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Exploring Gender Wage Gap in Urban Labor Market of Bangladesh

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Abstract

Using the Labor Force Survey 2010 dataset this paper examines gender wage gap in a large sample of urban workers in Bangladesh and explore whether gender wage gap varies across the wage distribution. Mincerian OLS regression and its Blinder-Oaxaca decomposition results reveal that the estimated wage gap between men and women workers is 21.2%. Adjusting women's endowments levels to those of men increases women's wage by 12.1% and a gap of 8.0% remains unexplained. The decomposition results based on the unconditional quantile regressions demonstrate that the estimated total gender wage gap is higher at lower end of the wage distribution compared to the higher end.

Keywords: Gender, Wage Gap, Urban, Bangladesh, Mincerian regression, Blinder-Oaxaca decomposition, Quantile Regressions

JEL Classification: C21, J16, J21, J24, J31, J71

1. Introduction

One of the most important mechanisms of transmitting the benefits of economic growth to male and female groups in the society is the labor market. Today women have become a significant part of the labor market in Bangladesh and therefore, play a significant role in growth trajectories. Women's share in the labor market across the globe is increasing at a faster rate than that of the men, a phenomenon termed as 'feminization' of the labor force (Standing, 1989; Cagatay and Ozler, 1995). Women participation in Bangladesh labor market is accelerating over time. Cheaper women labor in Bangladesh are inducing employers to alternate the male labors with the female ones in jobs like agriculture, services, construction, and manufacturing which were traditionally done by men (Rahman, 2013). Moreover, women are unassuming, not unionized and flexible in hiring and all these result in an increasing share of women in the labor market of Bangladesh. The significant rise in women employment in garment industries of Bangladesh (which are usually located in the urban areas) contributes to reducing gender gap in employment, income, social prestige, control over resources and decision making (ibid).

Gender wage gap across the globe is an oft-cited indicator of gender-based inequality in labor markets. The average 'global' gender pay gap is 16.5% whereas it is 21.1% in Asian countries (ITUC, 2008 in Kapsos, 2008). Women, in general, lag behind men in many spheres in developing countries and thus gender differences are noticeable in several domains in terms of access to and control over resources, work opportunities, participation and rewards. The nature and extent of these differentials varies across and within countries and is based on customs and economic system of a nation. For example, male-female wage differential is either country (or region specific) or context (rural-urban) specific. In the context of labor market opportunities, women, on an average, earn less than men for a similar work and the gap varies across and within countries. For example, Europe, Oceania and Latin America are far better when compared with Asia and Africa, where usual female economic participation is low and there are large informal economies (ibid).

Labor market in Bangladesh is segregated by gender as many women are involved either in non-market activities at home or in the informal sector. Among those who work in the formal sector are generally employed in the 'female labor-intensive industry' like readymade garment, shrimp processing and pharmaceuticals (Ahmed and Maitra, 2010). Moreover, women face upward mobility constraints in most of the workplace. Inferring wag gaps due to labor market segregation might provide some insight into evidence of discrimination against women in the labor markets of Bangladesh. In both rural and urban areas of Bangladesh, women in paid employment often receive lower wages than men and this gap still remain so even after controlling the covariates like age, education, occupation, regional variations (ibid). Though rural female wage rates remain constant at 44% of that of males in 2000 over 1996, urban female wage rates decline to 46% from 50% over the same time period (LFS, 2000 & 1995-96). However, relatively little is known about wage differences between the male and female labor force participation in the urban labor market as a whole and the extent to which any gender-based wage gap can be explained by the men's and women's relative endowments in productive and personal characteristics versus outright labor market discrimination. The

main objective of the study is to estimate the gender wage gap among a large sample of urban workers in Bangladesh using nationally representative cross-section dataset (Bangladesh Labor Force Survey 2010) from Bangladesh. This study also aims to explore whether gender wage gap varies across the wage distribution.

The rest of the article is organized as follows. Section 2 gives a brief literature review. Section 3describes the empirical specifications that are adopted in this study. In section 4, we discuss the summary statistics and the estimation of raw gender wage gap. Section 5 reports the results for our empirical analysis. The paper concludes with a brief summary of findings including the policy implications.

2. Literature Review

Wage inequalities between sexes, or races in a country exist due to either differences in their productive skills in addition to the differences in culture, geographic proximity and historical reasons or differences in rewards despite presence of equal endowments of productive skills (Ahmed and Maitra, 2010). These causes of wage inequalities are, in general, attributed to wage inequalities at the workplace (Becker, 1957; Phelps, 1972 and Arrow, 1972). Later on, works in line with wage inequalities by Oaxaca (1973), Blinder (1973), Reimers (1983), Neumark (1988) and Cotton (1988) were influenced by Becker. They all examined and identified active wage discrimination against women in the labor markets of Africa and Eastern & Central Europe (Psacharpoulos and Tzannatos, 1992; Knight and Sabot, 1982; Appleton *et al*., 1999; Glick and Sahn, 1997; Brainerd, 1998; Newell andReilly, 2001; Jurajda, 2001; Adamchik and Bedi, 2003). Horton (2002) finds that there are differences in returns to male and female productive factors, which account for half of the wage gaps between them. Jacob (2006) using longitudinal data set (1983 and 1999-2000) from India explores wage gap between caste and gender and concludes that 55% of the wage gap remains unexplained. Akter (2005) finds that 70% of the wage gap in Bangladesh is due to within job discrimination. There are few other relevant studies on Bangladesh (Majumder and Zohir, 1993; Majumder and Mahmud, 1994 and Zohir, 1998) which focus on wage gaps only in urban manufacturing sectors. They find the significant differences in the wage rates of men and women but this cannot be explained by the differences in productivity related characteristics and hence, discrimination against women might play a role there. Therefore, a considerable wage gap exists between male and female laborers and it is more rampant in urban areas compared to rural areas in Bangladesh (Ahmed and Maitra, 2010). However, detail studies on urban labor market in Bangladesh as a whole are rarely found. The objective of this study to address this gap by applying more advanced econometric techniques to find robust estimates on the male-female earnings gap.

