

Economic Models of Discrimination

Spring 2010

Models of Discrimination

- **Taste for Discrimination:** people act as if there is a non-pecuniary cost of associating with particular group
 - Non-production related attributes
 - Several possible sources: employer, employee, or customer
- **Statistical Discrimination:** offer different transaction terms to individuals because of perceived or accurate group differences
 - Group averages
- **Overcrowding Model:** crowding into lower wage jobs due to preferences or lack of alternative opportunities
- **Institutional Model:** everyday operation of firm causes differences in productivity, promotion opportunities, and pay

TASTE DISCRIMINATION

Taste Discrimination

Gary Becker (1957)

Modeled discrimination as a personal prejudice, or taste, against associating with a particular group

Sources: employer, employee (coworker), customer

To affect earnings, tastes must influence actions

Act as if there were a non-pecuniary cost of associating with particular group

Taste Discrimination

Discrimination Coefficient: measurement of the strength of an individual's discriminatory taste

- Denote by “d”
- Need to factor this “cost” into decision of firm or individual

Notation

Use the following subscripts to denote ‘groups’ of people:

- P: Preferred group
- NP: Non-preferred group
- e: Employer
- w: Employee/Coworker
- c: Customer

Employer Discrimination I

- Cost of employing preferred group: w_P
- Full cost of employing non-preferred: $w_{NP} + d_e$
- Discriminating employer will only hire NP at lower wage:

$$w_{NP} = w_P - d_e < w_P$$

$$w_{NP} < w_P$$

Employer Discrimination II

If P and NP have equal productivity:

$$w_{NP} < w_P = MP$$

- Group discriminated against is paid less than their marginal productivity

Wage gap increases with employers' discriminatory tastes (i.e. the larger d_e) and the number of non-preferred workers seeking employment

Criticisms of model:

In theory, competitive markets should eliminate the gap

- Discrimination is costly
- If discriminate and hire more expensive workers, you are forgoing the opportunity to hire cheaper labor
 - Higher costs → lower profits
 - Competitive advantage for non-discriminating firms
 - Non-discriminating firms drive out discriminatory firms

Even without driving them out of market, no wage gap will exist if there are enough non-discriminatory firms to hire NP workers

→ Segregation

Reasons why competitive markets don't solve gap:

- Lack of competition due to market power
 - Monopsony: large buyer of labor relative to size of market
 - Example: Factory town
 - Positive relationship between market power and employment discrimination [Black and Brainerd (2004) test this]
- Unions
 - Barrier to competitive wages
 - Recall diagram previous lecture
- Search costs
 - Employees may be willing to settle on a lower paying job rather than incur costs to search again
- Discrimination may boost profits
 - Ex: Housing agents protect business of prejudiced clients

Arrow (1971) - “The Theory of Discrimination”

Two types of labor: B and W

- Perfect substitutes
- Suppose employer prefers W to B

Trade-off between profits (π) and the number of B and W employees

Suppose that employer seeks to maximize utility rather than profits directly:

$$U(\pi, B, W)$$

where

- Output = $f(B + W)$
- Profit = $\pi = f(B + W) - w_B B - w_W W$
- w_i is the wage for type i

Arrow (1971)

Convention is to equate MP_L to price of input

- Input price is now the market price (wage) plus the discrimination coefficient

Arrow considers discrimination of both types of workers:

- d_B = “internal cost” for a one unit increase in type B labor force
 - Positive value
- d_W = “internal cost” for a one unit increase in type W labor force
 - Negative value

Arrow (1971)

Equate MP to “input price” for each type of worker:

- $MP_B = w_B + d_B$
- $MP_W = w_W + d_W$

Given equal productivity ($MP_B = MP_W$):

$$MP_W = w_W + d_W = w_B + d_B = MP_B$$

$$w_W - w_B = d_B - d_W > 0$$

Arrow (1971)

If all firms have the same degree of discrimination:

- B workers paid less than MP
- W workers benefit with higher wages
- Employers benefit from maximized utility
- Effect on firm profit depends on nature of utility function

If firms have varying degrees of discrimination (different utility):

- Wages still higher for W
- Less discrimination as firm gets larger
- Discrimination costly - like tax; restricts scale
- Production no longer efficient since MP 's no longer same for all firms

Black and Brainerd (2004) - "Importing Equality? The Impact of Globalization on Gender Discrimination."

Becker's model implies a positive relationship between market power and employment discrimination.

- Increased competition (decreased market power) should reduce the wage gap.

B&B (2004) use increased international trade in recent years as a measure of increased competition.

- Evaluate impact of trade on wage gap in non-competitive ('concentrated') versus competitive industries.

