# Male-Female wage gap and informal employment in Bangladesh: A quantile regression approach

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# Male-Female Wage Gap and Informal Employment in Bangladesh: A Quantile Regression Approach

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## Abstract

This article undertakes an examination of Bangladesh's latest available Quarterly Labour Force Survey 2015-2016 data to draw indepth insights as regards gender wage gap and wage discrimination in Bangladesh labour market. Mean wage decomposition shows that an average woman in Bangladesh earns 12.2 per cent lower wage than man, and about half of the wage gap can be explained by labour market discrimination against women. Quantile Counterfactual Decomposition shows that women are subjected to higher wage penalty at the lower deciles of the wage distribution with the wage gap varying between 8.3 per cent to 19.4 per cent at different deciles. We established that at lower deciles a significant part of the gender wage gap is on account of the relatively larger presence of informal employment. Conditional quantile estimates further reveals that formally employed female workers earn higher wage than their male counterparts at the first decile but suffer from wage penalty at the top deciles.

***Keywords:*** *Gender wage gap, Oaxaca-Blinder Decomposition, Quantile Decomposition, Informal Employment, Quantile Regression*

***JEL Classification:*** *C21, J31, J46, J70*

## 1. INTRODUCTION

Narrowing the male-female wage gap and reducing wage discrimination against women have remained a continuing concern in Bangladesh policy circles. This issue is so important that, in effect, this enshrined into the constitution of Bangladesh which recognized equality of men and women (Article 19). However, the fact of men earning more than women in Bangladesh has been well documented in the relevant literature[1]. Recent studies including finds a significant gender wage gap in Bangladesh labour market (e.g. Ahmed and McGillivray (2015) found that the differences in observed wage was 20.6 per cent in 2010). Thus, a deeper understanding of gender wage gap, its determinants and possible policy solutions has heightened policy significance in the Bangladesh context. In the above context, it is pertinent to examine what are the recent and emerging states in terms of gender wage gap in Bangladesh labour market, glean insights as regards the various involved dimensions of the concerned correlates and identify the underlying drivers of gender-driven gaps in earnings.

Gender wage gap has an extensively investigated subject for a number of decades and remains an active and innovative area of research. A number of important theoretical and empirical research has been carried out to explore various dimensions of the involved issues concerning gender wage gap starting from Mincer Earning Function (Mincer, 1958) to more recent developments that include Quantile Counterfactual Decomposition (QCD) by Chernozhukov et al., (2013). An important tool to study gender wage gap, the Oaxaca-Blinder Decomposition, was developed by Oaxaca (1973) and Blinder (1973) which has made seminal contribution to enable indepth analysis in related fields.

[1] Rahman and Islam (2003, 2013), Kapos (2008), Rahman (2004), Al-Samarrai (2007), Ahmed and Maitra (2011), Ahmed and McGillivray (2015).

In the global literature gender wage gap is a well-examined issue. Sanborn (1964) using U.S. census data 1950 found that male-female wage differential (as a proportion of female wage) is 0.72 (Oaxaca, 1973). More recently, Blau et al. (2017), using U.S. PSID 2010 data found that the mean gender wage gap is 23.1 per cent and this gap is higher at the lower level of wage distribution (about 16.5 per cent in the first decile) and tends to be narrower at the top of the wage distribution (about 12.5 per cent at the ninth decile). The topic has been receiving growing attention in the recent past years and the resultant global literature is quite extensive (Fitzenberger, 1999; Fitzenberger and Kunze, 2005; Hubler, 2005; Melly, 2005 on Germany; Machado and Mata, 2005 on Portugal; Jann, 2008 on Switzerland; Garcia, Hernandez and Lopez-Nicolas, 2001 on Spain). Researchers tend to agree that, a) gender wage gap exists in developed as also developing country contexts and b) gender wage gap is higher at the bottom of the wage distribution curve and tends to be narrower at the top. There are some exception to the last point, but only in some a limited cases [see, for instance, (Tromp, 2016)].

