Measuring Discrimination-Methodological Development

by

Prof. S. Madheswaran

Institute for Social and Economic Change

Bangalore

Email: madhes.hina@gmail.com

Methodology

- Blinder-Oaxaca Decomposition Method
- Cotton, Neumark & Oaxaca-Ransom Decomposition Method
- Expanded Decomposition Method

Blinder- Oaxaca (1973) Decomposition

- The gross wage differential can be defined as

$$G = \frac{Y_{Nsc} - Y_{sc}}{Y_{sc}} = \frac{Y_{Nsc}}{Y_{sc}} - 1$$

- In the absence of labour market discrimination, the NSC and SC wage differential would reflect pure productivity differences:

$$Q = \frac{Y^0_{Nsc}}{Y^0_{sc}} - 1$$

- The market discrimination coefficient (D) is then defined as the proportionate difference between G+1 and Q+1

$$D = \frac{Y_{Nsc} / Y_{sc} - (Y_{Nsc} / Y_{sc})^0}{(Y_{Nsc} / Y_{sc})^0}$$

- The logarithmic decomposition of the gross earnings differential

$$\ln(G+1) = \ln(D+1) + \ln(Q+1)$$

BO Decomposition contd…

- This decomposition can be further applied within the framework of semi-logarithmic earnings equations and estimated via OLS such that

$$\ln \bar{Y}_{Nsc} = \beta^{0}_{Nsc} + \sum \hat{\beta}_{Nsc} \bar{X}_{Nsc} + \varepsilon_{Nsc}$$

$$\ln \bar{Y}_{sc} = \beta^{0}_{sc} + \sum \hat{\beta}_{sc} \bar{X}_{sc} + \varepsilon_{sc}$$

- The gross differential in logarithmic term is given by

$$\ln(G+1) = \ln(\bar{Y}_{Nsc} / \bar{Y}_{sc})$$

$$= \sum \hat{\beta}_{Nsc} \bar{X}_{Nsc} - \sum \hat{\beta}_{sc} \bar{X}_{sc} \qquad (1)$$

- The hypothetical SCs earnings function can be given as

$$\ln \bar{Y}_{sc} = \sum \hat{\beta}_{Nsc} \bar{X}_{sc} \qquad (2)$$

BO Decomposition contd…

- Subtracting equation (2) from equation (1) we get

$$\ln \bar{Y}_{Nsc} - \ln \bar{Y}_{sc} = \sum \hat{\beta}_{Nsc} (\bar{X}_{Nsc} - \bar{X}_{sc}) + \sum \bar{X}_{sc} (\hat{\beta}_{Nsc} - \hat{\beta}_{sc})$$

- Alternatively, the decomposition can also be done as

$$\ln \bar{Y}_{Nsc} - \ln \bar{Y}_{sc} = \sum \hat{\beta}_{sc} (\bar{X}_{Nsc} - \bar{X}_{sc}) + \sum \bar{X}_{Nsc} (\hat{\beta}_{Nsc} - \hat{\beta}_{sc})$$

Cotton (1988), Neumark (1988), Oaxaca-Ransom (1994) Decomposition

The advantages of this decomposition are written below:

1.To solve the index number problem

2.To divide the discrimination component into two parts – one, representing the amount by which NSC characteristics are overcompensated relative to their marginal product and the other representing the amount by which SC characteristics are under compensated.

- The true non-discriminatory wage would lie somewhere between the NSC and SC wage structure. The logarithmic wage differential is written as

$$\ln \bar{Y}_{Nsc} - \ln \bar{Y}_{sc} = \sum \beta^{*} (\bar{X}_{Nsc} - \bar{X}_{sc}) + \sum \bar{X}_{Nsc} (\hat{\beta}_{Nsc} - \beta^{*}) + \sum \bar{X}_{sc} (\beta^{*} - \hat{\beta}_{sc})$$

where β^{*} is the reward structure that would have occurred in the absence of discrimination.

- The β^* used in **Cotton** decomposition:

$$\beta^* = P_{Nsc}\hat{\beta}_{Nsc} + P_{sc}\hat{\beta}_{sc}$$

- The non-discriminatory or pooled wage structure proposed by **Neumark (1988) and Oaxaca and Ransom (1994)** is given below**:**

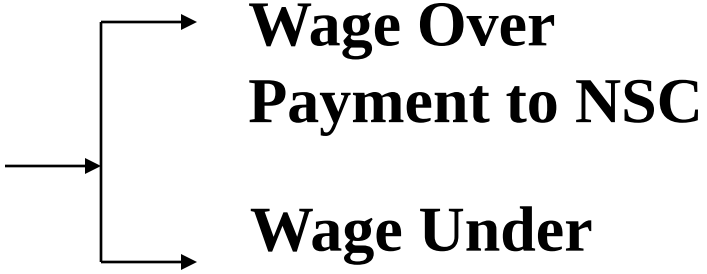
$$\beta^* = \Omega\hat{\beta}_{Nsc} + (I - \Omega)\hat{\beta}_{sc}$$

