men and women have almost the same picture.

Determination of monthly wage equations

In the wage analysis, the level of the observed wage is explained by a number of different observable factors. The dependent variable is the log of wages per month. The results are reported in Table 2.

Specification (1) suggests that men's average wage is about 34% more than women's of equal education, experience, party status and ownership. The estimated return in wages to years of schooling is 6%. This figure is consistent with the calculation of returns to schooling in China in other literatures. For example, Byron and Manaloto (1990) estimate returns to education in China is 4%, using the sample conducted in Nanjing, the capital of Jiangsu province

in China. Wang, Zhu and Stromsdorfer (1994) discover returns to education in China is between 1.8% and 3.0% and Meng (1998) calculates returns to schooling in the migrant market in China is 2.5%. By international standard, this figure is small. Psachropoulos (1981) places the rate of return to education between 5.9% (for Canada) and 22.8% (for Malaysia) and the rate of return to education tends to be higher in developing countries (with an average of 14.4%) than in more developed countries (with an average of 7.7%). The low estimated returns to education for China is particularly puzzling in light of China's status as a developing country and its rapid economic growth since 1978 (Xie, 1996). The coefficient of potential experience is negative and the coefficient of potential experience squared is insignificant, which do not confirm the expection from human capital theory that the experience effect should be concave. If we use variable age instead of potential experience, though the coefficient of age is positive and the coefficient of age squared is negative, both estimates are insignificant even at 10% level (specification 2).

In specification (3) we add the interaction of gender and years of schooling. Almost all variables are statistically significant at 1% level. The coefficient of the interaction of gender and years of schooling is negative and the negative interaction effect reveals that returns to schooling are higher for women than for men. It also indicated that returns to schooling for women are 8% while men's returns to schooling are 5%. However, the coefficient of potential experience is negative and significant at 1% level. A possible reason is that our sample just includes individuals between 30 and 45 and the determination of earnings at this age depends more on the variables of educational level and ownership than on potential experience. Another reason may be that rapid economic growth in China makes the variable of potential experience play less important role on the effect of income earnings in urban China.

In specification (4), we add education dummy variables instead of the variable years of schooling. The educational variables follow the expected pattern, increasing with level of education. Workers with 4 years of college earn 66% higher than ones with high middle school and the differential is significant at 1% level. Workers with primary school earn 26% lower than the ones with high middle school. These figures show that education level does have great influence on worker's earnings. Gustafsson and Shi (2000) show that effects of education increased dramatically in China. They estimate that while men with 4-years of college earn 9% higher than men with high-middle school in 1998, the difference had increased to 15% in 1995. Our figure is much higher than 15% and it indicates that effects of education continually increase in urban China. Another reason is that our data is collected from Beijing, the capital of China, where the market economy develops relatively faster than most other areas of China and therefore education plays more important role on wages.

It comes that the highest paying ownership is state-owned enterprises followed by other public enterprises. On average, workers in state-owned sector earn 31% more than workers in collective sector when all other things are equal. The coefficient before private sector is negative but it is not significant even at 10% level. Being a party member does not have significant effect on earnings.

Table 2.

Determinants of Log Monthly Wages

	Specification 1		Specification 2		Specification 3		Specification 4	
	coefficient	std. error	coefficient	std. error	coefficient	std. error	coefficient	std. error
INTERCEPT	6.762345***	0.340898	5.646022***	2.156907	6.143624***	0.197442	6.625334***	0.333638
AGE			0.02737	0.116934			0.020206	
AGESQ			–0.00062	0.001575			–0.000411	
EXP	–0.06078**	0.030964			–0.01784***	0.005564		0.034461
EXPSQ	0.001113	0.000797						0.00089
SCH	0.059065***	0.008867	0.078631***	0.007141	0.078066***	0.011273		
PA	0.018778	0.045637	0.024477	0.045531	0.033697	0.045555	0.027734	0.047459
GENDER	0.296254***	0.033682	0.293884***	0.03369	0.617788***	0.134199		
OWN1	0.285152***	0.075803	0.284023***	0.075954	0.294785***	0.075747	0.270595***	0.078859
OWN2	0.162271***	0.049102	0.163078***	0.049277	0.164077***	0.048977	0.118548**	0.051769
OWN3	–0.03891	0.040901	–0.03684	0.040917	–0.03352	0.040823	–0.012106	0.042128
SCH*GENDER					–0.02708***	–0.02872		
ED1							0.508085***	0.077092
ED2							0.372487***	0.06739
ED3							–0.001558	0.071625
ED4							–0.088483	0.046048
ED5							–0.303250**	0.10019
R-squared	0.27		0.27		0.29		0.29	