Gender wage gap remains an interesting area of study in the Bangladesh context. A number of studies has been carried out earlier in this area. One such study is Rahman (2003) which uses LFS 2000 data and found that rural women earn 45 per cent less as wages than men and urban women earn 31 per cent less than men. Using Household Income and Expenditure Survey (HIES) 2000 and 2005 data Al-Samarrai (2007) finds that women in Bangladesh have made notable inroads in the labour market of the country. The study concludes that the wage gap among the salaried workers in 2000, which was 52 percent, had come down to 32 per cent in 2005. Further decomposition by Al-Samarrai (2007) shows that in 2000, 31.0 per cent of the wage gap was due to characteristics effect and the rest was due to coefficient (in labour economics literature this was refered to as wage discrimination). Kapos (2008), using Occupational Wage

Survey 2007 and applying Oaxaca-Blinder decomposition technique found 22.5 per cent the wage gap in Bangladesh to be to the tune of 22.5 per cent. More recently, to have more indepth understanding of the gender wage gap, some studies have put emphasise on the gender wage gap across the distribution of the wage using conditional quantile regression. Using Labor Force Survey (LFS) 1999-2000 Ahmed and Maitra (2011) found that gender wage gap is 50.3 per cent at the first decile of the wage distribution while the gap is 45.4 per cent at ninth decile of the wage distribution. A notable finding of the Ahmed and Maitra (2011) study is that the coefficient (discrimination) effect contributes to most of the wage gap against women in the Bangladesh labour market. Ahmed and McGillivray (2015) applying Oaxaca-Blinder decomposition and distributional decomposition techniques and using LFS 1999-2000 and LFS 2009-2010 found that over the period 1999 to 2010 the average gap has come down by 31 per cent. The authors found that the differences in observed wage was 20.6 per cent in 2010 while it was 57.8 per cent in 2000.

QCD technique has not been applied to study the gender wage gap in Bangladesh. Using QLFS 2015-2016 and applying QCD we show that the gender wage gap is highest at the bottom deciles (second decile) of the wage distribution and tends to be narrower at top decile (ninth decile) of the wage distribution. QLFS 2015-2016 indicates that the informal employment in Bangladesh labour market consists of 86.2 per cent of the employed population. As a result, to have particular emphasis on how the presence of large informal employment contributes to increase in wage inequality. Using the conditional quantile regression and interaction between informal employment and gender variables, we have been able to establish that a significant part of gender wage gap at the lower level of wage distribution is due to the large presence of informal employment in the economy.

The remainder of the paper is organized as follows. Section 2 elaborates on the estimation methodology for the analysis undertaken and the justification of using the proposed models. Section 3 presents a brief overview of the data. Section 4 presents the results of the empirical analysis of gender wage gap. Finally, section 5 concludes the paper.

## 2. ESTIMATION METHODOLOGY

The focus of this study on full time paid employee and those who earn wage in the reference period of the survey. As a result, those who are not in the labour force [particularly female labour force participation is 36.5 per cent whereas male participation rate is 81.9 percent (BBS (2017)] is excluded from this analysis. As argued by Heckman (1976) this selection may cause bias and inconsistency the regression estimates. To overcome the selection bias this article first employs the Hackman Two Step (Heckit) technique. In the first stage, we compute Inverse Mill's Ratio from the Probit regression of labour force participation for female and then include Inverse Mill's Ratio into wage equation for female.

A widely used tool to examine gender wage gap by specific groups (e.g. sex) is the Oaxaca Blinder decomposition methods (Oaxaca, 1973; Blinder, 1973). This method divides the wage differential into two parts: the "explained" part that looks at group difference in productivity characteristics such as education and work experience. The "unexplained" part measures the discrimination which can not be accounted for by wage determinants.

Given, there are two groups – male (M) and female (F), an outcome variable wage (W), and a set of predictors. The method can be written as follows: $Difference = E(W_{M)} - E(W_F)$, where $E(W)$ denotes the expected value of the outcomes variable and is accounted for by the grouped difference in the predictors. Based on the linear model we write the wage function for both male and female as: $W_l = X_l^T \beta_l + \epsilon_l$, $E(\epsilon_l) = 0$, $l \in$

$\{X, Y\}$, where X is a vector containing the predictors and a constant, $\beta$ denoting the slope parameters and intercept, and $\epsilon$ is error term. Based on this, the regression model, a popular form of two-fold decomposition of labour market differential, can be written as (Jann, 2008):

$$Difference = [E(X_M) - E(X_F)]^T \beta^* + E[(X_M)^T(\beta_M - \beta^*) + E(X_F)^T(\beta^* - \beta_F)] \text{-----(1)}$$

The first part, $[E(X_M) - E(X_F)]^T \beta^*$, is the outcome difference that is explained by productivity characteristics. The second part, $E[(X_M)^T(\beta_M - \beta^*) + E(X_F)^T(\beta^* - \beta_F)]$, is attributed to discrimination and it also captures all the potential effects of differences in unobserved variables.[2]

