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## **PUBLIC PENSION GOVERNANCE AND ASSET ALLOCATION**

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### **Abstract:**

Female wages in Bangladesh are significantly lower compared to male wages. This paper seeks to quantify the extent of discrimination in explaining this gender wage gap. We decompose the gender wage differential into a component that can be explained by differences in productive characteristics and a component unexplained by observable productive differences, which are attributed to discrimination. We examine this issue both for rural and urban areas in Bangladesh, using individual level unit record data. Methodologically, we use a number of different approaches to decompose the wage gap between the “explained” and the “unexplained” components. Our results show that gender wage differentials are considerably larger in urban areas compared to rural areas. The decomposition analysis suggests that a significant portion of this gender wage gap results from discrimination. We also find that failure to correct for sample selection bias leads to a significant under estimation of the gender wage gap in both rural and urban areas. Our results have significant policy implications.

**Key Words:** Gender, Wage Discrimination, Bangladesh.

**JEL Classification:** J16, J21, J24, J31

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## **Gender Wage Discrimination in Rural and Urban Labour Markets of Bangladesh<sup>3</sup>**

### **1 Introduction**

It is now fairly well-established that women lag behind men in many domains in developing countries. Gender differences are noticeable in several spheres. For example, women have less access to and control over resources, few opportunities are made available to them at the workplace and they are disproportionately represented in the political scene. While women incur the direct costs of these inequalities, these costs are eventually borne by the society as a whole. The nature and extent of this inequality varies considerably across countries, and is related to the basis and structure of the economic system of a nation. One of the most visible examples in this perspective is inequality in wages based on gender. Women on average earn less than men for similar work and the gap varies across nations. In developing regions, like Southern Asia, and Sub-Saharan Africa the average gap between men's and women's income are 47% and 56% respectively, while in relatively rich regions like in North America and in Europe the wage gap is considerably lower.

Wage inequalities between races or between gender groups exist in almost every country and one can think of two main reasons for this. First, individuals of different race/gender groups may choose to accumulate different levels of productive skills. This may be motivated by, among other things, culture, geographic proximity or historical reasons. Second, even in the presence of equal endowments of productive skills, wage inequality may persist if employers reward productive skills differently depending on the race/gender group of the worker. Such potential cause of wage inequalities is usually

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attributed to discrimination at the workplace [Becker (1957), Phelps (1972) and Arrow (1972)]. Becker's work provided the background for subsequent work by Oaxaca (1973), Blinder (1973), Reimers (1983), Neumark (1988), and Cotton (1988). The methodology developed in these papers has been used to examine gender wage discrimination in a number of different (though primarily developed) countries. A small number of studies now exists on countries in Latin America [Psacharopoulos and Tzannatos (1992)], Africa [Knight and Sabot (1982); Appleton, Hoddinott and Krishnan (1999); Glick and Sahn (1997)] and transitional economies of Eastern and Central Europe [Brainerd (1998); Reilly and Newell (2000); Jurajda (2001); Adamchik and Bedi (2003)]. All these studies identify active discrimination against women in the labour market. In the context of Asia, Horton (1996) in a seven-country study of women in East Asian labour markets finds that differences in returns to male and female characteristics account for at least half the gap between male and female earnings. Recent studies on South Asia have yielded similar results. Jacob (2006) explores the changes in the wage gap between caste and gender groups in India between 1983 and 1999 – 2000 using a nationally representative data set. He observes that about 55% of the wage gap between men and women in 1999 cannot be explained by differences in productive characteristics and endowments. Akter (2005), in a study of the rural labour market in Bangladesh, finds that 70% of the total wage gap is due to within job discrimination. The few other studies that exist in Bangladesh have almost exclusively focussed on the urban manufacturing sector and report that differences in the wage rates of men and women cannot be accounted for by differences in productivity related characteristics, implying that discrimination against

women may play a role [Majumder and Zohir (1993); Majumder and Mahmud (1994) and Zohir (1998)].

This paper examines gender inequality in wages in Bangladesh. The labour market in Bangladesh is gender segregated with the bulk of women's work taking place in non-market activities in the home or in the informal sector. Those in the formal sector (public and private) are generally employed in female intensive industries (for example RMG sector, shrimp processing, and pharmaceuticals). Additionally upward mobility for female labourers is very limited. Inferring the differences in wages that stem from such labour market segregation could provide some insight into evidence of discrimination against women. Women in paid employment in both rural and urban areas often receive lower wages than men, even after controlling for type of employment, status of employment, occupation and hours of work.<sup>4</sup> Although the labour code of the country stipulates equal pay for equal work<sup>5</sup>, little is known about the exact characteristics of pay levels to clearly assess this difference.

## **2 The Empirical Specification**

In general, the quantifiable measures of discrimination against women focus extensively on the magnitude of the wage gap between males and females. The most commonly used technique is the Oaxaca-Blinder decomposition method [Oaxaca (1973) and Blinder

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<sup>4</sup> For example in the urban regions female wage rates was 50% of that of males in 1995-96 declining further to 46% in 1999-2000. In rural regions the ratio has remained constant at 44% over the same period (source: Report of the LFS 1995 – 96 and 1999 – 2000, Bangladesh Bureau of Statistics).

<sup>5</sup> Bangladesh has enacted a number of laws at the national level to eliminate discrimination against women and girls in all spheres. For example: Convention for Elimination of Discrimination against Women (CEDAW) and The National Policy for the Advancement of Women (NAP).

(1973)]. They decompose the wage differential into a component explained by differences in personal characteristics of workers that affected their productivity and a component unexplained by observable productive differences which they attribute to discrimination.

We start by estimating separate (log) hourly wage equations for males ( $m$ ) and females ( $f$ ). This allows for different rewards by gender to the same set of productive characteristics or endowments. The wage equations have the following form:

$$\ln Y_{ij} = \alpha_j + X_{ij}\beta_j + \varepsilon_{ij}; i = 1, \dots, n; j = m, f \quad (1)$$

$\ln Y_{ij}$  is the natural log of hourly wages,  $\alpha_j$  is an intercept term for gender group  $j$ ;  $j = m, f$ ,  $X_{ij}$  is a vector of characteristics for individual  $i$  who belongs to gender category  $j$  and  $\beta_j$  is a vector of coefficients to be estimated,  $\varepsilon_{ij}$  is the error term with zero mean and constant variance. Equation (1) is estimated using OLS, separately for males and females.

Define  $D$  as the difference in the expected values of male and female wages obtained by estimating equation (1) separately for males and females. We can then write:

$$\begin{aligned} D_1 &= \overline{\ln Y_{im}} - \overline{\ln Y_{if}} \\ &= (\bar{X}_{im} \hat{\beta}_m - \bar{X}_{if} \hat{\beta}_f) + (\hat{\alpha}_m - \hat{\alpha}_f) \\ &= (\bar{X}_{im} - \bar{X}_{if}) \hat{\beta}_m + \bar{X}_{if} (\hat{\beta}_m - \hat{\beta}_f) + (\hat{\alpha}_m - \hat{\alpha}_f) \end{aligned} \quad (2)$$

where  $\hat{\beta}_j$  and  $\hat{\alpha}_j$ ;  $j = m, f$  denote the corresponding estimated values of  $\beta_j$  and  $\alpha_j$  respectively. The first term in the right hand side  $\left[ (\bar{X}_{im} - \bar{X}_{if}) \hat{\beta}_m \right]$  is the explained portion, which is the portion that explains the gap due to observable characteristics at the

mean, evaluated by the male wage equation. The second term  $\left[ \bar{X}_{if} (\beta_m - \beta_f) \right]$  is the unexplained portion. It is the difference in the return to each wage determinant received by males and females, evaluated at the mean set of women's characteristics. The third term,  $\left[ \alpha_m - \alpha_f \right]$  is the difference between the constants. The latter two terms arise from differences in the coefficients in the wage equations (both intercepts and slopes) for men and women and is usually interpreted as a measure of labour market discrimination after adjusting for differences in observable characteristics (in other words, the adjusted wage gap).

An alternative way of writing equation (2) is to take the female wage structure as the non-discriminatory norm. Then the decomposition becomes:

$$D_2 = \overline{\ln Y_{im}} - \overline{\ln Y_{if}} = (\bar{X}_{im} - \bar{X}_{if}) \beta_f + \bar{X}_{im} (\beta_m - \beta_f) + (\alpha_m - \alpha_f) \quad (3)$$

Comparison of equations (2) and (3) lead us to an important question: what is the non-discriminatory wage structure to be used for comparison purposes? The original method used both male and female wage structures as the non-discriminatory norm. This creates an "index number" problem, since the choice of male and female wage structures as the competitive standard do not yield the same estimate for the discrimination component. Further, the resulting levels of discrimination provide a range within which the actual level of discrimination falls. Reimers (1983) hypothesizes that the correct procedure is instead to take an average of the range. Cotton (1988) and Neumark (1988) suggest improving upon the procedure by employing a weighted-average of the two wage structures, which should then, provide us with an exact figure rather than a range.

Cotton (1988) argues that in the presence of discrimination, the wage structure can be decomposed as follows: first, males are paid a premium for their productivity characteristics as a result of nepotism; second, females have their characteristics undervalued as a result of discrimination. He has, therefore, argued for estimating a non-discriminatory wage structure through a linear combination of the male and female wage structures. The resulting decomposition can be written as follows:

$$D_3 = \overline{\ln Y_{im}} - \overline{\ln Y_{if}} = (\bar{X}_{im} - \bar{X}_{if})\beta^* + \bar{X}_{im}(\beta_m - \beta^*) + \bar{X}_{if}(\beta^* - \beta_f) + (\alpha_m - \alpha_f) \quad (4)$$

where  $\beta^*$  is a non-discriminatory wage structure that is common to both men and women in the economy. The first term,  $\left[ (\bar{X}_{im} - \bar{X}_{if})\beta^* \right]$  of the decomposition is the explained component. The second term  $\left[ \bar{X}_{im}(\beta_m - \beta^*) \right]$  and the third term  $\left[ \bar{X}_{if}(\beta^* - \beta_f) \right]$  represent the male treatment advantage and the female treatment disadvantage, respectively. The sum of the last three terms is considered to be an indicator of the extent of discrimination.

