

Gender Wage Discrimination in India: Sticky Floor or Glass Ceiling?*

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Abstract

Prior analyses of the large *India Human Development Survey* have focused on mean differences of wages between men and women and corresponding decompositions such as the Blinder-Oaxaca method. To investigate the presence of a "sticky floor" or "glass ceiling," the magnitude of wage discrimination at the tails of the wage distribution, this paper uses quantile regression and the Machado-Mata-Melly decomposition to examine wage gaps at different quantiles of the wage distribution. *results go here*

*Thanks, Mom!

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1 Introduction

Gender wage discrimination has long been the subject of political and scholarly debate because the removal of discriminatory barriers has the power to enhance economic development. While economists explored the paradoxes of wage discrimination primarily in developing countries ([Blau and Kahn, 1992](#)), wage discrimination elsewhere was largely ignored.

Gender is a central organizing structure in Indian society. Women are disadvantaged economically on almost every imaginable front. Women own a mere 11% of agriculture land and constitute only 14% of landowners, underprivileged in inheritance laws built for passing property down through male lineage ([Agarwal et al., 2021](#)). Women bear the brunt of household labor, diminishing their ability to compete in wage labor markets ([Debnath, 2015](#)).

The body of empirical literature examining wage discrimination in India has primarily focused on estimations of the wage gap — the difference between the average wage for an advantaged group and the average wage for a disadvantaged group — and on the returns to additional years of education. In their seminal work, [Banerjee and Knight \(1985\)](#) examined the effects of caste-based discrimination. Research on gender wage discrimination has commonly analyzed the Indian National Sample Survey ([Bhaumik and Chakrabarty, 2008](#)).

While mean gaps are important, newer methods for decomposing differences go beyond single-statistic measures because differences may not be consistent across the wage distribution. [Jenkins \(1994\)](#) criticizes the single-statistic measure as inadequate for understanding the reality of discrimination. New research attempts to measure and decompose gaps and estimate coefficients across the wage distribution. This method has been applied for public-private wage differences ([Azam and Prakash, 2015](#)), caste discrimination ([Agrawal, 2014](#)), and gender discrimination (?).

In this paper, I conduct a distributional analysis of gender wage gaps using wage data from the India Human Development Survey. The methodology, for the most part, mirrors the implementation of the Machado-Mata decomposition in ?, which analyzes the Indian National Sample Survey.

The remainder of this paper proceeds as follows: Section 2 and Section 3 describe the empirical strategy and the data. I then present results in Section 4. Lastly, Section 5 concludes.

2 Methodology

2.1 Blinder-Oaxaca Decomposition

The Blinder-Oaxaca decomposition, first proposed by [Blinder \(1973\)](#) and [Oaxaca \(1973\)](#) considers the gap between mean wages of men and women as the sum of two factors. First, men are, on average, better endowed with covariates like education and experience that increase their productivity and by extension, their wages. Second, men experience greater returns to these covariates (e.g. a greater return for every year of education than women experience). The Blinder-Oaxaca decomposition terms the first the composition effect (the "explained" gap) and the second the wage structure effect (the "unexplained" gap).

Assume that the wages W can be naively estimated with a vector of independent controlling variables X by:

$$W_i = \beta_0 + \beta_k \mathbf{X}_k + u_i. \tag{1}$$

If the sample can be divided into two groups, A and B , then the same equation could be used over subsamples.

$$W_{Ai} = \beta_{A0} + \beta_{A1}X_{1i} + \dots + \beta_{Ak}X_{ki} + u_{Ai}$$

$$W_{Bi} = \beta_{B0} + \beta_{B1}X_{1i} + \dots + \beta_{Bk}X_{ki} + u_{Bi}$$

.

Therefore, the mean outcomes are

$$\overline{W}_A = \mathbf{X}'_A \hat{\beta}_A$$

$$\overline{W}_B = \mathbf{X}'_B \hat{\beta}_B.$$

Therefore, the mean difference is

$$\overline{W}_A - \overline{W}_B = \mathbf{X}'_A \hat{\beta}_A - \mathbf{X}'_B \hat{\beta}_B = \mathbf{X}'_A (\hat{\beta}_A - \hat{\beta}_B) + (\mathbf{X}'_A - \mathbf{X}'_B) \hat{\beta}_B. \quad (2)$$

The first term is the wage structure effect, describing how the difference in wages is an effect of different coefficient estimates, which are the effects of the control variables like education and experience. The second term is the composition effect, the difference in levels of the predictor variables, like amount of education and experience that determine the composition of each subsample.

2.2 Quantile Regression

Quantile regression was developed first by [Koenker and Bassett \(1978\)](#). While ordinary least squares estimates a conditional mean function (i.e. *conditional on the given values for \mathbf{X}' what is the expected value of Y ?*) quantile regression estimates conditional quantile functions (i.e. *conditional on the given values for \mathbf{X}' , what is the expected third quartile value of Y ?*). The insight of quantile regression is that

it allows for coefficients to vary by quantile of the wage distribution. This matches economic intuition one might have: in low-wage jobs, employers may value experience more and formal education less, but in high-wage managerial jobs, employers might value formal education and experience equally. OLS would obscure the nuances of these effects.