An important limitation of Oaxaca-Blinder decomposition is that it does not account for the wage difference across the wage distribution. To measure the degree to which the gender wage gap varies across the distribution of wage, we have applied the quantile counterfactual decomposition methods, the inference is based on bootstrap approach. This was carried out according to the QCD technique proposed by Machado and Mata (2005) and modelling and inference tools developed by Chernozhukov et al. (2013). The counterfactual decomposition of wage using quantile regression is obtained as the following[3]:

$$Q_{\mathrm{W(M|M)}}(\tau) - Q_{\mathrm{W(F|F)}}(\tau) = \underbrace{\left[Q_{\mathrm{W(M|M)}}(\tau) - Q_{\mathrm{W(F|M)}}(\tau)\right]}_{i} + \underbrace{\left[Q_{\mathrm{W(F|M)}}(\tau) - Q_{\mathrm{W(F|F)}}(\tau)\right]}_{ii} \text{---}$$

(2)

In the above equation, the first part represents the counterfactual effect of the conditional distribution (characteristics effect). The second part denotes the counterfactual effect of

[2] The *oaxaca* has been used for this purpose. This is available at RePEc.
[3] The *cdeco* command in Stata has been used for this purpose. This is available at https://sites.google.com/site/blaisemelly/home/computer-programs/inference-on-counterfactual-distributions/

changing the covariates distribution (composition effect, also known as coefficient effect) of the corresponding coefficient of the difference between the $\tau^{th}$quantile of the male wage distribution and $\tau^{th}$quantile of the female wage distribution.[4] To show that the gender wage gap between male and female due to the presence of large informal sector we apply the conditional quantile regression model introduced by Koenker and Bassett (1978).

## 3. THE DATA

The present study uses the QLFS 2015-2016 data of Bangladesh Bureau of Statistics (BBS). This is a cross-section dataset and has several important unique features. The sample size is considerably large and nationally representative. It contains information of 30,816 households or about 126,000 individuals. The sample in this study includes employed individuals in the age range of 15 and 60 years who have earned wages/salaries during the reference period of the survey. In addition, the research considers only *full time paid individuals*. Details of the sample selection is given in Table 1.

Table 1: Sample Selection

| | Formal Employment | Informal Employment | Total |
|---|---|---|---|
| Male | 1465 | 5469 | 6934 |
| Female | 470 | 1852 | 2322 |
| Total | 1935 | 7321 | 9256 |

Source: Author Calculation using QLFS 2015-2016

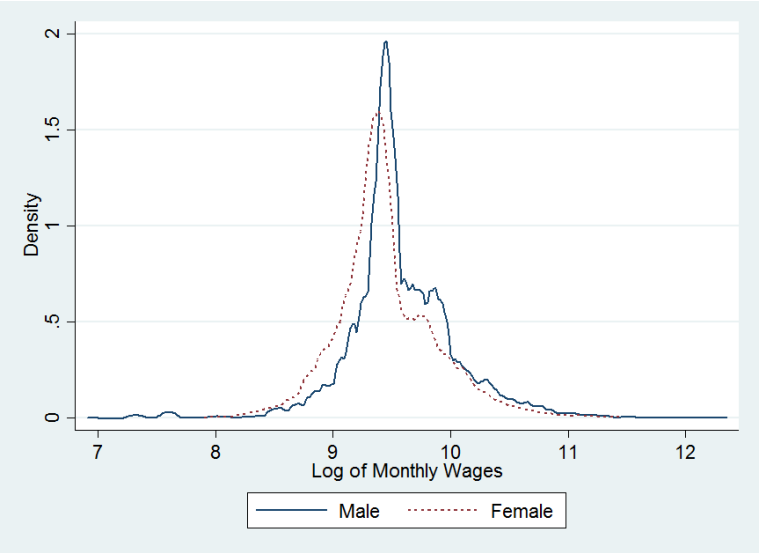
In analysing the gender wage gap issue, this paper has considered various productivity characteristics and nature of the workplace and occupations including, education, age, marital status, geographical location, occupational status and ownership pattern, and

[4] Detailed derivation and estimation procedure can be found at (Koenker and Bassett,1978), (Machado and Mata, 2005), (Koenker and Hallock, 2001), (Chernozhukov et al., 2013)

formal informal divide. For detail theoretical justification of including these variables in wage equations, one can see (Mincer, 1954; Oaxaca, 1972; Oaxaca and Smith, 2006; Kapos, 2008; Albrecht et al., 2009; Ahmed and Maitra, 2010; Chzhen and Mumford, 2011; Al-Samarrai, 2011; Ahmed and McGillivray, 2015). Below we discuss some of the key variables that determine wage and a summary statistic of key variables are given in Table 2.