Remember that  $\beta^*$  is unobservable and we define  $\beta^*$  as

$$\beta^* = \rho_m \beta_m + \rho_f \beta_f \quad (5)$$

where,  $\rho_m$  is the proportion of the male workforce and  $\rho_f$  is the proportion of the female workforce in the samples, and  $\beta_m$  and  $\beta_f$  are the estimated parameters from the male and female wage regressions.

## 2.1 Accounting for Sample Selection

One potential problem with the decomposition approaches discussed above is that they do not account for sample selection bias. The wage equations are applied to a sample of employed men and women, whose selection criteria are not random because we do not have wage data for those who are unemployed. Since the characteristics of the employed population in the labour force might not mirror that of the whole population, the OLS results obtained may be biased and inconsistent: the standard problem of selectivity bias.

In this paper we revisit the sample selection problem and the likely consequences of this selection issue on the gender wage gap. We start by estimating the selection (employment) equation where, individual  $i$  is assumed to choose his or her employment status according to a probit model:

$$I_i = \gamma Z_i + \mu_i \quad \forall i, i=1, \dots, n \quad (6)$$

where  $I_i$  is a dummy variable denoting employment status. We estimate separate employment status regressions for males and females. Having estimated equation (6), we compute the inverse mills ratio  $\left( \lambda_i = \frac{\phi(\gamma Z_i)}{1 - \Phi(\gamma Z_i)} \right)$ , which is included as an additional explanatory variable in wage equations given by (1). The expanded wage equations can be written as:

$$\ln Y_{ij} = \alpha_j + X_{ij} \beta_j + \theta_j \lambda_{ij} + \varepsilon_{ij}; j = m, f \quad (7)$$

$\theta_j$  denotes the covariance between the errors in the selection equation and the wage equation (one for each gender group  $j$ ). Equation (7) takes into account the correlation between  $\varepsilon_{ij}$  and  $\mu_{ij}$ .<sup>6</sup>

We can now compute the extended gender wage gap as:

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<sup>6</sup>See, for example Creedy, Duncan and Harris (2000), Kidd and Viney (1991).

$$D_4 = \overline{\ln Y_{im}} - \overline{\ln Y_{if}} = (\bar{X}_{im} - \bar{X}_{if})\beta_m + \bar{X}_{if}(\beta_m - \beta_f) + (\alpha_m - \alpha_f) + (\hat{\theta}_m \bar{\lambda}_{im} - \hat{\theta}_f \bar{\lambda}_{if}) \quad (8)$$

The observed wage differential ( $\overline{\ln Y_{im}} - \overline{\ln Y_{if}}$ ) is now the sum of the following components: the contribution of endowment differences or the explained portion  $\left[ (\bar{X}_{im} - \bar{X}_{if})\beta_m \right]$ , the unexplained portion which is attributed to labour market discrimination  $\left[ \bar{X}_{if}(\beta_m - \beta_f) + (\alpha_m - \alpha_f) \right]$ , and the contribution of differences in the average selectivity bias  $\left[ (\hat{\theta}_m \bar{\lambda}_{im} - \hat{\theta}_f \bar{\lambda}_{if}) \right]^7$ .

The incidence of sample selection bias indicates that the observed mean log-wage differential will differ from the unobserved differential in terms of wage offers (Kidd and Viney (1991)). Therefore, it is convenient to rewrite equation (8) in the following form:

$$\left( \overline{\ln Y_{im}} - \overline{\ln Y_{if}} \right) + \left( \hat{\theta}_f \bar{\lambda}_{if} - \hat{\theta}_m \bar{\lambda}_{im} \right) = (\bar{X}_{im} - \bar{X}_{if})\beta_m + \bar{X}_{if}(\beta_m - \beta_f) + (\alpha_m - \alpha_f) \quad (9)$$

Here the left-hand side provides the measure of differences in the offered wage (the sum of the difference in the observed mean wages and the difference in the average selectivity bias). The only difference between equation (8) and equation (9) is that, equation (9) presents a decomposition of the selectivity adjusted wage difference as opposed to a decomposition of the observed wage difference in equation (8).

We can rewrite equation (9) by taking the female wage structure as the non-discriminatory norm:

$$\left( \overline{\ln Y_{im}} - \overline{\ln Y_{if}} \right) + \left( \hat{\theta}_f \bar{\lambda}_{if} - \hat{\theta}_m \bar{\lambda}_{im} \right) = (\bar{X}_{im} - \bar{X}_{if})\beta_f + \bar{X}_{im}(\beta_m - \beta_f) + (\alpha_m - \alpha_f) \quad (10)$$

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<sup>7</sup> This part may be viewed as the differences in unobservable which influence wages. Following Hoffman and Link (1984), we do not further decompose the wage equation.

The information derived from equations (9) and (10) will allow us to decompose differences in observed and offered wages into the ‘explained’ and ‘discriminatory’ components.

### **3 The Data**

The dataset that we use for empirical estimation is obtained from the LFS 1999 – 2000 in the form of unit record files. This dataset has information on 34998 individuals aged 10 years and above, and provides information about whether an individual is employed, unemployed or out of the labour force. The estimating sample is restricted to individuals aged 15 and higher (i.e. we ignore child labour as defined by ILO).<sup>8</sup> This restricts the sample to 18979 individuals who are classified as actively participating (or are seeking to participate) in the labour force.<sup>9</sup> In this sample, 12394 (66%) are males and 6585 (34%) are females. Out of this sample, 5951 males and 2368 females reside in urban areas, while 6443 males and 4217 females reside in rural areas.

Finally in estimating the wage equation, we drop the unemployed individuals whose wage rates are not observed.<sup>10</sup> This restricts the sample to 18237 individuals. The sample consists of 11919 are males. 7875 individuals reside in urban areas, of which 72% are males. Males constitute 60% of the total rural sample of 10362.

In the wage regressions the dependent variable is the (log) of hourly wages. We focus on four classes of workers: the self-employed, wage employees, casual workers,

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<sup>8</sup> The upper boundary of the working age group is higher than the conventional retirement age of 60. This is because in rural areas individuals tend to work beyond the official retirement age.

<sup>9</sup> Thus, individuals below 15 years of age and those permanently not in the labour force (the retired, disabled, and full time students) are excluded from the sample.

<sup>10</sup> To avoid the problem of taking logarithm of zero in the wage equation and to ensure consistency between employment and wage equations, any person with a zero wage (i.e. unemployed) are dropped.

and unpaid family workers to obtain as complete a population coverage as possible. The (log) of hourly wages is obtained by dividing monthly wages by the imputed monthly hours of work.

The set of explanatory variables includes variables that measure individual productivity (this is unobserved and we use the individual's educational attainment, age and the square of age<sup>11</sup> as proxies); monthly hours worked<sup>12</sup>, the number of months unemployed<sup>13</sup>, dummies for being married, job status<sup>14</sup>, training and skill<sup>15</sup>. We also control for occupation and industry.

To identify the selection term's parameters in the employment equation, there must be a variable in this equation, which influences the probability of employment but not the wage rate. Generally, all the variables that affect wages cannot enter the employment status equation, since some of these are unobservable for the non-workers. We include asset ownership (an indirect proxy for non-labour income), home ownership status to proxy wealth, and some family status variables as identifying variables.<sup>16</sup> While

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<sup>11</sup> We do not have any information on actual labour market experience. Age is used as the approximate variable for general labour market experience. Moreover, as age increases, productivity and wage rates tend to rise. But further increases in age may lead to a decline in wage rates and productivity because of diminishing marginal returns. To capture the concavity of the wage profile a quadratic age term is included.

<sup>12</sup> The aim in including this variable is to assess the gross elasticity of hours worked per month with respect to wage rates. A negative impact of this variable on wage rates is often observed, which virtually reflects the predominance of income effects over substitution effects on returns per hour of work.

<sup>13</sup> It has been hypothesized that time out of the labour force can result in depreciation of human capital and therefore, depresses wage rates depending on whether an individual has experienced a long spell or a short spell of unemployment (Mincer and Polachek (1974)).

<sup>14</sup> The determination of job status is independent of occupation and industry classification but refers to the same job.

<sup>15</sup> In general skills and training may be highly, if not perfectly correlated. Skilled people usually tend to have training. In our case, we do not find perfect multicollinearity between skills and training. If multicollinearity is less than perfect or very high (i.e. near multicollinearity), the OLS estimators still retain the unbiased property. Because near multicollinearity per se does not violate the other assumptions of OLS estimation.

<sup>16</sup> One of the major drawbacks in our dataset is that we do not have information on pre-school age children, which would not only be a deterrent to women entering the labour force but also influence their engagement with the labour market.

these variables are unlikely to affect wages directly they are likely to affect employment status: for example the ownership of various types of assets could reduce the probability of employment by raising the shadow value of a person's time in non-market activities.