The literature on decomposition of gender wage gap in developed countries is quite large, but it is relatively scarce in developing countries. Exceptions to this are the studies by Pham and Reilly (2007) for Vietnam, Ganguli and Terrell (2005) for Ukraine and Nopo (2006) for Chile. The most common method of decomposing the gender wage gap is the use of Oaxaca-Blinder decomposition method (see Oaxaca, 1973; Blinder 1973), which decomposes at the mean of

the wage distribution. However, this might not tell us the full story and there is an alternative that quantifies wage gaps at different points of the wage distribution. Albrecht *et al.* (2003); Machado and Mata (2005); Miller (2005); Gupta *et al.* (2006) and Arulampalam *et al.* (2007) conclude that gender wage gap exists and it varies across the wage distribution. Literature is scarce for the Bangladesh urban labor market that uses the quantile decomposition approach. Moreover, ignoring differences in hours of work would result in a significant overestimation of the gender pay gap. Therefore, it is important for this study to measure raw weekly wage gaps considering weekly hours worked by male and female workers. One of the principal aims of this paper is to address these shortcomings by examining the extent of gender wage gap in Bangladesh urban labor market at different quantiles of a wage distribution and also decompose this gap as per their productive components.

3. The Empirical Specification

First of all, this study uses standard Mincerian regression model for the estimation of economic returns to various productive factors such as education as well as the estimation of gender earnings gap after controlling for the differences in age, working hours, education, occupation, industry, and location. The regression specification looks like the followings:

$$\ln w_i = \alpha + \beta_i x_i + \varepsilon_i$$

The dependent variable is the log of person $i's$ weekly wage, w_i. Independent variables include a female dummy, age, age squared, weekly hours worked, 10 education dummies, 10 occupation dummies, 20 industry dummies and the location dummies. The same regression specification is used at each personal characteristic considered in this study in order to explore more details of the gender wage gap.

Secondly, the most commonly used technique for the measuring discrimination against women labor force is the Oaxaca-Blinder decomposition method (Oaxaca, 1973; Blinder, 1973). They decompose the wage differential into two parts: explained and unexplained. Explained wage gap can be explained by differences in personal characteristics of workers and the unexplained component attribute to discrimination.

As decomposition technique starts by estimating wage equations separately for male and female, this study follows the following general specification:

$$\ln W_{ij} = \alpha_j + X'_{ij}\beta_j + \varepsilon_{ij}; \quad i = 1,\ 2,\ .....,n;\ j = male,\ female$$

$\ln W_{ij}$ is the natural log of weekly wages, α_j is the intercept term for gender group, X'_{ij} is a vector is a vector of characteristics of individual i who belong to gender group j and β_j is a vector of coefficients and ε_{ij} is the error term. For clarity, given are two groups, male (M) and female (F); an outcome variable, log of weekly wage (W); and a set of predictors such as age, age squared, weekly hours worked, 10 education dummies, 10 occupation dummies, 20 industry dummies and the location dummies. The mean outcome difference can

be expressed as:

$$D = E(W_M) - E(W_F)$$

Here $E(W)$ denotes the expected value of the outcome variable, is accounted for by group differences in the predictors. Based on the linear model

$$W_l = X_l'\beta + \varepsilon_l, \qquad E(\varepsilon_l) = 0 \qquad l \in (male,\ female)$$

Where, X is a vector of the predictors including the constant, β contains the slope parameters and the constant, and ε is the error. Now the mean outcome difference is the difference in the linear prediction at the group-specific means of the regressors. That is,

$$D = E(W_M) - E(W_F) = E(X_M)'\beta_M - E(X_F)'\beta_F$$

Now the contribution of group differences in the predictors to overall outcome difference can be obtained by the following way (see Jann, 2008; Winsborough and Dickinson, 1971; Jones and Kelley,1984; and Daymont and Andrisani,1984).

$$D = \{E(X_M) - E(X_F)\}'\beta_F + E(X_F)'(\beta_M - \beta_F) + \{E(X_M) - E(X_F)\}'(\beta_M - \beta_F)$$

Here outcome difference is divided into three parts, namely, endowment effect

$[\{E(X_M) - E(X_F)\}'\beta_F]$, discrimination effect $[E(X_F)'(\beta_M - \beta_F)]$ and the simultaneous effect

$[E(X_F)\}'(\beta_M - \beta_F)]$. This study estimates the first two effects.

Thirdly, we use quantile regression and the decomposition by quantiles in order to provide information about the relationship between the outcome variable, weekly wage (W), and the regressors X at different points in the conditional distribution of W. The full specification of Mincerian regression is applied for the specified quantiles.

4. Data and Summary Statistics

The dataset used in this analysis comes from Bangladesh Labor Force Survey conducted in 2010 (hereafter LFS 2010). This is a nationally representative (cross-sectional) random sample, administered by Bangladesh Bureau of Statistics (BBS). The data contains information on a wide range of individual such as age, sex, marital status, educational attainment, occupational status, hours worked weekly and wage earned weekly and household level characteristics like household size and composition, religion, landholding, location, asset ownership. The estimating sample for the LFS 2010 dataset consists of 199,704 individuals of which 159,296 individuals are from rural and 40,408 are from urban

areas. Of the 40,408, weekly wage data are available only for 10,764 individuals. This study considers only these individuals in order to explore and meet the objective of the study. Analysis is restricted to individuals aged 15 years and above.