Where Ω is a weighting matrix, specified by

$$\Omega = (X'X)^{-1}(X'_{Nsc}X_{Nsc})$$

Expanded Decomposition

1. Job Explained
2. Job Discrimination
3. Wage Explained
4. Wage Discrimination



Expanded Decomposition to Estimate both wage & Job Discrimination

- The gross differential in logarithmic term is given by

$$\ln(G+1) = \sum P_{isc} \ln \bar{Y}_{iNsc} - P_{isc} \ln \bar{Y}_{isc}$$

$$\ln(G+1) = \sum_i \ln \bar{Y}_{iNsc} (P_{iNsc} - P_{isc}) + \sum_i P_{isc} (\ln \bar{Y}_{iNsc} - \ln \bar{Y}_{isc})$$

- If we define $\hat{P}_{isc}$ as the proportion of SC workers that would be in occupation *i* if they had the same occupational attainment function as NSC, then decomposing further,

$$\ln(G+1) = \sum_i \ln \bar{Y}_{iNsc} (P_{iNsc} - \hat{P}_{isc}) + \sum_i \ln \bar{Y}_{iNsc} (\hat{P}_{isc} - P_{isc}) + \sum_i P_{isc} (\ln \bar{Y}^*_{iNsc} - \ln \bar{Y}_{iNsc}) +$$

$$\sum_i P_{isc} (\ln \bar{Y}_{iNsc} - \ln \bar{Y}^*_{iNsc}) + \sum_i P_{isc} (\ln \bar{Y}^*_{isc} - \ln \bar{Y}_{isc})$$

Expanded Decomposition contd…

- The final extended decomposition is given below:

$$\ln(G+1) = \sum_i \tilde{\beta}_{iNsc}(\bar{X}_{iNsc})(P_{iNsc} - \hat{P}_{isc}) \text{ (Job Explained)}$$

$$+ \sum_i \tilde{\beta}_{iNsc}(\bar{X}_{iNsc})(\hat{P}_{isc} - P_{isc}) \text{ (Job Discrimination)}$$

$$+ \sum_i P_{isc}[\tilde{\beta}_i^*(\bar{X}_{iNsc} - \bar{X}_{isc})] \text{ (Wage Explained)}$$

$$+\sum_i P_{isc}[\bar{X}_{iNsc}(\tilde{\beta}_{iNsc} - \tilde{\beta}_i^*)] \text{ (Wage Overpayment to NSC)}$$

$$+\sum_i P_{isc}[\bar{X}_{isc}(\tilde{\beta}_i^* - \tilde{\beta}_{isc})] \text{ (Wage Underpayment to SCs)}$$

4. Quantile Regression Technique

- Quantile regression is a technique for estimating the θ th quantile of a random variable conditional on covariates.

- In our application, the quantile regression model used assumes that the θ *th* quantile of the conditional distribution of the log wage of worker "i" (lnWi) is a linear function of a vector of covariates X .

- *Xi* representing the individual characteristics. It can be written in the following manner:

$$Q_\theta(\ln W_i | X_i) = X_i \beta(\theta), \quad \theta \in [0,1]$$

- As shown by Koenker and Bassett (1978), the coefficient vector $\beta(\theta)$ is estimated as the solution to the following minimization problem:

$$\hat{\beta}(\theta) = \underset{\beta(\theta)}{\arg Min} \left\{ \sum_{i:\ln W_i \geq X_i \beta(\theta)} \theta \left| \ln W_i - X_i' \beta(\theta) \right| + \sum_{i:\ln W < X_i \beta(\theta)_i} (1-\theta) \left| \ln W_i - X_i' \beta(\theta) \right| \right\}$$

- The main interest of quantile regression over ordinary least squares is the possibility to estimate the marginal effect of a covariate (for example, the gender) on log wage at various points of the wage distribution and not only at the mean.

- Only few studies have used the quantile regression technique. Some of these have examined the gender wage gap across the wage distribution (Albrecht, Björklund and Vroman 2003; Arulampalam, Booth and Bryan, 2007) and others the public-private wage differentials (Melly, 2005; Lucifora and Meurs, 2006).

5. Machado and Mata Decomposition Technique

- We decompose the difference between the male and female logarithm of wage distributions in two components:

(i) a component that is due to the difference in the distribution of covariates between the male and female groups

(ii) a component that is due to the differences in gender group-specific returns to these covariates at various quantiles.

- This decomposition technique is based on the construction of a counterfactual density.
- This is the logarithm of wage density that would have prevailed in male group if the male characteristics (covariates) have been distributed as individual characteristics were distributed in the female group but the returns to those characteristics prevailing in the male group.