Table 1 presents the descriptive statistics of the variables included in the selection and the wage equations separately for the urban and rural sample. We also present t-tests for gender differences. The following results are worth noting: Females are on average younger (AGE) and are generally less educated than males. Gaps in educational attainment between males and females are significant in all levels of education except for primary education (PRIM) in urban areas. A higher proportion of female participants are married compared to males in rural areas. This is quite a common scenario in rural Bangladesh where adult male members of the household migrate to urban areas but are unable to bring their family with them or due to adverse economic situations married female members are forced to assume wage employment outside home. Women are more likely to own assets like sewing machines, shallow machines and tractors (ASST03) compared to men, though men are more likely to own larger assets

In the urban sample, the log wage gap at the mean is 0.6703. That is, on average, women earn 95% less per hour than men.<sup>17</sup> The difference is statistically significant at the 1% level. In the rural sample, the mean log wage difference for men and women is 0.3551 at the 1% significance level. In percentage terms, on average, women earn 43% less than men in rural areas.<sup>18</sup> Finally women are predominantly employed in agriculture

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<sup>17</sup> The figure is derived from  $\exp(0.6703)-1$ . It is also worth noting that the gender wage differential in our urban data is significantly larger than that found using similar methodologies in other studies: Loureiro, Carneiro and Sachsida (2004) find 20% and 61% gap in the urban labour market of Brazil in 1992 and 1998, respectively, while Ashraf and Ashraf (1993) find a 61.14 % gap in Rawalpindi City, Pakistan.

<sup>18</sup> The figure is derived from  $\exp(0.3551)-1$ .

(OCCUP\_AGRI) and services (OCCUP\_SER), while men dominate sales (OCCUP\_SALES), and production (OCCUP\_PROD) related occupations.

In figures 1 and 2, we present the kernel density estimates of the log of hourly wages for males and females for the urban sample (Figure 1) and the rural sample (Figure 2). In general, the peak of the distribution of male (log) hourly wages lies to the right of the distribution of the female (log) hourly wages. The distribution of hourly wages looks different for males and females and indeed using a Kolmogorov-Smirnov (K-S) test for the equality of distributions we see that indeed they are: using the K-S test the null hypothesis of equality of distribution is always rejected (in every case the p-values is 0.000).

#### **4 Empirical Results**

Given that we argue, and the regression results presented agree, that ignoring selection bias could result in biased estimates; we focus our discussion on the selectivity corrected regression results. We start with a discussion of the selection equation and then turn to the selectivity corrected wage regressions. The uncorrected wage regression results are presented in the appendix.

##### ***Probit Results for Participation Status***

The selection (employment) equation is estimated using a probit regression model, where the dependant variable PART takes the value of 1 if the worker is employed and 0 if the worker is unemployed. Separate regressions are estimated for males and females. We present in Table 2 both the marginal effects and the actual coefficient estimates.

Age (AGE) has a positive and statistically significant effect on the employment probabilities of males and females across all samples. The square of the age of the individual (AGESQ) however has a negative and statistically significant suggesting that the probability of employment increases with age but at a decreasing rate for females in both samples and for males in the urban sample. Further, being married (MARRIED) has a stronger effect on the probability of employment of women compared to that of men. This might be a reflection of household budget constraints that force married women to enter the labour force in order to support their families. The marginal effects coefficient estimates of the educational attainment dummies are always negative, statistically significant and are monotonically decreasing. For example for the urban sample, males with primary schooling have a 2 percentage point lower probability of participating in the labour market compared to men with no schooling (the omitted category). This probability increases to 4.65 percentage points if the highest education attained is level 6 – 10 and rises further to 9.54 percentage points if the highest education attained is SSC/HSC or equivalent and to 9.81 percentage points if the individual has attained a graduate or higher degree. The corresponding probabilities for the sample of urban females are 3.39, 6.66, 10.70 and 10.05. The results are consistent with those reported by Ashraf and Ashraf (1993).

The effects of wealth on the probability of employment are measured by non-labour income like ownership of assets. Asset ownership generally has a statistically significant effect on probability of male participation status, but not on the participation status of females. In the urban sample, for both males and females, the probability of employment is higher for those who live in a rented house (HRENT) compared to those

who own the house they reside in. This result is surprisingly similar to what is typically found for developed countries. For example, Kidd and Viney (1991) using data from Australia report that the probability of participation in the labour market increases for women, if they live in a rented accommodation. On the other hand, it is surprising that residing in a rented accommodation has a negative and statistically significant impact on male's employment in the rural sample. In the case of men, it might be capturing the fact that in the rural sample those individuals working are also those more likely to own a home. Págán (2002) has identified a similar association in rural Guatemala, where owning the house where the person resides has a positive and statistically significant impact on employment probabilities for males.

***Results from the Selectivity Corrected Wage Regression:***

The estimated wage equations corrected for selection bias are reported next for males and females separately for the rural and the urban sample in Table 3. Wage rates increase with years of experience but the relationship is concave. In the urban sample wage rates peak at age 59 for males and at age 43 for females. The corresponding numbers for the rural sample are 46 and 29 respectively.

The estimated rates of return to educational attainment increase monotonically for both men and women. However, it is interesting to note that the returns to education for females are the highest for women residing in urban areas. This result is possibly attributable to sectoral differences in labour market opportunities as well as differences in productivity that provide higher wage rates for women with more educational attainment. Training appears to have a stronger role to play in the wage determination of women compared to that of men.

The wage rates of self-employed males and females (SELF\_EMPD), of wage employees (W\_EMPD), and of casual workers (C\_WKR) in the urban sample are positive and statistically significantly different from the wage rate of the reference group (i.e. unpaid family workers). However, we find a similar result in the rural sample except for the female wage employee. Although in all specifications the coefficients for males are larger than for females, gender differences are well pronounced in self-employment (SELF\_EMPD) in both the rural and the urban samples. One possible explanation for the observed difference is that males who select into self-employment are generally endowed with higher levels of education (i.e. some secondary and post secondary education) compared to females and accordingly, have a greater propensity to be successful in the labour market.

Being married (MARRIED) significantly reduces female wage rates in the rural sample. One explanation could be that married women impose higher costs of employment via maternity leave entitlements. On the other hand, marriage (MARRIED) leads to an increase in men's wage rates above the reference group in the urban sample, whereas MARRIED becomes statistically insignificant for males in the rural sample.

Finally it is worth noting that  $\lambda$  is always negative and statistically significant for males. It implies that employed men earn no more than would have the average individual in the sample of employed and unemployed population.<sup>19</sup> On the other hand,

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<sup>19</sup> A number of studies have used the Heckman (1979) estimator, but the estimates of the coefficient on the  $\lambda$  variable in the male wage equation differ considerably: Miller and Rummery (1991) report a significant, negative coefficient, Ashraf and Ashraf (1993) a positive, significant coefficient.

the coefficient for  $\lambda$  (inverse mills ratio) in the regression for females is negative and statistically insignificant in all samples.<sup>20</sup>

### ***Decomposition of the Wage Differential***

Next we turn to the decomposition results. First, we report decompositions of the wage differential, unadjusted for sample selection bias. The decomposition of the wage differential, adjusted for sample selection bias is reported next.

The decomposition of unadjusted estimates (Table 4) reveals that the wage differential between males and females in the urban sample when males are the baseline (Equation 2) is 67.03 percentage points. The decomposition of this gender gap shows that the explained proportion is smaller in magnitude than the discriminatory proportion of the gender wage differential. After accounting for differences in productive characteristics (the explained proportion), an adjusted wage gap (or the discriminatory component) remains 48.51 percentage points or 72%. The difference in the explained component is 18.52 percentage points is in favour of males. In other words, 28% of the differential is due to superior endowments of the typical male. However, using the female wage structure as the non-discriminatory norm (Equation 3) results in discriminatory component of 59.14 percentage points, or 88%, leaving an explained component of 7.89 percentage points, or 12%. The Blinder (1973) decomposition results obtained from the two baselines in fact suggest that a large fraction of the wage gap between men and

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<sup>20</sup> Ashraf and Ashraf (1993) report similar findings. The insignificant result of the sample selection variable  $\lambda$  in the female sample implies that working women are representative of the population of all women. Ermisch and Wright (1994) argue that a negative coefficient on  $\lambda$  in the female sample is very plausible when a woman's reservation and offered wages are positively correlated, and this is likely because women who are more productive in jobs also tend to be more productive in home activities.

women is not explained by differences in the accumulation of productive differences and discrimination is even larger when the female rather than the male structure is used as the competitive standard.<sup>21</sup> However, the Cotton (1988) decomposition analysis (Equation 4) provides similar results with discrimination and productivity differences (explained component) accounting respectively for 77% [i.e.,  $(0.4973+1.2020-1.1845) = 0.5148$  or 51.48 percentage points] and 23% of the differential. The implication here is that discrimination is playing a role in the determination of wage rates and the major contribution is attributed to female disadvantages in the urban labour market.

In the rural sample (Table 5), when the male wage structure is the baseline (Equation 2), the explained and discriminatory components of the gender wage differential are 0.2019 percentage points, or 57%, and 0.1532 percentage points, or 43%, respectively. The results imply that discrimination against women is small in magnitude. There is however a large difference between men and women in terms of the components of characteristics (explained proportion). While using the female wage structure as the standard baseline (Equation 3), the decomposition reveals that the differences in productivity characteristics serve to reduce rather than widen the wage gap. However, after controlling for productivity-related factors, the adjusted wage gap remains 74.52 percentage points [i.e.  $(0.3551+0.3901) = 0.7452$ ], which is attributed to gender-based labour market discrimination. Using the Cotton (1988) approach we find that discrimination against women (combining the ‘male advantage’, the ‘female disadvantage’ and the ‘differences in constants’) is relatively low at 39.01 percentage points.

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<sup>21</sup> Oaxaca and Ransom (1994) find similar results.