We use the log of monthly wage as the dependent variable in calculating the gender wage gap. This allows us to calculate the percentage difference in wage between men and women. The mean of log wage for men is 9.57 and 9.46 for female. In Bangladesh wage is paid on monthly basis and fixed at the time of appointment. Thus, regardless the number of hours an individual work it does not affect salary of full time paid employees.

Figure 1: Distribution of Log Monthly Wages by Gender




Source: Authors calculation using BBS (2017)

Figure 1 shows that wage for both male and female follow similar pattern but male wage is slightly rightward than female wage. A bulk of wage for male right after the highest peak shows another small peak. This shows that male earners at that level earn higher wage than female other than any other male.

Table 2: Summary Statistics of full time paid employees by gender

| | Male | | Female | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| Monthly Log Wage | 9.57 | 0.48 | 9.45 | 0.43 |
| Education | 8.41 | 4.11 | 6.95 | 4.71 |
| Age in Years | 34.16 | 11.33 | 30.96 | 10.22 |
| Rural | 0.32 | 0.47 | 0.17 | 0.38 |
| Informal Employment | 0.79 | 0.41 | 0.80 | 0.40 |

Source: Author Calculation using QLFS 2015-2016

The average years of education for male is 8.41 years on the others hand average years for female is 6.95 years. This shows that on average female are less educated in the labour market. Average age for female is also 4 years lower for female. The potential experience, which is a determinant of wage, is also not in favour for female.

## 4. RESULTS

Regression results as regards gender wage gap and wage discrimination are presented in Table 3. Results of quantile regression estimates, where we test the hypothesis concerning the origination of gender wage gap coming from informal employment, are presented in Table 7 and Table 8.

The variable Inverse Mill's Ratio in Heckit model suggests that the there is no sample selection problem in estimating the wage equation for the female. The Inverse Mill's Ratio is very small (0.0002) and statistically insignificant (Standard error is 0.019). Consequently, we do not include Inverse Mill's Ratio in wage decomposition.

Table 3: Decomposition of Male-Female Wage Differential
Dependent Variable: Log Monthly Wages

| Quantile | $\tau$ (10) | $\tau$ (20) | $\tau$ (30) | $\tau$ (40) | $\tau$ (50) | $\tau$ (60) | $\tau$ (70) | $\tau$ (80) | $\tau$ (90) | Oaxaca-Blinder |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 0.117 | 0.147 | 0.133 | 0.122 | 0.080 | 0.159 | 0.194 | 0.163 | 0.083 | 0.122 |
| effect | (0.009) | (0.023) | (0.023) | (0.015) | (0.00) | (0.022) | (0.031) | (0.024) | (0.029) | (0.011) |
| Char. | 0.000 | 0.000 | 0.000 | 0.080 | 0.000 | 0.143 | 0.125 | 0.105 | 0.083 | 0.065 |
| effect | (0.013) | (0.000) | (0.000) | (0.015) | (0.000) | (0.015) | (0.028) | (0.015) | (0.036) | (0.008) |
| Coeff. | 0.117 | 0.147 | 0.133 | 0.042 | 0.080 | 0.016 | 0.069 | 0.057 | 0.000 | 0.057 |
| effect | (0.016) | (0.024) | (0.023) | (0.019) | (0.000) | (0.017) | (0.033) | (0.023) | (0.06) | (0.009) |

Source: Authors Calculation Using QLFS 2015-2016
Note: The Probit distribution model has been applied. Bootstrap standard error with 100 repetitions are given in parenthesis. The following explanatory variables are included in each group: age, education, training, informal employment, ownership, permanent, occupation dummy, rural dummy, and divisional dummy.

The standard Oaxaca-Blinder decomposition result is presented in Table 8 (side by side with QCD result) shows that an average woman earns 12.2 per cent lower wage than man. In the Oaxaca-Blinder wage decomposition, the characteristics effect of 6.5 per cent implies mean wage increase in women's wage if they had the same characteristics as men. The coefficient effect, which is labour market discrimination against women, is 5.7 per cent[5].

QCD result in Table 8 shows that at the bottom of the wage distribution (1st decile) the gender wage gap is 11.7 per cent. In the second decile the gender wage gap is 14.7 per cent and after second decile the gender wage gap tends to decline and shows 8.0 per cent wage gap in the fifth decile. This gap is triggered by unobserved coefficient effect except in the fourth decile, where wage gap is 12.2 per cent and characteristics effect is 8.0 per cent. In the sixth decile, the wage gap is 15.9 per cent, 19.4 per cent in seventh decile and 16.3 per cent in the eighth decile. On the other hand, at the top of the wage distribution (9th decile) we do observe that the gender wage gap is 8.3 per cent. Overall, we see a blend

[5] Results are statistically significant at 1% level.

of coefficient and characteristics effect throughout the wage distribution. Inference on quantile counterfactual distribution is given in Table 9 below.