- We denote the counterfactual density by

$$f^{*}\left(\ln W; X^{male}, \beta^{female}\right)$$

The Machado-Mata algorithm for estimating the counterfactual density is as follows:

1.Draw m random numbers from a uniform distribution on [0,1]; $\theta_1, \theta_2, \ldots, \theta_m$

2.For each θ_i, with i=1,2,….m , use the male data to estimate the quantile regression coefficients, $\beta^{male}(\theta_i)$ from the model

$$Q_{\theta_i}^{male}(\ln W | X^{male}) = X^{male}\beta^{male}(\theta_i) = f(\ln W^{male})$$

3.make m random draws with replacement from the male covariates. Denote the outcomes of these draws by X_i^{*male} for I=1,2,……m

4.Generate counterfactual values:

$$\ln W_i^{*female} = X_i^{*male}\beta^{female}(\theta_i), \quad i = 1, 2, \ldots, m.$$

use these values to generate

$$f^*\left(\ln W; X^{male}, \beta^{female}\right)$$

The difference between the male and the female distributions (i.e., $f(\ln W^{male} - \ln W^{female})$ then can be decomposed into[11]:

$$f\left(\ln W^{male}\right) - f\left(\ln W^{female}\right) = \left\{f\left(\ln W^{male}\right) - f^*\left(\ln W; X^{male}, \beta^{female}\right)\right\} +$$
$$\left\{f^*\left(\ln W; X^{male}, \beta^{female}\right) - f\left(\ln W^{female}\right)\right\}$$

with $f(\ln W^{female}) = Q_{\theta_i}^{female}(\ln W | X^{female}) = X^{female}\beta^{female}(\theta_i)$

[11]Note that the decomposition could equivalently be written as

$$f\left(\ln W^{male}\right) - f\left(\ln W^{female}\right) = \left\{f\left(\ln W^{male}\right) - f^{*}\left(\ln W; X^{female}, \beta^{male}\right)\right\} +$$

$$\left\{f^{*}\left(\ln W; X^{female}, \beta^{male}\right) - f\left(\ln W^{female}\right)\right\}$$

Micro Studies – Methods used

1.Correspondence study of job discrimination in India (Sukhadeo Thorat and Paul Attewell, 2007)

• Undertook a field experiment to examine discrimination in the job application process among private sector enterprises in India.

• For this ‘correspondence study’ we selected job advertisements that appeared in major English language newspapers announcing openings for jobs requiring university degrees.

• The businesses chosen were multinational and Indian businesses in the modern private sector.

• Applications were made by mail for these job openings from equally-qualified male applicants, one with a high-caste name, one with a Dalit name, and one with a Moslem name.

• If an employer contacted the applicant asking him to come for an interview or for tests, this was deemed a positive outcome.

Correspondence study Cont…

- Approximately 9% out of 4808 applications received positive outcomes.
- Applications made by high caste names were significantly more likely to result in a positive job outcome than those with Moslem or Dalit names, despite their identical qualifications.
- The odds of a Dalit being invited for an interview were about two-thirds of the odds of a high caste applicant.
- The odds of a Moslem applicant being invited for an interview were about one-third of the odds of a high caste applicant.
- This evidence points to the existence of discriminatory processes that operate at the very first stage in the job application process, even among well-qualified university-educated Indians applying for jobs in modern private sector businesses in India.

2.Where the Path Leads: The Role of Caste in Post-University Employment Expectations (Ashwini Deshpande and Katherine Newman, 2007)

- This study attempts to trace the differential pathways that Dalit and non-Dalit students, from comparable, elite educational backgrounds, traverse in their journey from college to work. (Like Royster, Deirdre's 2003 study)

- While the training they receive in the university world is quite comparable, Dalit students lack many advantages that turn out to be crucial in shaping their employment outcomes. Dalit students support the affirmative action policy completely, which allows them to break their traditional marginality.

- Findings suggest that social and cultural capital (the overlapping of caste, class, family background and networks) matters a great deal in the urban, highly skilled, formal, allegedly meritocratic private sector jobs, where hiring practices are less transparent than appear at first sight.

3.**In The Name of Globalization: Meritocracy, Productivity and the Hidden Language of Caste (Surinder S. Jodhka and Katherine Newman, 2007)**

- More than a decade ago, Joleen Kirshenman and Kathryn Neckerman interviewed Chicago area employers to try to understand the role they played in the production of unequal employment outcomes by race and gender. Recognizing that young black men in the United States were plagued with high levels of unemployment, these sociologists sought to understand how hiring managers viewed the landscape of job applicants, how the stereotypes they employed affected their judgments about the qualifications of those who sought work.

- Like US studies, this paper draws on interview data to analyze the attitudes of employers/hiring managers in India's organized private sector towards caste and community attributes of their potential employees.

- They focus on the role ascriptive qualities play in employer perceptions of job candidates, arguing that they persist despite a formal adherence to the importance of merit.

- Antagonism toward reservations, as a mechanism for promoting employment for SC’s, is articulated as a principled commitment to modern virtues of competition and productivity.

- **4. Documenting successful stories.**

Thank you