Controlling for sample selection factor in wage equations for rural and urban samples reveals that the wage offer differential is higher than the observed wage differential because of the difference in the average selectivity bias between males and females (Tables 4 and 5, columns 4 and 5). Although the percentage contribution of the difference in the selectivity bias is very small, the addition of the term to the observed wage gap indicates that if the wage equation is not adjusted for sample selection bias, the extent of the wage differential will be underestimated.

In the urban sample, irrespective of weights, the results provide evidence of significant discrimination that accounts for between 73% and 89% of the wage offer differential. In the rural sample except for the male base line, the male-female wage offer differential largely attributable to discrimination rather than any endowment effect. However it is worth noting that the wage gap due to differences in productivity (explained component) is negative when the female wage structure is used as the baseline (Equation 10). It implies that if female characteristics are comparable to the male characteristics but rewarded according to the female wage structure in the labour market, then the wage gap is reduced significantly.

## **5 Conclusions and Policy Implications**

This paper analyses the determinants of employment decisions and (log) of hourly wages (adjusted and unadjusted for selectivity bias). It also decomposes the gender wage gap in rural and urban labour markets of Bangladesh using individual level unit record data from the LFS 1999 – 2000. Our decomposition indicates that considerable gap exists between male and female wage rates. This is more so in urban areas compared to rural areas, and

much of it is directly attributable to discrimination. We also find out that discrimination is larger and the productivity difference is smaller in magnitude when the female rather than the male wage structure is used as the competitive standard – a clear presence of the “Index number problem”. On the other hand, the results using the Cotton (1998) decomposition method suggests that the largest component of the unexplained wage gap in both samples comes from females being disadvantaged. Therefore, discrimination against women is more prevalent compared to nepotism towards men in explaining the wage gap. Correcting for sample selection bias leads to a significant increase in the gender wage gap in both rural and urban areas, and is an important contributor to the total discrimination component. The implication of this result is that the extent of male-female wage gap is likely to be understated if selection bias effects are ignored in the wage equations.

The main policy implications of the analysis is that probably the most fruitful approach to raising the earnings of women to be on a par with the men is an emphasis on skill development. Our results show that education is particularly crucial. It is also revealed that there is a marked gender disparity in enrolment at secondary level, post secondary level as well as tertiary level. Therefore, targeted efforts need to be made towards encouraging and supporting women to enter and remain in these sectors. Our results also suggest the need for affirmative government actions that persuade firms to employ women on comparative work policies. Additionally, in order to implement legislative and public policy changes there appears to be a strong requirement for gender-conscious planning.



Figure 1: The Distribution of Hourly Wages for Males and Females in the Urban sample (1999-2000)

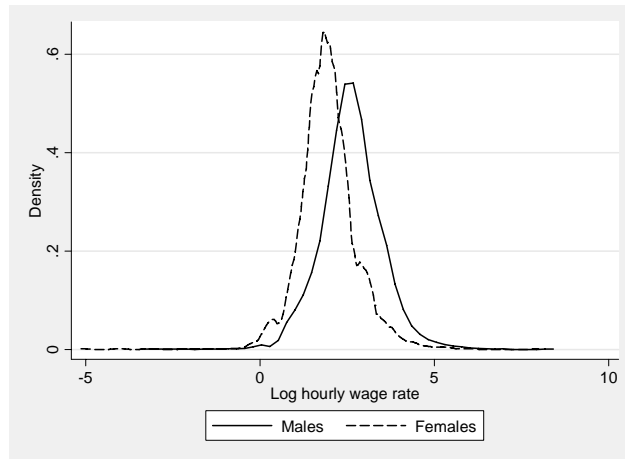


Figure 2: The Distribution of Hourly Wages for Males and Females in the Rural sample (1999-2000)

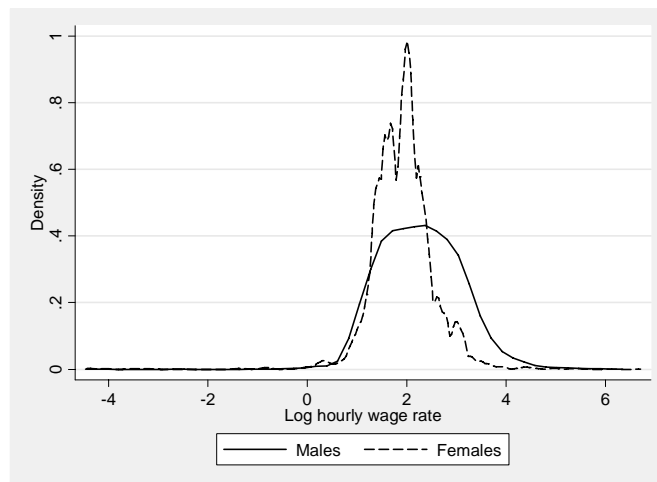


Table 1 Mean Values of Variables Used in Estimation

| Variable | Urban Sample         |                      |                                  | Rural Sample         |                      |                                  |
|----------|----------------------|----------------------|----------------------------------|----------------------|----------------------|----------------------------------|
|          | Males                | Females              | <i>t</i> -test<br>for difference | Males                | Females              | <i>t</i> -test<br>for difference |
| LNHRINC  | 2.6206<br>(0.8706)   | 1.9503<br>(0.8322)   | -31.13 ***                       | 2.2744<br>(0.8292)   | 1.9193<br>(0.6489)   | -23.16 ***                       |
| LN_MHRS  | 5.2805<br>(0.3286)   | 4.7458<br>(0.5782)   | -51.51 ***                       | 5.2220<br>(0.3363)   | 4.5172<br>(0.4903)   | -86.77 ***                       |
| AGE      | 35.6194<br>(12.3258) | 31.4759<br>(11.236)  | -14.18 ***                       | 36.2339<br>(14.3398) | 33.0868<br>(12.1557) | -11.75 ***                       |
| AGESQ    | 14.2064<br>(9.6394)  | 11.1693<br>(8.4092)  | -13.43 ***                       | 15.1849<br>(11.836)  | 12.4246<br>(9.362)   | -12.76 ***                       |
| UNEMPS   | 0.0347<br>(0.9757)   | 0.0045<br>(0.0948)   | -1.45                            | 0.0155<br>(0.6582)   | 0.0154<br>(0.5871)   | -0.01                            |
| PRIM     | 0.2106<br>(0.4077)   | 0.2226<br>(0.4160)   | 1.2                              | 0.2696<br>(0.4438)   | 0.2407<br>(0.4276)   | -3.34 ***                        |
| SECOND   | 0.2526<br>(0.4345)   | 0.1943<br>(0.3957)   | -5.66 ***                        | 0.1785<br>(0.3830)   | 0.1077<br>(0.3100)   | -10.05 ***                       |
| PSECON   | 0.1617<br>(0.3682)   | 0.0938<br>(0.2915)   | -8.03 ***                        | 0.0695<br>(0.2544)   | 0.0313<br>(0.1742)   | -8.54 ***                        |
| GRAD     | 0.1207<br>(0.3257)   | 0.0448<br>(0.2068)   | -10.52 ***                       | 0.0244<br>(0.1542)   | 0.0055<br>(0.0737)   | -7.43 ***                        |
| TRA_VOC  | 0.0097<br>(0.0982)   | 0.006754<br>(0.0819) | -1.27                            | 0.0069<br>(0.0826)   | 0.0037<br>(0.0604)   | -2.14 **                         |
| TRA_TECH | 0.0248<br>(0.1554)   | 0.0077<br>(0.0872)   | -4.89 ***                        | 0.0043<br>(0.0655)   | 0.0002<br>(0.0156)   | -3.9 ***                         |

Table 1 Continued

| Variable | Urban Sample       |                    |                                  | Rural Sample       |                    |                                  |
|----------|--------------------|--------------------|----------------------------------|--------------------|--------------------|----------------------------------|
|          | Males              | Females            | <i>t</i> -test<br>for difference | Males              | Females            | <i>t</i> -test<br>for difference |
| TRA_GEN  | 0.0207<br>(0.1424) | 0.0153<br>(0.1228) | -1.57                            | 0.0137<br>(0.1164) | 0.0085<br>(0.0920) | -2.4 **                          |
| SKIL     | 0.3405<br>(0.4739) | 0.1175<br>(0.3221) | -20.4 ***                        | 0.3673<br>(0.4821) | 0.0886<br>(0.2842) | -33.4 ***                        |
| MARRIED  | 0.7525<br>(0.4316) | 0.7466<br>(0.4350) | -0.56                            | 0.7624<br>(0.4257) | 0.8461<br>(0.3609) | 10.53 ***                        |
| ASST01   | 0.2242<br>(0.4171) | 0.1765<br>(0.3813) | -4.82 ***                        | 0.1083<br>(0.3108) | 0.092<br>(0.2891)  | -2.73 ***                        |
| ASST02   | 0.0413<br>(0.1991) | 0.0346<br>(0.1829) | -1.42                            | 0.047<br>(0.2117)  | 0.0424<br>(0.2016) | -1.11                            |
| ASST03   | 0.5579<br>(1.5744) | 0.5954<br>(1.6198) | 0.97                             | 0.8237<br>(1.8546) | 0.9134<br>(1.9319) | 2.4 **                           |
| HRENT    | 0.3917<br>(0.4882) | 0.3454<br>(0.4756) | -3.93 ***                        | 0.011<br>(0.1044)  | 0.0095<br>(0.0969) | -0.76                            |
| HFREE    | 0.0363<br>(0.1870) | 0.0401<br>(0.1963) | 0.83                             | 0.0194<br>(0.1379) | 0.0204<br>(0.1414) | 0.36                             |
| NMEN     | 1.6801<br>(0.9828) | 1.261<br>(0.8472)  | -18.23 ***                       | 1.6485<br>(0.9303) | 1.3353<br>(0.8430) | -17.63 ***                       |
| NFEM     | 0.5135<br>(0.6647) | 1.2829<br>(0.5822) | 49.03 ***                        | 0.91<br>(0.7280)   | 1.3427<br>(0.6472) | 31.33 ***                        |
| OLD01    | 0.0422<br>(0.2010) | 0.0418<br>(0.2002) | -0.08                            | 0.0897<br>(0.2858) | 0.0714<br>(0.2575) | -3.37 ***                        |
| OLD02    | 0.0049<br>(0.0696) | 0.0152<br>(0.1224) | 4.83 ***                         | 0.0107<br>(0.1029) | 0.0225<br>(0.1484) | 4.85 ***                         |