Table 4: Bootstrap Inference on counterfactual quantile process

| **Null Hypothesis** | **KS-statistic** | **CMS-statistic** |
|---|---|---|
| Correct specification of the parametric model 0 | 0.30 | 0.30 |
| Correct specification of the parametric model 1 | 0.38 | 0.59 |
| **Differences between the observable distributions** | | |
| No effect: QE(tau)=0 for all taus | 0.00 | 0.00 |
| Constant effect: QE(tau)=QE(0.5) for all taus | 0.02 | 0.00 |
| Stochastic dominance: QE(tau)>0 for all taus | 0.77 | 0.77 |
| Stochastic dominance: QE(tau)<0 for all taus | 0.00 | 0.00 |
| **Effects of characteristics** | | |
| No effect: QTE(tau)=0 for all taus | 0.00 | 0.00 |
| Constant effect: QE(tau)=QE(0.5) for all taus | 0.00 | 0.00 |
| Stochastic dominance: QE(tau)>0 for all taus | 0.56 | 0.56 |
| Stochastic dominance: QE(tau)<0 for all taus | 0.00 | 0.00 |
| **Effects of coefficients** | | |
| No effect: QE(tau)=0 for all taus | 0 | 0 |
| Constant effect: QE(tau)=QE(0.5) for all taus | 0.03 | 0.01 |
| Stochastic dominance: QE(tau)>0 for all taus | 0.89 | 0.89 |
| Stochastic dominance: QE(tau)<0 for all taus | 0.00 | 0.00 |

Source: Author Calculation using QLFS 2015-2016

Bootstrap inference on quantile counterfactual decomposition of male female gender wage gap is given in Table 4. We find that the functional form of regression model that we specify for the above analysis is the correct one. We reject the null hypothesis of "no effect of observable distributions". As a result, we make conclusion about the strong presence and stochastic dominance of gender wage gap in each decile of the wage distribution in Bangladesh. In addition, we reject the null hypothesis of "no effects of characteristics" and "no effect of coefficients". We can thus conclude that the gender wage gap in Bangladesh is a combination of both coefficient effect and characteristics effect.

Drawing attention to the large presence of informal employment in developing countries, Beaker (2004) characterises it as unregulated, unrecognized, unprotected and

unrecorded. The gap in wage between formal and informal employment is a penalty incurred on account of informality [see, for instance, Funkhouser, (1997); Gong and Van Soest (2002); Bargain and Kwenda (2014)]. Using the quantile regression framework this article has quantified the contribution of informal employment attributes to male-female gender wage gap.

Table 5: Gender Wage Gap in Formal Employment
Dependent Variable: Log Monthly wage

| Quantile | $\tau$ (10) | $\tau$ (20) | $\tau$ (30) | $\tau$ (40) | $\tau$ (50) | $\tau$ (60) | $\tau$ (70) | $\tau$ (80) | $\tau$ (90) | Oaxaca-Blinder |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | -0.080 | -0.061 | 0.000 | 0.027 | 0.000 | 0.000 | 0.000 | 0.036 | 0.089 | 0.016 |
| effect | (0.071) | (0.038) | (0.022) | (0.027) | (0.011) | (0.019) | (0.026) | (0.039) | (0.036) | (0.022) |
| Char. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -0.040 | -0.069 | 0.000 | -0.009 |
| effect | (0.031) | (0.029) | (0.029) | (0.029) | (0.021) | (0.017) | (0.024) | (0.028) | (0.035) | (0.015) |
| Coeff. | -0.080 | -0.061 | 0.000 | 0.027 | 0.000 | 0.000 | 0.041 | 0.105 | 0.089 | 0.026 |
| effect | (0.064) | (0.026) | (0.025) | (0.030) | (0.022) | (0.024) | (0.022) | 0.031) | (0.047) | (0.018) |

Source: Authors' calculations using QLFS 2015-16

Note: The Probit distribution model has been applied. Bootstrap standard error with 100 repetitions are given in parenthesis. The following explanatory variables are included in each group: age, education, training, ownership, permanent, occupation dummy, rural dummy, and divisional dummy.