Of the 10,764 urban workers for which weekly wage data are available, 83.71% is male. This reflects the very low labor force participation and employment rates among the female labor force in urban Bangladesh. The average weekly wage among male workers in the sample is approximately BDT 2,105, as against BDT 1,563 for female workers, representing 34.7% lower weekly wage for women workers. On the contrary, men work on an average of 54.07 hours per week compared to 51.80 hours for women. Thus, the net lower weekly wage for women workers is approximately 30% in the urban setting of Bangladesh. Descriptive statistics and the mean differences of the characteristics between men and women are reported in the annex tables A1 and A2 respectively.

The average age for women in the sample is 31.7 years as against 36.9 years for men, reflecting lower participation rates of older female workers in the country. The promising feature is that an increasing numbers of younger female labor force are entering into the workforce – particularly in formal wage-based occupations. Between 2000 and2005/6, women employment in formal-sector employment increased from 1.2 to 1.6 million whereas male employment increased to 8.6 from 8.4 million (LFS, 2000 & 2005/6). It is also evident in this study that 38.3% percent of the sample of women is aged 15-25 whereas it is 29.7% percent for men. This implies that younger female labor force is more in favor of access to employment than their predecessors in the urban labor market.

With regard to labor force participation by literacy and education, 40.6% women are illiterate whereas it is only 29.1% for men. Up to class Eight (i.e., Eight years of schooling), there are no significant differences in the participation between male and female. Similar results are obtained in cases of Bachelor, Masters, medical, engineering and technical education, where the differences are not significant at 5% level. From class nine (i.e., nine years of schooling) to HSC (i.e., twelve years of schooling), male labor force participation is higher than that of the female. There are differences in the labor force participation across occupations too. For example, this study finds no female labor force in armed forces. Moreover, no significant differences are observed for technician & associated professional and crafts & related trade workers. In cases of professionals and plant, machine operators and assembling, women's participation is significantly higher than the male. With respect to labor force participation, the major industries include manufacturing; wholesale and retail trade & repair of motor vehicles; transportation and storage; agriculture, forestry & fishing; construction and education. Male participation rate in those specified major industries are not necessarily more than that of female. Female labor force participation is significantly higher in the manufacturing and in the education industries. With respect to geographical proximity, no significant differences in the labor force participation are observed in Chittagong and Rajshahi division though women participate more in the labor force compared to men. In Dhaka, women's participation rate is significantly higher than that of the males. The reverse picture is true in favor of men in Barisal and Khulna division.

Regarding wage differentials across ages, this study finds no significant wage differentials at the early stages of entering into the jobs. However, wage differential increases as age increases and this result is particularly true for male labor force. Similarly, there is a positive association between education and wage differential. However, there are no significant wage differentials for medical and engineering & technical and vocational education. In 5 out of the 10 occupational categories, men earn significantly more than female. These categories include legislators, senior officials and managers; professionals; technicians and associated professionals; service workers, shops and market sales; and plant, machine operators and assembling. Though female participation is more in the manufacturing and education industry, men are earning significantly more than their female counterpart. No significant wage differences are observed for agriculture and transport industries. Wage differentials are visible only in Dhaka and Chittagong divisions, where urbanization is more rapid compared to the other divisions. Detailed findings regarding wage differentials are reported in the annex table A3.

For the estimation of raw gender wage gap, this study uses weekly hours worked and earnings of the male and female workers. Women are likely to work fewer hours than men and this makes a gap in weekly earnings between the two groups substantial even if their hourly wages are the same. Therefore, it is important to observe how much efforts women provide and how much they receive compared to their male counterpart. This helps us identifying raw wage gaps across different characteristics. The following equation is used to estimate the robust raw gender wage gap.

$$Raw\ gender\ wage\ gap = Female\ weekly\ wages\ as\ a\ \%\ of\ male - Female\ weekly\ hours\ as\ a\ \%\ of\ male$$

Positive sign implies the gender gap in favor of the women and the opposite is true for the men. Though the earnings gap is positive (1.2%) for ages between 15 to 25 years, the gap reaches to -29.2% for ages 55 and above. This implies men are benefitted more than women as experience increases. Many believe education might play a key role to closing the wage gap. One of the most sobering findings of this study is that more educated women often find themselves on the wrong side of an even bigger pay gap. The highest earnings gap is evidenced for the medical and engineering degree holders, which is approximately -46%. There are significantly fewer women in highly paid occupations like legislators, senior officials and managers. Highest wage gap is also found for this category (about -39%). On the contrary, though men and women equally participate in the crafts and related trade works, there is a positive gender earnings gap (about 19%). Though women participation is more than twice compared to men in the manufacturing industries, women receive, on average, 33% less compared to men. Similar findings are observed for financial and insurance activities and the education. As per geographical variations, the highest wage gap is observed in Dhaka division (approx. -37%), which is followed by Chittagong (approx. -27%). Positive gender wage gaps are found for Barisal (12.5%), Rajshahi (12.7%) and Khulna (11.9%) divisions. See annex table A4 for more detail.

5. Results and Discussion

5.1 Measuring Gender Wage Gap

Table 1. Mincer Regression Results from Different Specifications

	(1)	(2)	(3)	(4)	(5)
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Female	-0.192***	-0.125***	-0.126***	-0.0812***	-0.0773***
	(0.0169)	(0.0170)	(0.0171)	(0.0158)	(0.0167)
Age		0.0499***	0.0499***	0.0334***	0.0325***
		(0.00252)	(0.00252)	(0.00239)	(0.00237)
Age squared		-0.000529***	-0.000529***	-0.000329***	-0.00032***
		(3.21e-05)	(3.21e-05)	(3.01e-05)	(2.96e-05)
Hours per week			-0.000291	0.00395***	0.00248***
			(0.000582)	(0.000548)	(0.000552)
Education Dummies (Base category: Class one)					
Class two				0.122***	0.0929***
				(0.0156)	(0.0152)
Class Three				0.240***	0.194***
				(0.0177)	(0.0176)
Class Four				0.266***	0.208***
				(0.0243)	(0.0240)
Class five				0.489***	0.385***
				(0.0255)	(0.0262)
Class Six				0.637***	0.505***
				(0.0282)	(0.0302)
Class Seven				0.829***	0.654***
				(0.0290)	(0.0324)
Class Eight				1.008***	0.822***
				(0.0361)	(0.0381)
Class Nine				1.484***	1.246***
				(0.0920)	(0.0925)
Class Ten				0.846***	0.696***
				(0.110)	(0.109)
Occupation dummy				No	Yes
Industry dummy				No	Yes
Divisional dummies				No	Yes
Constant	7.353***	6.316***	6.333***	6.139***	6.628***
	(0.00731)	(0.0460)	(0.0564)	(0.0548)	(0.112)
Observations	10,764	10,764	10,764	10,764	10,757
R-squared	0.011	0.058	0.058	0.234	0.296