Table 1 Continued

| Variable     | Urban Sample       |                      |                                  | Rural Sample       |                    |                                  |
|--------------|--------------------|----------------------|----------------------------------|--------------------|--------------------|----------------------------------|
|              | Males              | Females              | <i>t</i> -test<br>for difference | Males              | Females            | <i>t</i> -test<br>for difference |
| MALE_HHEAD   | 0.9178<br>(0.2746) | 0.8045<br>(0.3967)   | -14.85 ***                       | 0.9393<br>(0.2388) | 0.8802<br>(0.3247) | -10.81 ***                       |
| FEMALE_HHEAD | 0.0155<br>(0.1234) | 0.1136<br>(0.3174)   | 20.31 ***                        | 0.0166<br>(0.1278) | 0.0669<br>(0.2498) | 13.65 ***                        |
| OCCUP_PROF   | 0.0212<br>(0.1441) | 0.0041<br>(0.0635)   | -5.41 ***                        | 0.0011<br>(0.0334) | 0.0002<br>(0.0156) | -1.57                            |
| OCCUP_CLERIC | 0.0875<br>(0.2827) | 0.0257<br>(0.1582)   | -9.74 ***                        | 0.0193<br>(0.1376) | 0.0037<br>(0.0604) | -6.86 ***                        |
| OCCUP_SALES  | 0.2890<br>(0.4533) | 0.0459<br>(0.2094)   | -24.27 ***                       | 0.1346<br>(0.3413) | 0.0188<br>(0.1358) | -20.67 ***                       |
| OCCUP_SER    | 0.0624<br>(0.2420) | 0.160738<br>(0.3674) | 13.87 ***                        | 0.0233<br>(0.1509) | 0.0488<br>(0.2155) | 7.08 ***                         |
| OCCUP_AGRI   | 0.1197<br>(0.3247) | 0.3661<br>(0.4818)   | 26.18 ***                        | 0.6428<br>(0.4792) | 0.8511<br>(0.3560) | 23.85 ***                        |
| OCCUP_PROD   | 0.3601<br>(0.4801) | 0.3206<br>(0.4668)   | -3.31 ***                        | 0.1481<br>(0.3553) | 0.0659<br>(0.2481) | -12.9 ***                        |
| INDS_MANU    | 0.2045<br>(0.4033) | 0.2188<br>(0.4135)   | 1.41                             | 0.0838<br>(0.2771) | 0.0630<br>(0.2429) | -3.92 ***                        |
| INDS_WHRET   | 0.2757<br>(0.4469) | 0.0486<br>(0.2151)   | -22.93 ***                       | 0.1326<br>(0.3392) | 0.0200<br>(0.1401) | -20.16 ***                       |
| INDS_HOTEL   | 0.0269<br>(0.1618) | 0.008105<br>(0.0897) | -5.17 ***                        | 0.0120<br>(0.1088) | 0.0012<br>(0.0349) | -6.12 ***                        |
| INDS_COMMU   | 0.1498<br>(0.3569) | 0.0086<br>(0.0921)   | -18.41 ***                       | 0.0528<br>(0.2237) | 0.0017<br>(0.0413) | -14.47 ***                       |

Table 1 Continued

| Variable     | Urban Sample       |                    |                                  | Rural Sample       |                    |                                  |
|--------------|--------------------|--------------------|----------------------------------|--------------------|--------------------|----------------------------------|
|              | Males              | Females            | <i>t</i> -test<br>for difference | Males              | Females            | <i>t</i> -test<br>for difference |
| INDS_FINST   | 0.0200<br>(0.1400) | 0.0041<br>(0.0635) | -5.16 ***                        | 0.0029<br>(0.0535) | 0.0005<br>(0.0221) | -2.71 ***                        |
| INDS_REALEST | 0.0090<br>(0.0946) | 0.0041<br>(0.0635) | -2.28 **                         | 0.0019<br>(0.0437) | 0.0005<br>(0.0221) | -1.93 *                          |
| INDS_PUBADMN | 0.0591<br>(0.2358) | 0.0225<br>(0.1484) | -6.8 ***                         | 0.0115<br>(0.1066) | 0.0007<br>(0.0271) | -6.33 ***                        |
| INDS_HLTH    | 0.1028<br>(0.3037) | 0.2688<br>(0.4434) | 19 ***                           | 0.0327<br>(0.1779) | 0.0552<br>(0.2283) | 5.6 ***                          |
| INDS_EDU     | 0.0264<br>(0.1602) | 0.0531<br>(0.2243) | 5.92 ***                         | 0.0239<br>(0.1529) | 0.0071<br>(0.0838) | -6.45 ***                        |

See Table AI for definition of variables.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% . Standard deviations reported in parentheses.

Data Source: Unit record data, LFS 1999 – 2000.

Table 2 Estimates of Selection Equations: LFS 1999 – 2000  
(Dependent Variable: Binary variable of employment in the labour force)

| Variable            | Urban Sample        |                   |                     |                   | Rural Sample        |                   |                     |                   |
|---------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|
|                     | Males               |                   | Females             |                   | Males               |                   | Females             |                   |
|                     | Coef                | M.E. <sup>a</sup> | Coef                | M.E. <sup>a</sup> | Coef                | M.E. <sup>a</sup> | Coef                | M.E. <sup>a</sup> |
| AGE                 | 0.0716<br>(0.0178)  | 0.0023 ***        | 0.1018<br>(0.0250)  | 0.0050 ***        | 0.0762<br>(0.0255)  | 0.0012 ***        | 0.1198<br>(0.0180)  | 0.0022 ***        |
| AGESQ               | -0.0007<br>(0.0002) | 0.0000 ***        | -0.0008<br>(0.0004) | 0.0000 **         | -0.0004<br>(0.0004) | 0.0000            | -0.0011<br>(0.0002) | 0.0000 ***        |
| PRIM                | -0.4617<br>(0.1564) | -0.0203 ***       | -0.5053<br>(0.1500) | -0.0339 ***       | -0.3349<br>(0.1092) | -0.0065 ***       | -0.2530<br>(0.1341) | -0.0054 *         |
| SECOND              | -0.8503<br>(0.1435) | -0.0465 ***       | -0.7962<br>(0.1417) | -0.0666 ***       | -0.4957<br>(0.1139) | -0.0119 ***       | -0.4928<br>(0.1431) | -0.0147 ***       |
| PSECOND             | -1.1716<br>(0.1511) | -0.0954 ***       | -0.9766<br>(0.1629) | -0.1070 ***       | -0.9242<br>(0.1357) | -0.0412 ***       | -0.9147<br>(0.1792) | -0.0485 ***       |
| GRAD                | -1.1412<br>(0.1622) | -0.0981 ***       | -0.9038<br>(0.2238) | -0.1005 ***       | -0.9276<br>(0.2082) | -0.0451 ***       | -1.2336<br>(0.3467) | -0.0971 ***       |
| MARRIED             | 0.9459<br>(0.1077)  | 0.0557 ***        | 0.7393<br>(0.1169)  | 0.0551 ***        | 0.4312<br>(0.1281)  | 0.0092 ***        | 0.8628<br>(0.1136)  | 0.0349 ***        |
| ASST01              | 0.2833<br>(0.0840)  | 0.0077 ***        | 0.0736<br>(0.1254)  | 0.0035            | 0.2172<br>(0.1309)  | 0.0027 *          | -0.0211<br>(0.1666) | -0.0004           |
| ASST02              | 0.5587<br>(0.2355)  | 0.0104 **         | -0.3217<br>(0.2607) | -0.0216           | 0.1869<br>(0.2082)  | 0.0023            | 0.2920<br>(0.3106)  | 0.0038            |
| ASST03              | -0.0032<br>(0.0202) | -0.0001           | 0.0105<br>(0.0321)  | 0.0005            | 0.0159<br>(0.0212)  | 0.0002            | 0.0288<br>(0.0271)  | 0.0005            |
| HRENT               | 0.2922<br>(0.0806)  | 0.0088 ***        | 0.4236<br>(0.1187)  | 0.0188 ***        | -0.5570<br>(0.3078) | -0.0176 *         | -0.5064<br>(0.3648) | -0.0171           |
| HFREE               | -0.0587<br>(0.1886) | -0.0020           | -0.0236<br>(0.2718) | -0.0012           | 0.1207<br>(0.3700)  | 0.0016            | 0.3156<br>(0.5189)  | 0.0039            |
| NMEN                | (b)                 |                   | -0.1111<br>(0.0575) | -0.0055 *         | (b)                 |                   | -0.1120<br>(0.0552) | -0.0020 **        |
| NFEM                | -0.1591<br>(0.0479) | -0.0051 ***       | (b)                 |                   | -0.0199<br>(0.0514) | -0.0003           | (b)                 |                   |
| OLD01               | -0.0725<br>(0.1621) | -0.0025           | 0.0987<br>(0.2312)  | 0.0045            | -0.2410<br>(0.1287) | -0.0048 *         | -0.1174<br>(0.1896) | -0.0024           |
| OLD02               | 0.6197<br>(0.5525)  | 0.0103            | 0.3279<br>(0.6094)  | 0.0118            | -0.2448<br>(0.2932) | -0.0052           | -0.4439<br>(0.3401) | -0.0137           |
| MALE_HHEAD          | 0.3258<br>(0.0925)  | 0.0142 ***        | 0.1026<br>(0.1543)  | 0.0054            | 0.2249<br>(0.1287)  | 0.0045 *          | 0.1756<br>(0.1745)  | 0.0037            |
| FEMALE_HHEAD        | 0.2821<br>(0.2257)  | 0.0067            | 0.3167<br>(0.2437)  | 0.0123            | 0.5319<br>(0.2683)  | 0.0045 **         | 0.0412<br>(0.2391)  | 0.0007            |
| No. of Observations | 5951                |                   | 2368                |                   | 6443                |                   | 4217                |                   |

<sup>a</sup>M.E. = the marginal effect for dummy variables is computed as dF/dx as x changes from 0 to 1, holding the other explanatory variables at their sample means.