We see in the Table 5 that the average wage gap between men and women is insignificant 1.6 percent. But in the first decile of the wage distribution formal employed women earn 8 per cent higher wage than male and in second decile women earn 6.1 per cent higher wage than male. In the 3$^{rd}$, 4$^{th}$, 5$^{th}$, 6$^{th}$, 7$^{th}$ deciles we observe equality of male and female in terms of their respective wages. But in the 8$^{th}$ decile male earns 3.6 per cent higher wage than female and in 9$^{th}$ decile male earns 8.9 per cent more wage than female. However, in 8$^{th}$ and 9$^{th}$ deciles characteristics favour to women but labour market discrimination causes the wage gap in these deciles.

Table 6: Gender Wage Gap in Informal Employment
Dependent Variable: Log Monthly wage

| Quantile | $\tau$ (10) | $\tau$ (20) | $\tau$ (30) | $\tau$ (40) | $\tau$ (50) | $\tau$ (60) | $\tau$ (70) | $\tau$ (80) | $\tau$ (90) | Oaxaca-Blinder |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 0.182 | 0.154 | 0.182 | 0.087 | 0.123 | 0.080 | 0.113 | 0.169 | 0.223 | 0.143 |
| effect | (0.034) | (0.025) | (0.000) | (0.004) | (0.021) | (0.000) | (0.019) | (0.038) | (0.018) | (0.010) |
| Char. | 0.000 | -0.047 | 0.000 | 0.000 | 0.039 | 0.000 | 0.074 | 0.134 | 0.163 | 0.059 |
| effect | (0.005) | (0.022) | (0.000) | (0.004) | (0.011) | (0.000) | (0.017) | (0.029) | (0.031) | (0.006) |
| Coeff. | 0.182 | 0.201 | 0.182 | 0.087 | 0.083 | 0.080 | 0.039 | 0.036 | 0.061 | 0.084 |
| effect | (0.034) | (0.011) | (0.000) | (0.000) | (0.022) | (0.000) | (0.009) | (0.022) | (0.027) | (0.009) |

Source: Authors' calculations using QLFS 2015-16
Note: The Probit distribution model has been applied. Bootstrap standard error with 100 repetitions are given in parenthesis. The following explanatory variables are included in each group: age, education, training, ownership, permanent, occupation dummy, rural dummy, and divisional dummy.

The average wage gap between informally employed male and female employee is 14.3 per cent where 8.4 per cent is labour market discrimination against women. Throughout the wage distribution we observe higher wage gap than what we observed for the full sample. In the bottom of the wage distribution (up to 4$^{th}$ decile) we see that these wage gap due to labour market discrimination against women. But after that a large part of wage gap due to differences in endowments between men and women. Table 5 makes clear that the observed wage gap between male and female originate from the unregulated informal employment.

To support and establish above mentioned claim and to link results in Table 4 and Table 5 we take the interaction between *female* and *informal employment* dummy. This allows us to have a deeper understanding about the effects of informal employment for specific groups at conditional quantiles. The results of quantile regression estimates are given in Table 7 and Table 8.

Table 7: Quantile Regression of Log Monthly Wage Equation[6]
Dependent Variable: Log of Monthly Wage

| Variables\ Q | $\tau$ (10) | $\tau$ (20) | $\tau$ (30) | $\tau$ (40) | $\tau$ (50) | $\tau$ (60) | $\tau$ (70) | $\tau$ (80) | $\tau$ (90) | OLS |
|---|---|---|---|---|---|---|---|---|---|---|
| Female | -0.102*** | -0.072*** | -0.058*** | -0.044*** | -0.039*** | -0.035*** | -0.035*** | -0.035*** | -0.044*** | -0.039*** |
| | (0.018) | (0.011) | (0.008) | (0.007) | (0.006) | (0.006) | (0.007) | (0.007) | (0.012) | (0.009) |
| Others variables Included? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 |
| R-squared | 0.13 | 0.18 | 0.21 | 0.24 | 0.28 | 0.33 | 0.35 | 0.36 | 0.37 | 0.41 |

Source: Authors Calculation Using QLFS 2015-2016.
Note: Robust Standard Error in Parenthesis, *** p<0.01, ** p<0.05, * p<0.1. The following explanatory variables are included in each group: age, education, training, informal employment, ownership, permanent, occupation dummy, rural dummy, divisional dummy. We suppressed the full results for the sake of brevity.