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 1 provides estimates from Mincerian regressions of 5 different specifications. Specification (1) includes only the female dummy and thus provides the unadjusted gender wage gap. Each of the subsequent regressions add additional explanatory variables including age, age squared, hours worked per week, education dummies, occupation and industry dummies. The raw gender wage gap in the urban Bangladesh, given in specification (1), is 19.2 percent. The exact difference stands at 21.2% [i.e., $exp\ (0.192) - 1) * 100$]. Adding relevant explanatory variables in the subsequent regressions reduces the gap to 7.7% (exact 8.0%). Controlling for differences across hours worked, occupations, industries, and geographical variations have only a minor effect on the estimated gender gap. However, the large reduction in the estimated gender gap is found in this study with the inclusion age, which is used as a surrogate for experience in this study. This implies substantial gender-based segregation across the different age groups and this is clearly comprehensible in our descriptive statistics. Another important factor that can explain gender earnings gap is the education. This is because a large proportion of working women are with no or less education compared to male. Overall, the estimated gender wage gap in this sample of urban wage workers in Bangladesh is 8%after controlling the influence of all other explanatory variables.

5.2 Measuring Gender Wage Gaps by Major Characteristics

Table 2. Mincer Regression Results from Full Specifications by Characteristics

Characteristics	**Gender wage gap**	**Characteristics**	**Gender wage gap**
Age		**Industry**	
15-25	.0544926*	Agriculture, forestry and fishing	.0258215
26-35	-.1438599***	Manufacturing	-.0527743**
36-45	-.181369***	Construction	-.399370***
46-55	-.0624478	Wholesale and retail trade	-.0776073
55^{+}	-.0770647	Transportation and storage	-.2402065**
Education		financial and insurance activities	-.1439699
Literacy	-.0700687***	Education	-.152745***
No education	-.03878	**Occupation**	
Class i-v	-.0401144	legislators, senior officials and managers	-.272145***
Class vi-viii	-.1695765***	Professionals	-.0983573*
Class ix-x	.0016608	Technicians and associated professional	.1377785*
SSC/equivalent	-.0413677	Clerks	-.0350045
HSC/equivalent	-.0556784	Service workers and shop and market sales	.0584182
Bachelor degree/equivalent	-.0660851	Skilled agricultural and fishery worker	-.139016
Master degree/equivalent	-.1557061**	Craft and related trade workers	.1701011***
Medical/engineering degree	-.2652113	Plant and machine operators and assembling	-.149921***
Technical/vocational education	.2780843	Elementary occupations	-.154417***

***** p<0.01, ** p<0.05, * p<0.1**

Table 2 provides the estimates of gender wage gap after controlling for all factors. For age categories, the largest significant wage gap is found for the age range 36 to 45 years. As the age increases, wage gap increases up to a certain age and then becomes insignificant. The largest gender wage gap is observed in the construction industry (40%), followed by transportation and storage (24%) and education (15%). It is clear that earnings gaps differ substantially across industries and urban women working in all major non-agricultural industries, on average, earn less than men.

5.3 Decomposition of Gender Wage Gap

The standard application of the Blinder-Oaxaca technique is to divide the wage gap between male and female labor force into a part that is explained by differences in determinants of wages, such as age and education, and a part that cannot be explained by such group differences. Table 3 reports the twofold decomposition, where the option 'pooled' determines the choice of the reference coefficients, using Blinder-Oaxaca decomposition technique.

Table 3. Results Using Blinder-Oxaca Decomposition

Dependent variable: log of wage	**(1) Coefficients (robust standard errors)**	**(2) Exponentiated coefficients (robust standard error)**	**(3) Coefficients from survey estimation**
Panel A: Overall			
Men	7.352602***	1560.252***	7.373685***
	(.0073195)	(11.40011)	(.0078732)
Women	7.160741***	1287.865***	7.154836***
	(.0154434)	(19.70256)	(.0159734)
Difference	.1918613***	1.211503***	.2188486***
	(.0170902)	(.0205397)	(.0178083)
Explained	.1145751***	1.121397***	.1287129***
	(.0117313)	(.0131554)	(.0124581)
Unexplained	.0772863***	1.080351***	.0901357***
	(.01657)	(.0179015)	(.0174328)
Panel B: Endowments			
Age	.0517534***	1.053116***	.0423566***
	(.0042483)	(.0044739)	(.0038823)
Hours worked/week	.0055674***	1.005583***	.0049276***
	(.0014354)	(.0014434)	(.0014058)
Education	.0377798***	1.038503***	.0495825***
	(.0062747)	(.0065163)	(.006861)
Occupation	.0350294***	1.03565***	.0440479***
	(.0062697)	(.0064933)	(.00704)
Industry	-.0090611	.9909798	-.0043627
	(.0081012)	(.0080282)	(.0089999)
Division	-.0064938**	.9935272**	-.007839**
	(.0031946)	(.003174)	(.0031203)

The decomposition output reports the average predictions by groups and their differences in the first column. In this study, the mean of log wages (lnwage) is 7.35 for men and 7.16 for women, yielding a wage gap of 0.19. This gap is divided into two parts: explained and unexplained. The first part reflects the mean increase in women's wage if they had the same characteristics as men. The increase of 0.115 indicates that differences in age, weekly hours worked, education, occupation and industry account for more than half of the wage gap. The second part quantifies the change in women's wages when applying the men's coefficients to the women's characteristics.