<sup>b</sup>variable not included.

Standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% .

Table 3 Selectivity Adjusted Estimates of Wage Equations: LFS 1999 – 2000  
(Dependent Variable: Natural logarithm of hourly wages)

| Variable     | Urban Sample |  |             |  | Rural Sample |  |             |  |
|--------------|--------------|--|-------------|--|--------------|--|-------------|--|
|              | Males        |  | Females     |  | Males        |  | Females     |  |
|              | Coef         |  | Coef        |  | Coef         |  | Coef        |  |
| Constant     | 4.2340 ***   |  | 5.3172 ***  |  | 5.0638 ***   |  | 6.5943 ***  |  |
|              | (0.1740)     |  | (0.2594)    |  | (0.1648)     |  | (0.1516)    |  |
| LN_MHRS      | -0.7536 ***  |  | -0.7008 *** |  | -0.8569 ***  |  | -0.9379 *** |  |
|              | (0.0266)     |  | (0.0335)    |  | (0.0236)     |  | (0.0162)    |  |
| AGE          | 0.04739 ***  |  | 0.0173 **   |  | 0.0277 ***   |  | 0.0058      |  |
|              | (0.0048)     |  | (0.0072)    |  | (0.0039)     |  | (0.0036)    |  |
| AGESQ        | -0.0004 ***  |  | -0.0002 **  |  | -0.0003 ***  |  | -0.0001     |  |
|              | (0.0001)     |  | (0.0001)    |  | (0.0000)     |  | (0.0000)    |  |
| UNEMPS       | 0.0087       |  | 0.1123      |  | 0.0036       |  | 0.0016      |  |
|              | (0.0085)     |  | (0.1498)    |  | (0.0118)     |  | (0.0122)    |  |
| TRA_VOC      | -0.033       |  | 0.1258      |  | 0.0323       |  | 0.0514      |  |
|              | (0.0851)     |  | (0.1738)    |  | (0.0905)     |  | (0.1193)    |  |
| TRA_GEN      | 0.1815 ***   |  | 0.4233 ***  |  | -0.1743 ***  |  | 0.1851 **   |  |
|              | (0.0596)     |  | (0.1173)    |  | (0.0664)     |  | (0.0805)    |  |
| TRA_TECH     | 0.1268 **    |  | 0.4562 ***  |  | -0.0271      |  | -0.0615     |  |
|              | (0.0558)     |  | (0.1650)    |  | (0.1153)     |  | (0.4610)    |  |
| SELF_EMPD    | 1.1726 ***   |  | 0.1316 **   |  | 1.2462 ***   |  | 0.3638 ***  |  |
|              | (0.0383)     |  | (0.0583)    |  | (0.0282)     |  | (0.0294)    |  |
| W_EMPD       | 0.9464 ***   |  | 0.3835 ***  |  | 0.9085 ***   |  | 0.0408      |  |
|              | (0.0410)     |  | (0.0643)    |  | (0.0377)     |  | (0.0501)    |  |
| C_WKR        | 0.5466 ***   |  | 0.1089 *    |  | 0.5366 ***   |  | 0.1034 ***  |  |
|              | (0.0441)     |  | (0.0635)    |  | (0.0287)     |  | (0.0304)    |  |
| PRIM         | 0.1350 ***   |  | 0.1129 ***  |  | 0.1328 ***   |  | 0.0006      |  |
|              | (0.0251)     |  | (0.0387)    |  | (0.0200)     |  | (0.0178)    |  |
| SECOND       | 0.2891 ***   |  | 0.1205 ***  |  | 0.2617 ***   |  | 0.0211      |  |
|              | (0.0266)     |  | (0.0461)    |  | (0.0244)     |  | (0.0263)    |  |
| PSECON       | 0.5423 ***   |  | 0.1812 ***  |  | 0.4307 ***   |  | 0.1092 **   |  |
|              | (0.0329)     |  | (0.0679)    |  | (0.0399)     |  | (0.0544)    |  |
| GRAD         | 0.8128 ***   |  | 0.6540 ***  |  | 0.6538 ***   |  | 0.2961 **   |  |
|              | (0.0389)     |  | (0.0935)    |  | (0.0613)     |  | (0.1172)    |  |
| OCCUP_PROF   | 0.0167       |  | 0.4946 *    |  | 0.1043       |  | 0.6014      |  |
|              | (0.0745)     |  | (0.2829)    |  | (0.2398)     |  | (0.4717)    |  |
| OCCUP_CLERIC | -0.1122 **   |  | -0.1033     |  | 0.1106       |  | 0.2937 **   |  |
|              | (0.0505)     |  | (0.1256)    |  | (0.0858)     |  | (0.1468)    |  |
| OCCUP_SALES  | -0.0369      |  | -0.1578     |  | 0.1348       |  | -0.4616 *** |  |
|              | (0.0538)     |  | (0.1496)    |  | (0.0882)     |  | (0.1516)    |  |

Table 3 continued

| Variable            | Urban Sample            |                         | Rural Sample            |                         |
|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                     | Males<br>Coef           | Females<br>Coef         | Males<br>Coef           | Females<br>Coef         |
| OCCUP_SER           | -0.297 ***<br>(0.0572)  | -0.8834 ***<br>(0.1074) | -0.0457<br>(0.0905)     | -0.7535 ***<br>(0.1139) |
| OCCUP_AGRI          | -0.0507<br>(0.0742)     | -0.6039 ***<br>(0.1375) | 0.0106<br>(0.0833)      | -0.55 ***<br>(0.1030)   |
| OCCUP_PROD          | -0.1503 ***<br>(0.0491) | -0.4872 ***<br>(0.1009) | 0.1627 **<br>(0.0789)   | -0.7077 ***<br>(0.1121) |
| INDS_MANU           | 0.1520 **<br>(0.0632)   | -0.1475<br>(0.1133)     | -0.1030 *<br>(0.0533)   | 0.1223 *<br>(0.0724)    |
| INDS_WHRET          | 0.0622<br>(0.0632)      | -0.1160<br>(0.1498)     | -0.1076 *<br>(0.0593)   | -0.0648<br>(0.1171)     |
| INDS_HOTEL          | 0.0614<br>(0.0808)      | 0.2245<br>(0.1917)      | 0.0692<br>(0.0938)      | -0.5543 **<br>(0.2224)  |
| INDS_COMMU          | 0.0614<br>(0.0642)      | 0.4431 **<br>(0.1886)   | -0.2330 ***<br>(0.0600) | 0.5512 ***<br>(0.1892)  |
| INDS_FINST          | 0.2859 ***<br>(0.0900)  | 0.4176<br>(0.2897)      | 0.2157<br>(0.1588)      | 0.9923 ***<br>(0.3388)  |
| INDS_REALEST        | 0.1622<br>(0.1061)      | 0.4074<br>(0.2487)      | 0.2508<br>(0.1753)      | 1.2897 ***<br>(0.3349)  |
| INDS_PUBADMN        | 0.1964 ***<br>(0.0719)  | 0.4519 ***<br>(0.1518)  | 0.2282 **<br>(0.0906)   | 1.4542 ***<br>(0.2803)  |
| INDS_HLTH           | 0.09111<br>(0.0640)     | -0.1302<br>(0.1084)     | -0.0730<br>(0.0646)     | 0.0951<br>(0.0819)      |
| INDS_EDU            | -0.1298<br>(0.0849)     | -0.3965 ***<br>(0.1455) | 0.0646<br>(0.0930)      | -0.076<br>(0.1319)      |
| SKIL                | 0.1553 ***<br>(0.0190)  | 0.1788 ***<br>(0.0471)  | 0.1799 ***<br>(0.0171)  | 0.0595 **<br>(0.0262)   |
| MARRIED             | 0.0854 **<br>(0.0390)   | -0.0765<br>(0.0470)     | 0.0123<br>(0.0333)      | -0.0787 ***<br>(0.0296) |
| $\lambda$           | -0.3724 ***<br>(0.1251) | -0.0919<br>(0.1824)     | -0.6218 ***<br>(0.1900) | -0.0206<br>(0.1349)     |
| No. of observations | 5654                    | 2221                    | 6265                    | 4097                    |
| Wald Chi-squared    | 5092.46                 | 1456.52                 | 6317.47                 | 4362.34                 |

Standard errors in parentheses.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% .