Table 8: Quantile Regression of Log Monthly Wage Equation with Interaction
Dependent Variable: Log of Monthly Wage

| **Variables\Q** | $\tau$ (10) | $\tau$ (20) | $\tau$ (30) | $\tau$ (40) | $\tau$ (50) | $\tau$ (60) | $\tau$ (70) | $\tau$ (80) | $\tau$ (90) | OLS |
|---|---|---|---|---|---|---|---|---|---|---|
| female | 0.085** | 0.017 | 0.003 | -0.023* | -0.038** | -0.029 | -0.041* | -0.065*** | -0.076** | -0.014 |
| | (0.041) | (0.015) | (0.019) | (0.012) | (0.017) | (0.018) | (0.021) | (0.016) | (0.037) | (0.019) |
| Informal Emp | -0.227*** | -0.131*** | -0.074*** | -0.028* | -0.001 | -0.005 | 0.006 | 0.032* | 0.034 | -0.031 |
| × Female | (0.047) | (0.020) | (0.021) | (0.015) | (0.019) | (0.019) | (0.022) | (0.017) | (0.040) | (0.021) |
| Others variables Included? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 | 9,256 |
| R-squared | 0.14 | 0.19 | 0.21 | 0.24 | 0.28 | 0.33 | 0.35 | 0.36 | 0.37 | 0.41 |

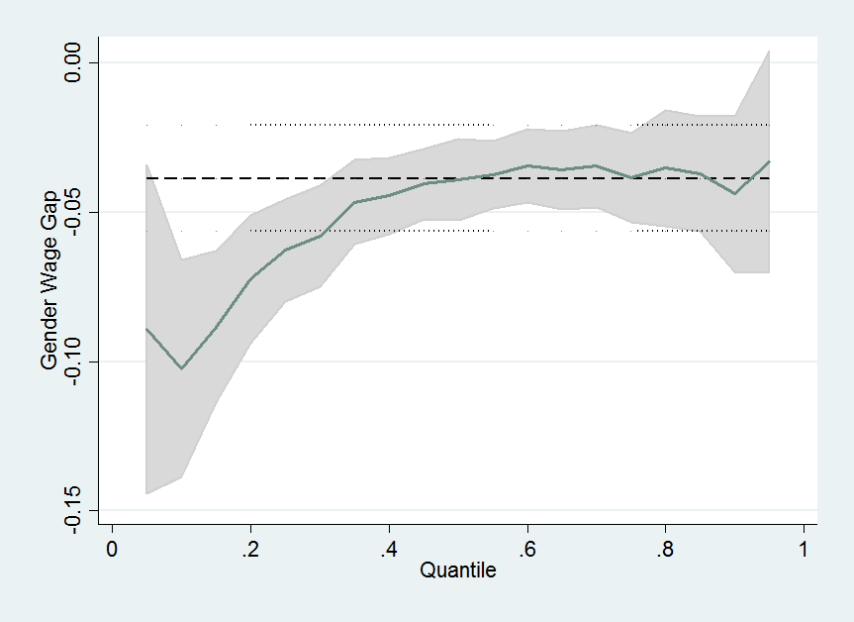
Source: Authors Calculation Using QLFS 2015-2016.
Note: Robust Standard Error in Parenthesis, *** p<0.01, ** p<0.05, * p<0.1. The following explanatory variables are included in each group: age, education, training, informal employment, ownership, permanent, occupation dummy, rural dummy, divisional dummy. We suppressed the full results for the sake of brevity.

Results in Table 7, where quantile regression results are presented, also shows that gender wage gap is higher in the lower deciles of the wage distribution; women earn about 10.2 per cent less wage than men at the first decile. This gender wage gap tends to be narrow as we move along the higher deciles of the wage distribution; e.g. the wage gap is about 3.5 per cent in the 8$^{th}$ decile (Table 7).

[6] The quantile regression results are different from QCD because the effect of counterfactual is absent.

In Table 8 we test whether the large presence of informal employment (about 86.2 percent nationally and 79.1 per cent in this subsample) is a major source of gender wage gap in Bangladesh. We have taken the interaction of female workers and informal sector workers to test the hypothesis concerning "origination of wage gap from informal sector". We find that when we include the interaction term in the analysis, there is a dramatic change in the regression results. For the 1st decile, this interaction term accounts for all the gender wage gap (statistically significant at 1% level) while the gender variable (female) becomes positive (statistically significant at 5% level). The noteworthy result is that given the men and women characteristics at the first decile of the wage distribution, formally employed women earn 8.5 per cent more wage then men. In fact, centile of male female wage distribution shows that at the first decile female log of monthly wage is 9.47 and male monthly wage is 9.39. The results show that our hypothesis holds in the above-mentioned context and proves that informality is the major cause of the gender wage gap in Bangladesh. To a large extent, this result holds for 1st, 2nd, 3rd, and 4th deciles. In 4th, 5th, 7th, 8th, and 9th deciles we observe the presence of gender wage gap even after including the interaction term in the analysis. In sum, the informal employment contribution to gender wage gap is higher in the lower decile of the wage distribution and tends to be lower in the higher decile of the wage distribution. This is from the fact that those who are informally employed but earn higher wage in the market are very competitive and discrimination against them is very difficult due to their bargaining power over the wage. This is, however, not to say that gender is not a factor in the gender-wage gap. This exercise indicates that in the Bangladesh context, an important strategy to narrow down gender wage gap will be to pursue a strategy of reducing informality in a consistent manner. The key findings of table 7 and 8 are graphically presented in Figure 2 and Figure 3 respectively.