The results from Blinder-Oaxaca decomposition (column 1) are expressed on the logarithmic scale and thus it is sensible to transform the results to the original scale (column 2). Now it shows that the mean wages are BDT 1560.25 and 1287.87 for men and women respectively and hence, the wage gap is 21.2%. Adjusting women's endowments levels to the levels of men increase women's wage by 12.1% and therefore, a gap of 8% remains unexplained.

For column 3, survey estimation technique by Oaxaca is used to check robustness of the estimates. Here 'wgt_svrs' variable provides sampling weights for the Bangladesh Labor Force Survey 2010. The estimates from survey estimation are consistent with and close approximation to the previous estimates.

From panel B, it is obvious that the differences in age, education and occupation account for 5.3%, 3.9% and 3.6% of the explained part of the outcome differential respectively. Moreover, though the differences in hours worked per week and the division play significant role, the magnitudes are not large enough. Finally, industrial segregation based on 21 major groups of the international standard classification of basic industries in Bangladesh does not seem to matter much.

5.4 Gender wage gap: Quantile Regression Approach

The quantile regression output for the different quantiles is reported in table 4. The coefficients vary across quantiles. The female coefficients are found highly statistically significant at the two lower conditional quantiles of earnings (Q10 and Q25). Ordinary least square (OLS) coefficient, reported in specification 5 of table 1, differs considerably from the QR coefficients, even those for median regression. This is the rationale behind using quantile regression. This study uses bootstrapped standard errors from 20 replications.

One reason for coefficients differing across quantiles is the presence of heteroskedastic errors, which is evidenced in this study. The estimated value of chi2(47) is 615.05, which is highly statistically significant. Thus, the null hypothesis of homoskedasticity is soundly rejected and hence, the use of quantile regression is justified. For the hypothesis test of equality of the regression coefficient of female at different conditional quantiles, this study uses simultaneous quantile regression with specified values in the previous quantile regressions. It shows that the estimated value of F(4, 10709) is 22.22, which reject the null hypothesis of coefficient equality.

Table 4. Quantile Regression Output

	(1)	(2)	(3)	(4)	(5)
Variables	**Q10**	**Q25**	**Q50**	**Q75**	**Q90**
Female	-0.201***	-0.176***	-0.0409	0.0262	-0.0339
	(.0237504)	(.0246827)	(.0228797)	(.0186914)	(.0292352)
Age	0.0436***	0.0385***	0.0389***	0.0200***	0.0119**
	(.004949)	(.0038534)	(.003544)	(.0037618)	(.0047295)
Age squared	-0.000488***	-0.000410***	-0.000407***	-0.000175***	-5.95e-05
	(.0000633)	(.0000469)	(.0000436)	(.0000479)	(.0000666)
Hours per week	0.00372***	0.00371***	0.00181**	0.000363	0.00198**
	(.0010577)	(.0007226)	(.0008199)	(.0007341)	(.0011062)
Education Dummies (Base category: Class one)					
Class two	0.0588**	0.0793***	0.0899***	0.0857***	0.103***
	(.0297716)	(.0159244)	(.0175976)	(.0171128)	(.0256432)
Class Three	0.114***	0.150***	0.207***	0.184***	0.213***
	(.0228676)	(.0160132)	(.0231159)	(.018461)	(.0277305)
Class Four	0.0928**	0.170***	0.179***	0.237***	0.299***
	(.0460835)	(.0235546)	(.0211699)	(.039984)	(.0377909)
Class five	0.242***	0.316***	0.364***	0.392***	0.514***
	(.0314214)	(.0262889)	(.0328383)	(.0389421)	(.0637241)
Class Six	0.342***	0.447***	0.501***	0.494***	0.579***
	(.0493985)	(.0512861)	(.0330707)	(.0364872)	(.0497578)
Class Seven	0.523***	0.615***	0.594***	0.653***	0.713***
	(.0595512)	(.0513119)	(.0287765)	(.0504716)	(.0648631)
Class Eight	0.754***	0.822***	0.754***	0.750***	0.942***
	(.0577747)	(.0423604)	(.0439638)	(.0501646)	(.1069198)
Class Nine	1.020***	1.192***	1.118***	1.299***	1.602***
	(.2748855)	(.1165385)	(.1284382)	(.0744646)	(.1315464)
Class Ten	0.383***	0.297***	0.792***	0.722***	0.861***
	(.1779696)	(.1915398)	(.1314965)	(.1339176)	(.2007225)
Occupation dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Division dummies	Yes	Yes	Yes	Yes	Yes
Constant	5.891***	6.376***	6.528***	7.230***	7.392***
	(.4233515)	(.1476057)	(.0995682)	(.119369)	(.1417592)
Observations	10,757	10,757	10,757	10,757	10,757
R-squared	0.262	0.277	0.289	0.281	0.264

Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The decomposition results based on the unconditional quantile regressions are reported in table 5. We find that the estimated total gender wage gap is higher at lower end of the wage distribution compared to the higher end. Thus the gender wage gap in the urban workers ranges from 6% to 32%. It is observed that the gender wage gap is lower at 50th quantile of the wage distribution compared to anywhere else on the distribution. For this empirical data, discrimination accounts for the majority of the gender wage gap except for the 50th quantile.