Table 4 Decomposition of the Gender Wage Differential (Urban Sample)

|  | OLS | Selectivity Corrected |
|--|-----|-----------------------|
|--|-----|-----------------------|

|  | (1)     | (2)     | (3)      | (4)     | (5)     |
|--|---------|---------|----------|---------|---------|
| Differences in Observed Wages          | 0.6703  | 0.6703  | 0.6703   | 0.6703  | 0.6703  |
| Differences in Adjusted wages          | 0.4851  | 0.5914  | 0.5148   | na      | na      |
| Differences in Selection Bias          | na      | na      | na       | 0.0206  | 0.0206  |
| Differences in Offered Wages           | na      | na      | na       | 0.6909  | 0.6909  |
| <i>Contribution of Characteristics</i> |         |         |          |         |         |
| LN_MHRS                                | -0.4024 | -0.3744 | -0.3946  | -0.4029 | -0.3747 |
| AGE                                    | 0.2092  | 0.0785  | 0.1726   | 0.1939  | 0.0709  |
| AGESQ                                  | -0.1475 | -0.0629 | -0.1238  | -0.1358 | -0.0577 |
| UNEMPS                                 | 0.0003  | 0.0033  | 1.10E-03 | 0.0003  | 0.0034  |
| EDUCATION                              | 0.1093  | 0.0659  | 0.0971   | 0.1162  | 0.0683  |
| SKIL                                   | 0.0352  | 0.0403  | 0.0366   | 0.0346  | 0.0399  |
| TRAINING                               | 0.0030  | 0.0105  | 0.0051   | 0.0030  | 0.0105  |
| MARRIED                                | 0.0016  | -0.0006 | 0.0009   | 0.0009  | -0.0008 |
| JOB STATUS                             | 0.3313  | 0.0381  | 0.2493   | 0.3313  | 0.0381  |
| OCCUPATION                             | 0.0204  | 0.1802  | 0.0652   | 0.0201  | 0.1800  |
| INDUSTRY                               | 0.0248  | 0.1000  | 0.0460   | 0.0228  | 0.0999  |
| Total                                  | 0.1852  | 0.0789  | 0.1555   | 0.1844  | 0.0778  |
|  | (28%)   | (12%)   | (23%)    | (27%)   | (11%)   |
| Discrimination                         | 0.4851  | 0.5914  | 0.5148   | 0.5065  | 0.6131  |
|  | (72%)   | (88%)   | (77%)    | (73%)   | (89%)   |
| Male Advantage                         |         |         | 0.4973   |         |         |
| Female Disadvantage                    |         |         | 1.2020   |         |         |
| Differences in constants               |         |         | -1.1845  |         |         |

Columns (1) and (4) show the result from **Blinder Approach** and use the male wage structure as the non-discriminatory norm, whereas columns (2) and (5) use the female wage structure as the non-discriminatory following the **Blinder Approach**.

Column (3) describes the decomposition using the **Cotton Approach**. Total discriminatory component is the sum of the components attributable to the differences in constant terms, the male advantage and the female disadvantage.

The following explanatory variables are included in each group. Education: PRIM, SECOND, PSECON, GRAD. Training: TRA\_VOC, TRA\_GEN, TRA\_TECH. Job Status: SELF\_EMPD, W\_EMPD, C\_WKR. Occupation: OCCUP\_PROF, OCCUP\_CLERIC, OCCUP\_SALES, OCCUP\_SER, OCCUP\_AGRIC, OCCUP\_PROD. Industry: INDS\_MANU, INDS\_WHRET, INDS\_HOTEL, INDS\_COMMU, INDS\_FINST, INDS\_REALEST, INDS\_PUBADMN, INDS\_HLTH, INDS\_EDU.  
na = Not available

Table 5 Decomposition of the Gender Wage Differential (Rural Sample)

|  | OLS | Selectivity Corrected |
|--|-----|-----------------------|
|--|-----|-----------------------|

|  | (1)      | (2)      | (3)      | (4)      | (5)      |
|--|----------|----------|----------|----------|----------|
| Differences in Observed Wages          | 0.3551   | 0.3551   | 0.3551   | 0.3551   | 0.3551   |
| Differences in Adjusted wages          | 0.1532   | 0.7452   | 0.3901   | na       | na       |
| Differences in Selection Bias          | na       | na       | na       | 0.0304   | 0.0304   |
| Differences in Offered Wages           | na       | na       | na       | 0.3855   | 0.3855   |
| <i>Contribution of Characteristics</i> |          |          |          |          |          |
| LN_MHRS                                | -0.6015  | -0.6609  | -0.6252  | -0.6039  | -0.6610  |
| AGE                                    | 0.1076   | 0.0199   | 0.0725   | 0.0901   | 0.0189   |
| AGESQ                                  | -0.0863  | -0.0182  | -0.0590  | -0.0719  | -0.0172  |
| UNEMPS                                 | 3.60E-05 | 1.73E-07 | 2.85E-07 | 3.80E-08 | 1.71E-09 |
| EDUCATION                              | 0.0471   | 0.0112   | 0.0327   | 0.0524   | 0.0115   |
| SKIL                                   | 0.0505   | 0.0166   | 0.0369   | 0.0501   | 0.0166   |
| TRAINING                               | -0.0008  | 0.0008   | -0.0002  | -0.0009  | 0.0009   |
| MARRIED                                | -0.0055  | 0.0063   | -0.0008  | -0.0010  | 0.0065   |
| JOB STATUS                             | 0.6796   | 0.1730   | 0.4769   | 0.6752   | 0.1725   |
| OCCUPATION                             | 0.0302   | 0.0272   | 0.0290   | 0.0298   | 0.0273   |
| INDUSTRY                               | -0.0190  | 0.0340   | 0.0022   | -0.0193  | 0.0339   |
| Total                                  | 0.2019   | -0.3901  | -0.0350  | 0.2006   | -0.3899  |
|  | (57%)    | (-109%)  | (-0.09%) | (52%)    | (-101%)  |
| Discrimination                         | 0.1532   | 0.7452   | 0.3901   | 0.1849   | 0.7754   |
|  | (43%)    | (209%)   | (109%)   | (48%)    | (201%)   |
| Male Advantage                         |          |          | 0.9852   |          |          |
| Female Disadvantage                    |          |          | 1.1226   |          |          |
| Differences in constants               |          |          | -1.7177  |          |          |

Columns (1) and (4) show the result from **Blinder Approach** and use the male wage structure as the non-discriminatory norm, whereas columns (2) and (5) use the female wage structure as the non-discriminatory following the **Blinder Approach**.

Column (3) describes the decomposition using the **Cotton Approach**. Total discriminatory component is the sum of the components attributable to the differences in constant terms, the male advantage and the female disadvantage.

The following explanatory variables are included in each group. Education: PRIM, SECOND, PSECON, GRAD. Training: TRA\_VOC, TRA\_GEN, TRA\_TECH. Job Status: SELF\_EMPD, W\_EMPD, C\_WKR. Occupation: OCCUP\_PROF, OCCUP\_CLERIC, OCCUP\_SALES, OCCUP\_SER, OCCUP\_AGRI, OCCUP\_PROD. Industry: INDS\_MANU, INDS\_WHRET, INDS\_HOTEL, INDS\_COMMU, INDS\_FINST, INDS\_REALEST, INDS\_PUBADMN, INDS\_HLTH, INDS\_EDU.

na = Not available

## Appendix

**Table AI.** Definition of Variables

The following variables are used in estimation of the wage and selection equations.

### *Dependent Variables*

LNHRINC = Log of hourly wages  
PART = 1 if individual is employed;  
= 0 otherwise

### *Independent Variables*<sup>22</sup>

LN\_MHRS = Log of monthly hours worked  
*Age*  
AGE = Age of individual measured in months  
AGESQ = Age of individual squared  
*Education*  
PRIM = 1 if individual is between level 1-5  
= 0 otherwise  
SECOND = 1 if individual is between level 6-10  
= 0 otherwise  
PSECON = 1 if individual attains SSC/HSC<sup>i</sup> and equivalent.  
= 0 otherwise  
GRAD = 1 if individual attains graduate or higher degree  
= 0 otherwise

### *Marital Status*

MARRIED = 1 if individual is married  
= 0 otherwise

### *Occupation*

OCCUP\_PROF = 1 if occupation category is professional/technical; = 0 otherwise  
OCCUP\_CLERIC = 1 if occupation category is clerical; = 0 otherwise  
OCCUP\_SALES = 1 if occupation category is sales; = 0 otherwise  
OCCUP\_SER = 1 if occupation category is service; = 0 otherwise  
OCCUP\_AGRI = 1 if occupation category is agriculture; = 0 otherwise  
OCCUP\_PROD = 1 if occupation category is production, transport labourers and others; = 0 otherwise

### *Industry*

INDS\_MANU = 1 if industry category is manufacturing (including mining and quarrying; electricity, gas and water supply and construction); = 0 otherwise  
INDS\_HLTH = 1 if industry category is health and social work; = 0 otherwise  
INDS\_PUBADMN = 1 if industry category is public administration; = 0 otherwise  
INDS\_COMMU = 1 if industry category is transport, storage and other social services = 0 otherwise

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<sup>22</sup> Many variables measured in this study are categorical in nature. Therefore, the technique of binary variables is employed to indicate the presence or absence of various attributes. So, it allows one to estimate the effect that the selected categorical variables will have on an individual's wage, quantitatively.