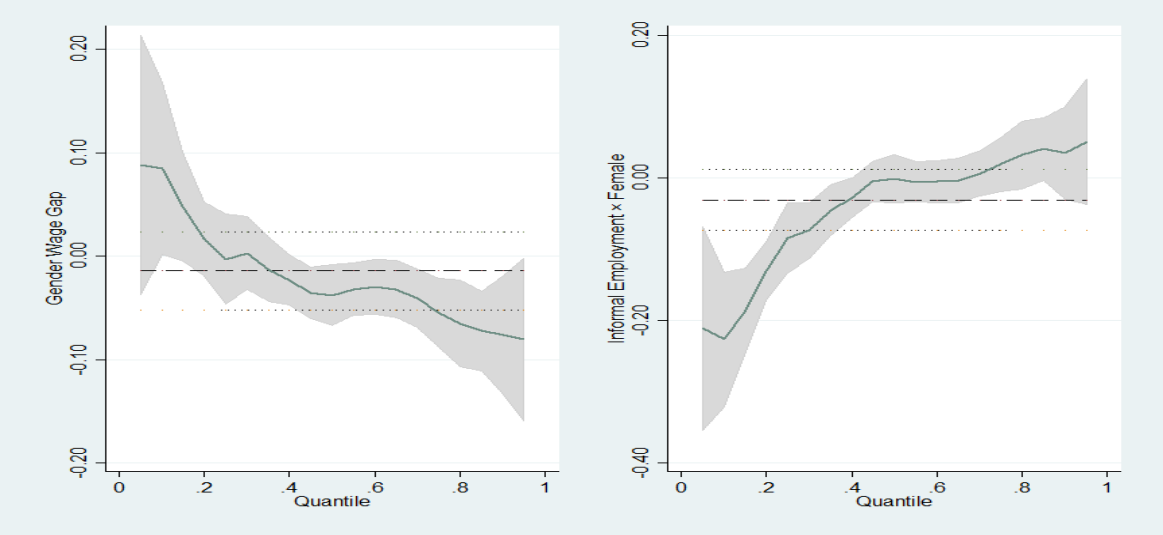
Figure 2: Male-Female Earning Gap in Bangladesh Labour Market




Source: Authors' calculation using QLFS 2015-2016

Figure 2 compares the OLS coefficient and quantile regression graphically which was observed from Table 11. The gender wage gap is higher than the OLS in the lower decile of the wage distribution (about 5 percentage points more for the first decile than the OLS) and quantile coefficient approaches the OLS coefficient from the fifth decile.

Figure 3: Effect of Informal Employment in Male-Female Wage Gap




Source: Authors' calculation using QLFS 2015-2016

Figure 3 compares the OLS coefficient and quantile regression graphically based on Table 12. From the left panel in Figure 3 it is seen that the quantile regression crosses the OLS from above at the 4th decile and thereafter goes below. The right panel of Figure 3 shows that informality causes gender wage but this becomes statistically insignificant after the 4th decile.

## 5. CONCLUSION

This paper has made an attempt to undertake an indepth and detailed investigation into the underlying factors driving the gender wage gap in Bangladesh. The Oaxaca-Blinder decomposition shows that the mean gender wage gap in the country is 12.2 per cent. In addition, QCD shows that this gap is higher in the lower deciles of wage distribution and the gap tends to be lower towards the higher deciles. Further, we find that in the formal employment the mean wage gap between male and female is statistically insignificant. In contrast, female employees receive 14.4 per cent lower wage than male in informal employment. We showed that informal employment was the key contributor to gender wage gap in the full sample.

This article shows that a change in wage distribution in favour of women is possible if policymakers incentivises women's access to formal jobs, in greater numbers. Since informal employment will continue to be pervasive, over the medium term, policymakers in developing countries will need to design policies, interventions and incentives. So that women in informal employment are able to access better paid jobs in the informal labour market.

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