Table 5. Decomposition of Gender Wage Gap by Quintiles

Quartile	Total gap	% gap	Endowment	Discrimination	Proportion due to discrimination
0.25	.251279	28.57	.098766	.152513	0.606947
0.50	.05591	5.75	.085264	-.029354	-0.52502
0.75	.096209	10.10	-.017873	.112481	1.169132

6. Concluding Comments and Policy Implications

The main objective of this paper is to examine whether the gender wage gap exists in the urban labor market of Bangladesh. This paper also investigates whether gender wage gap varies across the wage distributions to assess the contribution of different factors that may explain variations in the gender wage gap.

Mincerian OLS regression and its Blinder-Oaxaca decomposition results indicate that women employees are paid less compared to their male counterparts. The estimated wage gap is 21.2%. Adjusting women's endowments levels to the levels of men increase women's wage by 12.1%. Therefore, a gap of 8.0% remains unexplained. It is obvious from this study that the differences in age, education and occupation each account for 5.3%, 3.9% and 3.6% of the explained part of the outcome differential. Thus, the factors age, education and occupation seem to matter indeed.

The quantile regression output for the different quantile confirms that the coefficients vary across different quintiles and also confirms the presence of heteroskedastic errors in the OLS regression. Hence the ordinary least square (OLS) coefficient differs considerably from the QR coefficients, even those for median regression. This study finds that female coefficients are found highly statistically significant at the two lower conditional quantiles of earnings (Q10 and Q25). Equality of the regression coefficients of female at different conditional quantiles is tested using simultaneous quantile regressions and rejected the null hypothesis of coefficient equality. The decomposition results based on the unconditional quantile regressions find that the estimated total gender wage gap is higher at lower end of the wage distribution compared to the higher end. The gender wage gap in the urban workers ranges from 6% to 32%. For this empirical data, discrimination accounts for the majority of the gender wage gap except for the 50th quantile.

What causes the gender wage gap and why is the gender wage gap more at the lower tail of the distribution? This might be due to the combination of a number of different factors (e.g. trade unionism, social norms). Unfortunately, the available data does not allow us to elaborate

on this specific issue. We find that discrimination is a major part of the wage differential along the entire wage distribution. These facts strongly suggest that, although the Bangladesh labor code stipulates equal pay and equal employment opportunity, there is still potential underutilization of women's skills in the labor market. Though legislations have been passed and the government has accepted the role of gender based affirmative action policies in reducing the gender wage gap in Bangladesh, there is still considerable lack of enforcement of these laws. To attain true gender equality, we need stronger enforcement.

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Appendix

Table A1: Descriptive statistics

Variables	Full sample		Male		Female	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Weekly wage received	2016.503	2511.817	2104.974	2702.685	1562.531	978.2301
Age	36.08867	12.88224	36.93767	12.78563	31.73215	12.49346
Weekly hours worked	53.68843	11.25066	54.05676	11.2101	51.7984	11.27191
Literacy and education						
Literacy	.6899218	.4625469	.7086255	.4544209	.5939463	.4912351
No education	.2937779	.4555127	.2802449	.4491438	.363221	.4810651
Class i-v	.2277385	.4193925	.2254869	.4179258	.2392918	.4267731
Class vi-viii	.1626304	.3690453	.1637173	.3700394	.1570531	.3639548
Class ix-x	.0798249	.2710345	.0839176	.2772797	.0588235	.2353613
SSC/equivalent	.0707899	.2564855	.0759043	.2648596	.044546	.2063636
HSC/equivalent	.0582154	.2341611	.0611018	.2395303	.0434038	.2038225
Bachelor degree/equivalent	.0572839	.2323951	.0589872	.2356139	.0485437	.2149735
Master degree/equivalent	.0396796	.1952144	.0398442	.1956039	.038835	.1932566
Medical/Engineering degree	.0065201	.0804873	.0067891	.0821203	.0051399	.0715292
Technical/Vocational education	.0035395	.059391	.0040067	.0631749	.0011422	.0337869
Occupation						
Armed forces	.0018629	.043123	.0022259	.0471299	-	-
Legislators, senior officials and managers	.0259873	.1591048	.0286032	.1666979	.0125642	.1114158
Professionals	.0612891	.2398711	.0524207	.2228863	.1067961	.3089421
Technicians and associated professional	.0359538	.1861837	.0362827	.1870031	.0342661	.1819639
Clerks	.0453614	.2081052	.0478575	.2134766	.0325528	.1775138
Service workers and shop and market sales	.2047317	.4035243	.2288258	.4201002	.0810965	.2730613
Skilled agricultural and fishery worker	.0346498	.1828997	.038286	.1918966	.0159909	.1254757
Craft and related trade workers	.1377608	.3446648	.1363383	.3431666	.14506	.3522619
Plant and machine operators and assembling	.1561103	.3629768	.1255426	.3313516	.312964	.4638323
Elementary occupations	.2962928	.456643	.3036171	.4598449	.2587093	.4380507
Division						
Barisal	.055421	.2288108	.0594324	.2364453	.0348372	.1834198
Chittagong	.2026826	.4020167	.2023372	.4017647	.2044546	.4034177
Dhaka	.4144001	.4926411	.4065665	.4912199	.4545974	.4980766
Khulna	.1194113	.324287	.1235392	.3290735	.0982296	.2977098
Rajshahi	.1397168	.3467092	.1378965	.3448105	.1490577	.3562471
Sylhet	.0683681	.2523883	.0702282	.2555454	.0588235	.2353613