Note: Oblique numbers are standard errors. ***: significantly different from 0 at 1% level, **: significantly different from 0 at 5% level,
*: significantly different from 0 at 10% level. In the case of education dummies, we adopt senior secondary school variable as base.
In the case of ownership dummies, we adopt collective sector variable as base. In the case of party membership dummy, non-party member is base.

Conventional Gender Wage Decomposition:

Our investigation of the decomposition components will be considered based on the results from employing OLS estimation (Specification 4 and Table 2). We decompose gross wage differentials into productivity differences and difference attributed into gender discrimination. Table 4 shows the gen-

der wage gap decomposition using Oaxaca and Neumark methods. One interesting question is the extent to which the three alternative decomposition methods give qualitatively similar results.

Table 3.

Decomposition the gender wage gap using the Oaxaca and Neumark methods

	Total	Explained	Unexplained	Male Advantage	Female Disadvantage
Male weighted	0.239	–0.055 (–23)	0.294 (123)	0.294 (123)	
Female weighted	0.239	–0.050 (–21)	0.289 (121)	0.289 (121)	
Neumark	0.239	–0.039 (–16)	0.278 (116)	0.112 (47)	0.166 (69)

Note: Numbers in parentheses are %.

The overall average wage gap between sexes appears to be 23.9%, the unexplained part (due to discrimination) seems to dominate the wage gap. A more interesting finding is that the female are better endowed than the male, and higher levels of education for the female may be explained by the negative sigh partly. Indeed, the fact that the female are better endowed than male makes the estimated discrimination larger than the gross wage gap.

While the male wage structure is assumed to be the true wage structure, –23 percent of this difference in wages is explained by differences in characteristics, while 123 percent of wage gap is not explained by productive characteristics. The unexplained portion of this wage differential exceeds the total log wage differential, suggesting that the productivity related characteristics of women are higher than the characteristics for men, but the returns to those characteristics are lower for women than for men.

Under female wage structure as the nondiscriminatory standard, 121% of the difference in wages is attributable to discrimination against women. In addition, the female employees are estimated to enjoy productivity advantage over male employees. If we use Neumark' method, the proportion of the wage differential due to discrimination and endowments are 116% and –16% respectively.

Full decomposition including sectoral effects

Considering the possibility that wage gap may be affected by sectors, we divide the sectors in which male and female are employed into three parts: public (state owned and other public), private and collective sectors. Table 4 shows the decomposition of the gender gap using the method developed by Appleton (1999). The first three terms are within-sector wage gap. Overall, it shows very similar patterns to the Neumark decompositions in table 3 and most of the intra-sector wage gap is unexplained.

The last three terms show the effect of gender differences in proportions of workers in the public, private and collective sectors. It seems that the influence of sectoral location, on gender gap in urban China is small. The sum

(–0.026) is negative: differences in sectoral location are favorable to women. In fact, we learned from table 5 that the proportion of women working in the public sector is higher than that of men. Moreover, public sector is the highest paying sector. So women employee's characteristics are more conductive to public sector employment and women are more likely to be in the higher-paying public sector when their characteristics are given. There may be three reasons: Women are slightly more educated than men in our sample, and public sector has higher requirements for education level compared to collective and private sectors. Therefore it is easier for women to find a job in public sector. Secondly, the public sector may adopt less discriminatory hiring than the private and collective sectors. Thirdly, traditionally, women always try to find a stable job especially when they are married and have given birth to their babies. Working in the public sector is more stable in China compared to working in the collective or private sectors. For example, women are much willing to work in teaching, nursing or as civil servants, which are mainly jobs in public sector.