|                        |   |
|------------------------|---|
| INDS_FINST             | = 1 if industry category is bank, insurance and other financial institutions = 0 otherwise  |
| INDS_REALEST           | = 1 if industry category is real estate, rental and other business activities = 0 otherwise |
| INDS_HOTEL             | = 1 if industry category is hotel and other business; = 0 otherwise                         |
| INDS_WHRET             | = 1 if industry category is wholesale/retail; = 0 otherwise                                 |
| INDS_EDU               | = 1 if industry category is education; = 0 otherwise  |
| <i>Training</i>        |   |
| TRA_VOC                | = 1 if individual has vocational training; = 0 otherwise                                    |
| TRA_GEN                | = 1 if individual has general training; = 0 otherwise                                       |
| TRA_TECH               | = 1 if individual has technical training; = 0 otherwise                                     |
| <i>Skill</i>           |   |
| SKIL                   | = 1 if individual is skilled; = 0 otherwise   |
| <i>Job Status</i>      |   |
| W_EMPD                 | = 1 if individual is wage employed; = 0 otherwise   |
| SELF_EMPD              | = 1 if individual is self-employed; = 0 otherwise   |
| C_WKR                  | = 1 if individual is a casual worker or day labourer; = 0 otherwise                         |
| UNEMPS                 | = The number of months unemployed   |
| <i>Family Status</i>   |   |
| FEMALE_HHEAD           | = No. of female household head  |
| MALE_HHEAD             | = No. of male household head  |
| NMEN                   | = No. of males aged between 15 and 64   |
| NFEM                   | = No. of females aged between 15 and 64   |
| OLD01                  | = No. of males aged 65 and above  |
| OLD02                  | = No. of females aged 65 and above  |
| <i>Asset Ownership</i> |   |
| ASST01                 | = 1 if individual has shop/business; = 0 otherwise  |
| ASST02                 | = 1 if individual has rickshaw/van/pushcart/boat; = 0 otherwise                             |
| ASST03                 | = 1 if individual has sewing machine/shallow machine/tractor; = 0 otherwise                 |
| <i>Home Ownership</i>  |   |
| HRENT                  | = 1 if household is renting accommodation; = 0 otherwise                                    |
| HFREE                  | = 1 if household pays no rent; = 0 otherwise  |
| $\lambda$              | = Inverse Mills Ratio   |

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Notes: <sup>1</sup>SSC = Secondary School Certificate/ HSC = Higher Secondary School Certificate.

**Table AII.** OLS Wage Equation Estimates: LFS 1999 – 2000  
(*Dependent Variable: Natural logarithm of hourly wages*)

| Variable | Urban Sample |         | Rural Sample |         |
|----------|--------------|---------|--------------|---------|
|          | Males        | Females | Males        | Females |

|              | Coef        |  | Coef        |  | Coef        |  | Coef        |
|--------------|-------------|--|-------------|--|-------------|--|-------------|
| Constant     | 4.0738 ***  |  | 5.2583 ***  |  | 4.8668 ***  |  | 6.5845 ***  |
|              | (0.3440)    |  | (0.3000)    |  | (0.1700)    |  | (0.1853)    |
| LN_MHRS      | -0.7526 *** |  | -0.7003 *** |  | -0.8534 *** |  | -0.9378 *** |
|              | (0.0673)    |  | (0.0560)    |  | (0.0263)    |  | (0.0212)    |
| AGE          | 0.0511 ***  |  | 0.0192 ***  |  | 0.0331 ***  |  | 0.0061 **   |
|              | (0.0050)    |  | (0.0052)    |  | (0.0034)    |  | (0.0029)    |
| AGESQ        | -0.0005 *** |  | -0.0002 *** |  | -0.0003 *** |  | -0.0001 *   |
|              | (0.0001)    |  | (0.0001)    |  | (0.0000)    |  | (0.0000)    |
| UNEMPS       | 0.0094 **   |  | 0.1079      |  | 0.0034      |  | 0.0016      |
|              | (0.0045)    |  | (0.2245)    |  | (0.0153)    |  | (0.0013)    |
| TRA_VOC      | -0.0335     |  | 0.1262      |  | 0.0347      |  | 0.0516      |
|              | (0.0803)    |  | (0.1856)    |  | (0.0936)    |  | (0.0590)    |
| TRA_GEN      | 0.1828 ***  |  | 0.4231 ***  |  | -0.1678 **  |  | 0.1850 **   |
|              | (0.0529)    |  | (0.1125)    |  | (0.0680)    |  | (0.0861)    |
| TRA_TECH     | 0.1313 ***  |  | 0.4574 ***  |  | -0.0301     |  | -0.0624     |
|              | (0.0504)    |  | (0.1405)    |  | (0.1068)    |  | (0.0700)    |
| SELF_EMPD    | 1.1733 ***  |  | 0.1315 **   |  | 1.2529 ***  |  | 0.3642 ***  |
|              | (0.0569)    |  | (0.0619)    |  | (0.0262)    |  | (0.0468)    |
| W_EMPD       | 0.9483 ***  |  | 0.3849 ***  |  | 0.9156 ***  |  | 0.0413      |
|              | (0.0591)    |  | (0.0717)    |  | (0.0384)    |  | (0.0832)    |
| C_WKR        | 0.5454 ***  |  | 0.1088 **   |  | 0.5425 ***  |  | 0.1039 ***  |
|              | (0.0616)    |  | (0.0486)    |  | (0.0228)    |  | (0.0325)    |
| PRIM         | 0.1282 ***  |  | 0.1086 ***  |  | 0.1205 ***  |  | 0.0002      |
|              | (0.0241)    |  | (0.0322)    |  | (0.0174)    |  | (0.0177)    |
| SECOND       | 0.2640 ***  |  | 0.1103 **   |  | 0.2390 ***  |  | 0.0198      |
|              | (0.0252)    |  | (0.0439)    |  | (0.0205)    |  | (0.0263)    |
| PSECON       | 0.5030 ***  |  | 0.1677 **   |  | 0.3731 ***  |  | 0.1054 **   |
|              | (0.0297)    |  | (0.0756)    |  | (0.0348)    |  | (0.0474)    |
| GRAD         | 0.7762 ***  |  | 0.6417 ***  |  | 0.6021 ***  |  | 0.2913 **   |
|              | (0.0433)    |  | (0.1101)    |  | (0.0659)    |  | (0.1427)    |
| OCCUP_PROF   | 0.0165      |  | 0.4935 **   |  | 0.1023      |  | 0.5967 ***  |
|              | (0.0769)    |  | (0.2308)    |  | (0.2250)    |  | (0.1660)    |
| OCCUP_CLERIC | -0.1115 **  |  | -0.1018     |  | 0.1034      |  | 0.2932      |
|              | (0.0483)    |  | (0.1588)    |  | (0.0996)    |  | (0.2297)    |

**Table AII. continued**

| Variable | Urban Sample | Rural Sample |
|----------|--------------|--------------|
|----------|--------------|--------------|

|                     | Males<br>Coef           | Females<br>Coef         | Males<br>Coef           | Females<br>Coef         |
|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| OCCUP_SALES         | -0.0344<br>(0.0608)     | -0.1572<br>(0.1910)     | 0.1271<br>(0.1082)      | -0.4614 **<br>(0.2278)  |
| OCCUP_SER           | -0.2963 ***<br>(0.0578) | -0.8829 ***<br>(0.1412) | -0.0532<br>(0.1026)     | -0.7535 ***<br>(0.1870) |
| OCCUP_AGRI          | -0.0496<br>(0.0763)     | -0.6038 ***<br>(0.1463) | 0.0015<br>(0.0984)      | -0.5497 ***<br>(0.1544) |
| OCCUP_PROD          | -0.1514 ***<br>(0.0496) | -0.4871 ***<br>(0.1458) | 0.1542 *<br>(0.0922)    | -0.7074 ***<br>(0.1818) |
| INDS_MANU           | 0.1607 **<br>(0.0661)   | -0.1455 *<br>(0.0848)   | -0.1038 *<br>(0.0559)   | 0.1221<br>(0.0867)      |
| INDS_WHRET          | 0.0680<br>(0.0697)      | -0.1148<br>(0.1287)     | -0.1060 *<br>(0.0638)   | -0.0648<br>(0.1658)     |
| INDS_HOTEL          | 0.0646<br>(0.0835)      | 0.2264<br>(0.2848)      | 0.0702<br>(0.0889)      | -0.5538 **<br>(0.2407)  |
| INDS_COMMU          | 0.0702<br>(0.0659)      | 0.4432 **<br>(0.2195)   | -0.2298 ***<br>(0.0606) | 0.5509<br>(0.4341)      |
| INDS_FINST          | 0.2963 ***<br>(0.0915)  | 0.4208 **<br>(0.1779)   | 0.2250 *<br>(0.1352)    | 0.9905 **<br>(0.4068)   |
| INDS_REALEST        | 0.1691<br>(0.1304)      | 0.4106<br>(0.3341)      | 0.2448 *<br>(0.1256)    | 1.2897 ***<br>(0.1463)  |
| INDS_PUBADMN        | 0.2083 ***<br>(0.0720)  | 0.4535 ***<br>(0.1213)  | 0.2329 ***<br>(0.0727)  | 1.4552 ***<br>(0.2091)  |
| INDS_HLTH           | 0.0964<br>(0.0669)      | -0.1280 *<br>(0.0732)   | -0.0703<br>(0.0651)     | 0.0953<br>(0.1031)      |
| INDS_EDU            | -0.1298<br>(0.0856)     | -0.3967 **<br>(0.1545)  | 0.0653<br>(0.1094)      | -0.0753<br>(0.2220)     |
| SKIL                | 0.1579 ***<br>(0.0196)  | 0.1808 ***<br>(0.0481)  | 0.1811 ***<br>(0.0157)  | 0.0595<br>(0.0395)      |
| MARRIED             | 0.1571 ***<br>(0.0304)  | -0.0628<br>(0.0395)     | 0.0667 ***<br>(0.0250)  | -0.0758 ***<br>(0.0221) |
| No. of observations | 5654                    | 2221                    | 6265                    | 4097                    |
| $R^2$               | 0.479                   | 0.671                   | 0.545                   | 0.501                   |

Standard errors reported in parentheses and are computed robustly to account for heteroskedasticity.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% .

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