Table A2: Mean differences of their characteristics

Characteristics	Male	Female	Difference
Weekly wage received	2104.974	1562.531	542.4433***
Age	36.93767	31.73215	5.205521***
Weekly hours worked	54.05676	51.7984	2.25836***
Literacy and education			
Literacy	.7086255	.5939463	.1146792***
No education	.2802449	.363221	-.0829762***
Class i-v	.2254869	.2392918	-.0138049
Class vi-viii	.1637173	.1570531	.0066642
Class ix-x	.0839176	.0588235	.0250941***
SSC/equivalent	.0759043	.044546	.0313583***
HSC/equivalent	.0611018	.0434038	.0176981***
Bachelor degree/equivalent	.0589872	.0485437	.0104435*
Master degree/equivalent	.0398442	.038835	.0010092
Medical/engineering degree	.0067891	.0051399	.0016492
Technical/vocational education	.0040067	.0011422	.0028645*
Occupation			
Armed forces	.0022259	-	-
Legislators, senior officials and managers	.0286032	.0125642	.016039***
Professionals	.0524207	.1067961	-.054375***
Technicians and associated professional	.0362827	.0342661	.0020166
Clerks	.0478575	.0325528	.0153047***
Service workers and shop and market sales	.2288258	.0810965	.1477293***
Skilled agricultural and fishery worker	.038286	.0159909	.0222952***
Craft and related trade workers	.1363383	.14506	-.0087216
Plant and machine operators and assembling	.1255426	.312964	-.187421***
Elementary occupations	.3036171	.2587093	.0449078***
Industry classification			
Agriculture, forestry and fishing	.1131468	.0531125	.0600343***
Mining and quarrying	.0057739	.0017133	.0040606 **
Manufacturing	.191539	.4625928	-.271053***
Electricity, gas, steam and air condition	.0056629	.0017133	.0039496**
Water supply; sewerage, waste management	.0009993	.0011422	-.0001429
Construction	.0967133	.0354083	.061305***
Wholesale and retail trade; repair of m	.1937597	.0439749	.1497848***
Transportation and storage	.1419054	.0148487	.1270567***
Accommodation and food service activity	.023873	.0097087	.0141642***
Information and communication	.0024428	.0005711	.0018717
Financial and insurance activities	.0227626	.0211308	.0016318
Real estate activities	-	-	-
Professional, scientific and technical	.0064402	.0034266	.0030135

Administrative and support service activities	.0294248	.0142776	.0151473***
Public administration and defense	.0326449	.0177042	.0149407***
Education	.0373085	.0988007	-.061492***
Human health and social work activities	.0123251	.0285551	-.01623***
Arts, entertainment and recreation	.0017766	.0011422	.0006344
Other service activities	.0642905	.0731011	-.0088106
Activities of households as employers;	.0143238	.117076	-.102752***
Activities of extraterritorial organization	-	-	-
Division			
Barisal	.0594324	.0348372	.0245952***
Chittagong	.2023372	.2044546	-.0021174
Dhaka	.4065665	.4545974	-.048030***
Khulna	.1235392	.0982296	.0253096***
Rajshahi	.1378965	.1490577	-.0111612
Sylhet	.0702282	.0588235	.0114046*

Table A3: Wage differentials by gender and characteristics

Age category	**Male**	**Female**	**Difference**
15-25	1409.718	1412.539	-2.8216
26-35	2114.141	1647.842	466.2984***
36-45	2275.06	1654.556	620.5044***
46-55	2580.761	1760.301	820.4597***
55^{+}	2325.732	1495.568	830.1637**
Literacy and Education			
Literacy	2404.866	1713.358	**691.508*** **
No education	1396.167	1350.564	45.60233
Class i-v	1614.18	1384.63	229.5501***
Class vi-viii	1915.148	1383.916	531.2318***
Class ix-x	2032.102	1512.136	519.9662**
SSC/equivalent	2606.455	1892.859	713.5956**
HSC/equivalent	3079.585	2191.197	888.3873**
Bachelor degree/equivalent	3813.877	2528.835	1285.042***
Master degree/equivalent	4726.469	2786.324	1940.146***
Medical/engineering degree	7575.41	4055.556	3519.854
Technical/vocational education	3725	2725	1000
Occupational categories			
Armed forces	-	-	-
Legislators, senior officials and managers	4807.315	2481.818	2325.497*
Professionals	3446.285	2234.048	1212.236***
Technicians and associated professional	2873.261	2334.033	539.2274*
Clerks	2867.156	2582.018	285.1383
Service workers and shop and market sales	2655.083	1718.965	936.1184***

Skilled agricultural and fishery worker	1876.948	1204.286	672.662
Craft and related trade workers	1582.5	1722.106	-139.6067
Plant and machine operators and assembling	1766.941	1209.195	557.7453***
Elementary occupations	1391.7	1321.28	70.41979
Industry classification			
Agriculture, forestry and fishing	1513.681	1438.28	75.40149
Mining and quarrying	1950	1666.667	283.3333
Manufacturing	2016.997	1352.805	664.1916***
Electricity, gas, steam and air conditioning	2217.608	2016.667	200.9412
Water supply; sewerage, waste management	2070	1850	220
Construction	1563.416	989.6774	573.7382***
Wholesale and retail trade; repair of motor vehicle	2538.127	1576.299	961.8285**
Transportation and storage	1526.391	1215	311.3912
Accommodation and food service activity	1952.298	1727.647	224.6506
Information and communication	2850	1900	950
Financial and insurance activities	3965.971	2660	1305.971*
Real estate activities	-	-	-
Professional, scientific and technical	4940.948	2083.333	2857.615
Administrative and support service activities	3265.442	2646	619.4415
Public administration	2410.575	2087.097	323.4781
Education	2861.217	2007.41	853.8069***
Human health and social work activities	3299.315	2548.8	750.5153
Arts, entertainment and recreation	1627.5	1000	627.5
Other service activities	1992.815	1640.234	352.5808
Activities of households as employers;	1632.248	1549.62	82.62855
Activities of extraterritorial organization	-	-	-
Division			
Barisal	2038.408	2016.393	22.0148
Chittagong	1830.397	1315.517	514.8798***
Dhaka	2607.472	1553.092	1054.38***
Khulna	1583.826	1604.32	-20.49364
Rajshahi	1627.345	1708.349	-81.00322
Sylhet	1897.935	1785.951	111.9836