Table 4.

Full Decomposition of Gender Wage Gap

Actual wage gap	0.239
Difference due to within-sector differences	0.266 (111)
Characteristics $\sum_j \hat{p}_j(\bar{X}_{jm} - \bar{X}_{jf})\hat{\beta}$	–0.014 (–6)
Male advantage $\sum_j \hat{p}_j \bar{X}_{mj}(\hat{\beta}_{jm} - \hat{\beta}_j)$	0.110 (46)
Female disadvantage $\sum_j \hat{p}_j \bar{X}_{jf}(\hat{\beta}_j - \hat{\beta}_{jf})$	0.170 (71)
Difference due to sectoral location:	–0.026 (–11)
Characteristics $\sum_j \hat{\beta}_{jm} \bar{X}_{jm}(\hat{p}_{jm} - \hat{p}_j) + \sum_j \hat{\beta}_{jf} \bar{X}_{jf}(\hat{p}_j - \hat{p}_{jf})$	–0.014 (–6)
Deviation in effect of characteristics on male location $\sum_j \hat{\beta}_{jm} \bar{X}_{jm}(p_{jm} - \hat{p}_{jm})$	–0.003 (–1)
Deviation in effect of characteristics on female location $\sum_j \hat{\beta}_{jf} \bar{X}_{jf}(\hat{p}_{jf} - p_{jf})$	–0.008 (–3)

Table 5.

	Male	Female
Sample size	647	437
Percentage of employed in:		
Public sector (state and another public)	29.52	33.41 (32.66)
Private sector	46.99	39.59 (42.22)
Collective sector	23.49	27.00 (25.12)
Mean of log wages::		
Public sector (state and another public)	7.327	7.135
Private sector	6.873	6.525
Collective sector	6.931	6.719

Note: Numbers in parentheses are the predicted proportion of women working in three different sectors.

IV. Conclusion

This paper investigates the gender wage disparity using data collected from Fangshan, Beijing.

We learn that education level does have great influence on wages and returns to education in urban China are smaller than those in most other developing countries but returns to education for female are higher than returns to education for male. However, the data used here is not ideal.

We decompose the gender wage gap using the traditional method developed by Oaxaca and Neumark. The gender wage differences are disaggregated into a component that is affected by the endowment of productive characteristics as well as a component, which is affected by the returns to those productive characteristics in the labour market. It shows that the unexplained part seems to dominate the gender wage gap in urban China.

The Appleton decomposition, which takes in account sectoral location, shows that the gender pay gap is mostly within sector in urban China and the gender pay differential due to sector location is small. In fact, sectoral location in urban China favours female, but it is found that most of the intra-sector wage gap is unexplained.

However, the data used here is not ideal and there are some shortcomings. Firstly, the age of the individuals in the sample is 30–45 years old because they are parents of primary school students, so the result of this paper could only concentrate on the group who are the parents of primary school students. We could not analyse the effect of other variables on the gender gap, for example, the variables of marriage and a child. Secondly, the data is collected in Fangshan, one district of Beijing, so the sample may not be a good representative of Beijing population.

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Abstract **Gender Wage Gap in Urban China**

This paper analyses the gender wage gap and returns to education in urban China using data collected from Fangshan, Beijing. The traditional Oaxaca decomposition shows that the unexplained part seems to dominate the gender wage gap in urban China. The Appleton decomposition, which takes into account sectoral location, shows that the gender gap is mostly within sector and most of the intra-sector wage gap is unexplained. The gender pay differential due to sectoral location is small; in fact, the overall sectoral location favours female in urban China.