Discrimination: Second Lecture

LABOR ECONOMICS (ECON 385)

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Introduction

- Statistical Discrimination. Preferences are not the only mechanism through which discrimination occurs. Alternatively, information asymmetries can lead to discrimination.
- Employers attempt to use salient traits like gender to signal an applicant's labor force attachment or productivity.
- Consider the following model of discrimination.*

*Based on Aigner, Dennis J. and Glen G. Cain. 1977. "Statistical Theories of Discrimination in Labor Markets." *Industrial and Labor Relations Review*, Vol. 30, No. 2: 175-187.

The model

- There are two groups of workers, "Male" and "Female". They submit accurate (but imprecise or "noisy") signals ("y") of their productivity ("q") to employers:

$$y = q + u,$$

where the term, u, reflects the signal's imprecision; think of a thorough "resume" as the signal.

The model, continued

Employers base their wage offers on the expected value of *q*, conditional on the observed signal, *y*:

$$E(q|y) = wage = \hat{q}.$$

- Each group can have a different average productivity (α_M and α_F), a different variance in productivity ($Var(q_M)$ and $Var(q_F)$), and different precision in signals ($Var(u^M)$ and $Var(u^F)$).
- Claim: based on the signal, *y*, the <u>expected value</u> of *q* <u>is a weighted average of the signal and the group's mean productivity</u>.

$$E(q|y, M) = (1 - \gamma^M)\alpha^M + \gamma^M y$$
$$E(q|y, F) = (1 - \gamma^F)\alpha^F + \gamma^F y$$

- Gamma (γ) is the weight, determined by,

$$\gamma = \frac{Covariance(q, y)}{Var(y)}.$$

The model, continued

- The weights depend on what fraction of signal variation comes from productivity differences and what fraction comes from imprecision, i.e.,

$$Var(y) = Var(q) + Var(u).$$

- The weight placed on the signal is:

$$\gamma = \frac{Var(q)}{Var(q) + Var(u)} = \frac{Cov(y, q)}{Var(y)}.$$

- If there was no imprecision, the signal would perfectly reveal productivity, and gamma would equal 1. If the signal was totally uncorrelated with productivity, gamma would be 0.

Discrimination from poor signal strength

If the signal is perfect, there is no discrimination between groups; everybody just gets his/her VMP like earlier models. If the signal is really poor, group differences determine wage offers. I.e.,

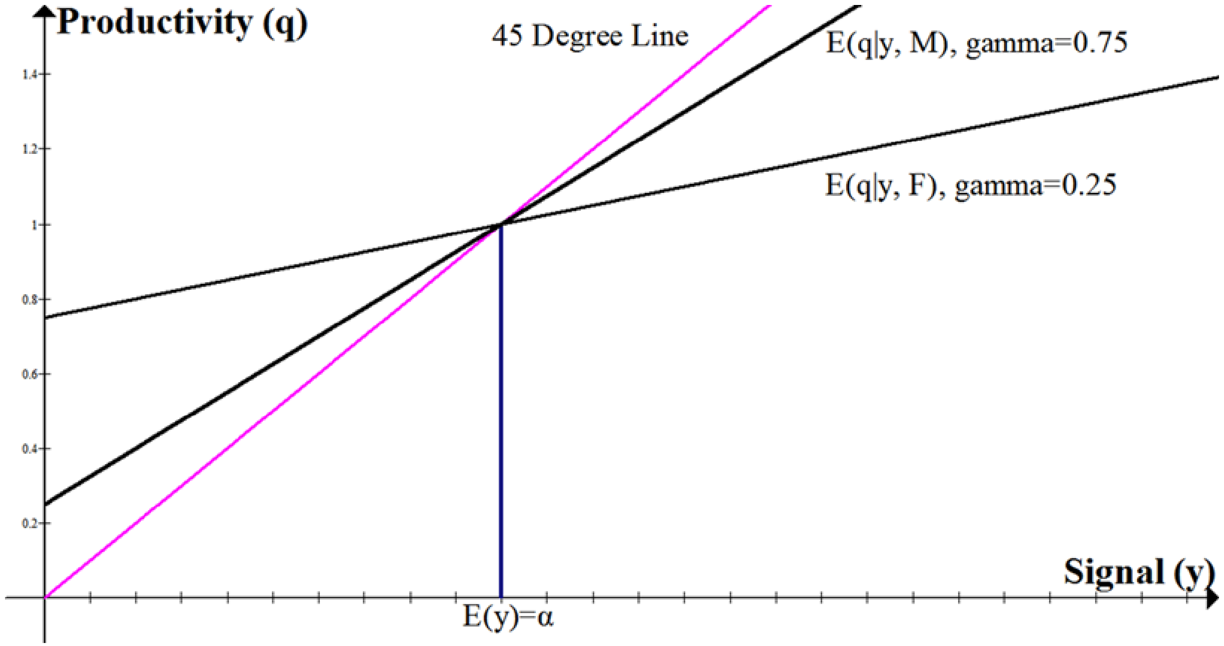
$$Cov(q, y^M) = Cov(q, y^F) = \gamma^M = \gamma^F = 0,$$

and $\hat{q}|M = \alpha^M, \hat{q}|F = \alpha^F$.

- Discrimination is not based on preferences—instead on lack of information about each individual.
- If the groups have two different average productivity levels, they will still (rightly) have different average wages.
- Even if they have the same average productivity ($\alpha^M = \alpha^F = \alpha$), wages between the groups may differ based on the precision of signals.

Effect of variation in productivity within groups

- If one group has a larger $Var(q)$, it means that a "good" (greatly above average) signal reveals more information.
  - Same with a "bad" (below average) signal.
- If men vary more in their productivity, a "good" signal sent by a man will create a better impression than one sent by a woman.
  - A "bad" signal sent by a man will create a worse impression than one sent by a woman.



Effect of variation in signal strength

- If one group has a “noisier” signal ($Var(u)$ is higher), it produces the same result as the previous graph, with more weight being placed on the signal of the more precise group.
  - But neither of these possibilities explains systematic differences between groups . . . yet. Losses by low productivity men are negated by gains by high productivity men. Resulting in no difference in average wage.

Extensions to the A&C model

- Discrimination could result from differences in the productivity variance across groups if the employers care about the variance in addition to the expected value.
  - Hiring would favor the group with less variance.
- If workers with very low q are not hired at all—instead of hired at a low wage—the model would predict wage gaps in favor of the group with lower (productivity or signal) variance.

Discrimination coefficient, continued

- Though the market wage for black workers is w_b, the employer acts as if it costs $w_b(1+d)$ dollars to hire them.
- So they are less likely to hire the cheaper group at all, and even if they do hire them, they will hire fewer of them than is profit-maximizing.
- Note: the "colorblind" firm is included ($d = 0$) as a special case.

Statistical discrimination

Incentives for statistical discrimination will exist as long as information about productivity is revealed by non-productive characteristics.

- Better methods for screening applicants based on productivity would remedy.
  - Gets individuals to self-select, separating equilibrium.
  - Arbitrage opportunities exist if a firm can devise a more accurate way to estimate applicants' productivities. They should respond to this incentive!
- Some advocate more heavy-handed approaches: anti-discrimination, equal pay laws.
  - Economists are reluctant to support these because they don't actually deal with the information problem.