Table A4: Wage gaps by characteristics and gender

	Weekly hours worked		Female weekly working hours as a % of male	Weekly wage		Female weekly wage as a % of male	Wage gap
	Male	female		Male	female		
Age category							
15-25	54.62332	54.0611	98.97073	1409.718	1412.539	100.2001	1.22937
26-35	54.68788	52.01996	95.12155	2114.141	1647.842	77.94381	-17.1777
36-45	54.30284	49.97143	92.0236	2275.06	1654.556	72.72582	-19.2978
46-55	52.94401	47.42614	89.57791	2580.761	1760.301	68.2086	-21.3693
55^{+}	51.95845	48.56818	93.47504	2325.732	1495.568	64.30526	-29.1698
Literacy and education							
Literacy	53.8431	51.24615	95.17682	2404.866	1713.358	71.24547	-23.9314
No education	54.75377	52.94654	96.69935	1396.167	1350.564	96.7337	0.03435
Class i-v	55.60069	55.90215	100.5422	1614.18	1384.63	85.77916	-14.763
Class vi-viii	54.02651	50.33091	93.15965	1915.148	1383.916	72.26157	-20.8981
Class ix-x	55.20159	47.70874	86.42639	2032.102	1512.136	74.41241	-12.014
SSC/equivalent	54.27566	47.32051	87.18551	2606.455	1892.859	72.62197	-14.5635
HSC/equivalent	52.08197	48.59211	93.29929	3079.585	2191.197	71.15235	-22.1469
Bachelor degree/equivalent	49.74906	45.52941	91.51813	3813.877	2528.835	66.30615	-25.212
Master degree/equivalent	48.58939	45.33824	93.30893	4726.469	2786.324	58.95149	-34.3574
Medical/engineering degree	48.13115	47.77778	99.26582	7575.41	4055.556	53.5358	-45.73
Technical/vocational education	49.47222	40	80.85346	3725	2725	73.15436	-7.6991
Occupation							
Armed forces	-	-		-	-		
Legislators, senior officials and managers	52.00389	47.04545	90.46525	4807.315	2481.818	51.62587	-38.8394
Professionals	48.31423	47.34759	97.99926	3446.285	2234.048	64.82482	-33.1744
Technicians and associated professional	49.11963	46.46667	94.59898	2873.261	2334.033	81.23289	-13.3661
Clerks	49.18605	43.85965	89.17091	2867.156	2582.018	90.05502	0.88411
Service workers and shop and market sales	57.03551	55.05634	96.52993	2655.083	1718.965	64.74242	-31.7875

Skilled agricultural and fishery worker	52.76163	32.89286	62.34239	1876.948	1204.286	64.16193	1.81954
Craft and related trade workers	53.38776	47.82283	89.57639	1582.5	1722.106	108.8219	19.24551
Plant and machine operators and assembling	55.9406	56.56204	101.1109	1766.941	1209.195	68.43437	-32.6765
Elementary occupations	54.07038	52.18543	96.5139	1391.7	1321.28	94.94	-1.5739
Industry classification							
Agriculture, forestry and fishing	52.97448	46.35484	87.5041	1513.681	1438.28	95.0187	7.5146
Mining and quarrying	49.88462	48	96.22204	1950	1666.667	85.4701	-10.7519
Manufacturing	54.06087	54.22963	100.3122	2016.997	1352.805	67.07025	-33.242
Electricity, gas, steam and air conditioning	49.7451	45.33333	91.13125	2217.608	2016.667	90.93884	-0.19241
Water supply; sewerage, waste management	52.55556	62	117.9704	2070	1850	89.37198	-28.5984
Construction	52.77842	52.5	99.47247	1563.416	989.6774	63.30224	-36.1702
Wholesale and retail trade; repair of motor vehicles	57.16963	50.25974	87.91336	2538.127	1576.299	62.10481	-25.8086
Transportation and storage	56.73787	52.15385	91.9207	1526.391	1215	79.59953	-12.3212
Accommodation and food service activity	59.32558	57.23529	96.47658	1952.298	1727.647	88.493	-7.98358
Information and communication	53.59091	54	100.7634	2850	1900	66.66667	-34.0967
Financial and insurance activities	47.49268	46.54054	97.99519	3965.971	2660	67.07059	-30.9246
Real estate activities	50.90909	-	-	2995.455	-	-	-
Professional, scientific and technical	52.74138	43	81.52991	4940.948	2083.333	42.16464	-39.3653
Administrative and support service activities	48.25283	44.64	92.51271	3265.442	2646	81.03038	-11.4823
Public administration and	48.48639	43.09677	88.88426	2410.575	2087.097	86.58088	-2.30338

defense							
Education	47.96131	47.28324	98.58621	2861.217	2007.41	70.15931	-28.4269
Human health and social work activities	50.87387	48.24	94.82274	3299.315	2548.8	77.2524	-17.5703
Arts, entertainment and recreation	47.3125	32	67.6354	1627.5	1000	61.44393	-6.19147
Other service activities	54.0639	48.21875	89.18844	1992.815	1640.234	82.30739	-6.88105
Activities of households as employers;	51.85271	55.07317	106.2108	1632.248	1549.62	94.93778	-11.273
Activities of extraterritorial organization	50	-	-	1962.5	-	-	-
Division							
Barisal	53.76966	46.45902	86.40378	2038.408	2016.393	98.91999	12.51621
Chittagong	53.533	53.13687	99.26003	1830.397	1315.517	71.87058	-27.3895
Dhaka	56.0438	54.36055	96.99655	2607.472	1553.092	59.56313	-37.4334
Khulna	51.97838	46.4593	89.38197	1583.826	1604.32	101.294	11.91203
Rajshahi	52.18725	48.0728	92.11599	1627.345	1708.349	104.9777	12.86171
Sylhet	51.63233	48.86408	94.63853	1897.935	1785.951	94.09969	-0.53884