The θ^{th} quantile of the conditional distribution is given by

$$Q_{\theta}(Y_i|X_i) = X_i\beta_{\theta}, \theta \in (0, 1). \quad (3)$$

For a given θ , the estimate of β_{θ} minimizes the sum of deviation,

$$\sum_{i=1}^n \rho_{\theta}(Y_i - X_i\beta_{\theta}) \quad (4)$$

where

$$\rho_{\theta} = \begin{cases} \theta(u) & \text{for } u > 0 \\ (1 - \theta)u & \text{for } u \leq 0 \end{cases}. \quad (5)$$

2.3 Machado-Mata Decomposition

The Machado-Mata decomposition, first developed by [Machado and Mata \(2005\)](#), is a generalization of the BO decomposition specifically for quantile regression. The MM method decomposes the gap at each quantile by constructing a counterfactual distribution, either using men's characteristics and women's returns, or vice-versa.

3 Data

3.1 Data

To investigate gendered wage gaps, I use individual-level data from the India Human Development Survey (IHDS). The IHDS is a survey jointly conducted by the National

Council of Applied Economic Research (NCAER) in Delhi; University of Maryland, College Park; Indiana University; and the University of Michigan. It is a nationally-representative panel survey of more than 42,000 households and 420,311 individuals with an 85% reinterview rate. The first set of interviews, IHDS 1, was conducted in 2004 and 2005. The second set of interviews, IHDS 2, was conducted in 2011 and 2012.

3.2 Variables

The dependent variable of interest is the natural logarithm of inflation-adjusted hourly wages. For robustness, 11 outliers were trimmed, defined as those observations either below the 25th income percentile less three times the interquartile range or greater than the 75th income percentile plus three times the interquartile range. By author's calculations from the Wholesale Price Index, the rupee inflation rate from 2005 to 2012 was 68.032%, an adjustment that is applied to wage data collected in 2005. Unreported OLS estimations including an indicator for survey period suggested an in-sample wage inflation rate of 70-78%.

The grouping variable of interest is a *female*, an indicator for women. Independent variables of interest include *age*, *years of education*, and indicators for marriage and literacy: *marital status*, and *literacy* — all self-explanatory. Again following the method of [Agrawal \(2014\)](#), three years of education were added for respondents who reported graduate degrees, because the original data were censored at bachelor's. Likewise, years of experience can only be inferred by a proxy *years of potential experience*, which is calculated as age minus five years (to account for years before education) minus years of education.¹

¹It is assumed that paid work begins immediately after education finishes.

3.3 Descriptive Statistics

Sample summary statistics are presented in [A.1](#). The sample is 93382 observations, about 28% of whom are women. Respondents outside the working age of 15 to 65 and those working less than 240 hours per year were excluded, in line with the method employed by [Agrawal \(2014\)](#). Summary statistics of the sample, and subsamples of men and women are presented in Table 1.

4 Results

5 Conclusion

References

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A Appendix Tables and Figures

A.1 Descriptive Statistics

Appendix Table A1: Inflation-Adjusted Sample Descriptive Statistics

	Full sample	Men	Women
Inflation-adjusted hourly wages	33.50 (39.94)	38.11 (42.32)	21.71 (29.98)
Log hourly wages	3.14 (0.791)	3.30 (0.760)	2.72 (0.712)
female	0.28 (0.449)	0.00 (0)	1.00 (0)
Literacy	0.66 (0.472)	0.76 (0.429)	0.42 (0.494)
Years of Education	5.84 (5.211)	6.72 (5.022)	3.58 (5.002)
Marital Status	0.77 (0.421)	0.78 (0.415)	0.74 (0.437)
Age	36.52 (12.05)	36.42 (12.10)	36.77 (11.92)
Years of Pot. Experience	25.68 (13.81)	24.70 (13.61)	28.19 (14.02)
Observations	93382	67177	26205

mean coefficients; sd in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table A2: Subsample Regressions with Men and Women, $\tau = .9$

	(1)	(2)
	Men	Women
q90		
married	0.444*** (22.04)	0.277*** (7.05)
HQ19 11.2 Educ: Literacy	0.742 (1.50)	1.641*** (4.91)
HQ19 11.6 Educ: Completed Years, never,i1=0	0.104*** (21.75)	0.131*** (10.03)
HQ19 11.1 Educ: Post 2nd subj	0.0357*** (5.54)	0.0408*** (3.40)
HQ12 7.4 Occupation -job1	-0.00807*** (-19.20)	-0.00974*** (-10.11)
Constant	2.445*** (4.98)	1.162** (3.02)
Observations	14112	2942

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B Appendix One