Black and Brainerd (2004) - Data

Individual Data

- Current Population Survey (CPS) 1977-1994
- Full-time workers
- Checked results using Census and Outgoing Rotation Groups of the CPS

Trade Data

- National Bureau of Economic Research (NBER) Trade Database
- Manufacturing industries only

Black and Brainerd (2004) - Model

Dependent variable: change in industry level residual gender wage gap from 1976 - 1993

- **Decline in residual wage gap is an improvement**

Key independent variables:

- 1 Change in import share in industry over period
- 2 Dummy variable for concentrated industries
- 3 Interaction of (1) and (2)

Black and Brainerd (2004) - Results

Positive coefficient on concentrated industry dummy

- Gap declined more in competitive industries in absence of import penetration.

Positive coefficient on change in import share

- Non-concentrated industries: gap grew more in industries that had greater import increases than those with little or no additional competition from increased trade.
- Captures negative effect trade has on less-skilled workers; women hold disproportionate share of less-skilled jobs.

Black and Brainerd (2004) - Results

Negative coefficient on interaction term

- Trade increased gender gap in competitive industries but actually reduced gap in concentrated industries.

Results insensitive to measurement of wages, market structure, length of time, and data set.

Trade may increase wage inequality by reducing relative wages of less-skilled but also appears to benefit women by reducing ability of firms to discriminate.

Bertrand and Mullainathan (2004) - "Are Emily and Greg more Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination"

- Sent fictitious resumes with randomly assigned African-American- or White-sounding names to help-want ads in Chicago and Boston
- Measured call-backs for interviews
 - Existence of racial gap?
 - Does the racial gap change with resume quality?
 - Does neighborhood of residence matter?
 - Does the racial gap vary by occupation or industry?

Bertrand and Mullainathan (2004) - Resumes

- Names
 - Data from birth certificates in Massachusetts between 1974 to 1979 (racial frequency)
 - Checked perceptions with survey
- Two qualities of resumes
 - Experience, employment history, email address, honors, foreign language, certifications, volunteer history, computer skills
- Sent 4 resumes to each job
 - One for each quality and race combination

Bertrand and Mullainathan (2004) - Resumes II

- Used online resumes as templates
- Fake phone numbers, emails, addresses
 - Randomly assign postal address
 - “Wealthier” neighborhoods tend to be more educated and whiter
- 1,300 employment ads between 2001 and 2002
- Sales, administrative support, clerical, and customer service job categories
- Kept job information: job requirements, if equal opportunity employer

Bertrand and Mullainathan (2004) - Resumes III

Advantages:

- Can generate compatibility of partner
- No demand effects - participants can't influence results [no face-to-face contact]
- Low marginal cost - large sample size

Disadvantages:

- Want employment and wage rather than callback rates
- Do not directly report race (inferred from name)
- Use very distinct names, may not represent average applicant

Bertrand and Mullainathan (2004) - Results

| Mean Callback Rates By Racial Soundness of Names | | | |
|---|-------------------------------------|-------------------------------------|-------|
| | Percent callback for White names | Percent callback for Black names | Ratio |
| All resumes | 9.65 | 6.45 | 1.50 |
| Chicago | 8.06 | 5.40 | 1.49 |
| Boston | 11.63 | 7.76 | 1.50 |
| Females | 9.89 | 6.63 | 1.49 |
| Females in Admin | 10.46 | 6.55 | 1.60 |
| Females in Sales | 8.37 | 6.83 | 1.22 |
| Males | 8.87 | 5.83 | 1.52 |

Source: Bertrand and Mullainathan (2004), Table 1

Bertrand and Mullainathan (2004) - Results II

- White names receive 50% more callbacks
 - Equivalent to 8 years of experience
- Resume quality has greater effect for White names (higher return)
- Significant “favoritism” towards whites
- No evidence that African Americans benefit more than whites from living in a Whiter, more educated zip code
- Race gap relatively uniform across occupations, job requirements, employer characteristics, and industries

Bertrand and Mullainathan (2004) - Results and Theory

- Taste-based Discrimination
 - Customer and coworker - gap is not larger for jobs with more customer or coworker contact [not consistent with theory]
 - Employer discrimination - matches finding that employers located in neighborhood with higher percentage of black residents discriminate less; struggles to explain lower returns for credentials [could be consistent]
- Statistical Discrimination
 - Race does not appear to proxy for unobservables (lower returns)
 - Imprecise information theory - control resume characteristics

Bertrand and Mullainathan (2004) - Model Limitations

- Data only from 2 large, metropolitan areas (Chicago and Boston)
- Limited occupational categories
- Quality may be subjective - have to pay more for a higher quality employee
- No information on other applicants (racial proportion)
- Non-random job selection:
 - Location of job advertisement - *The Boston Globe*, *The Chicago Tribune*
 - Eliminated job if required call or appearance

Bertrand and Mullainathan (2004) - Model Limitations

- Current staff at firm (proportion in each race)
- Contact via postal mail not measured
- Time of year (labor demand)
- Economic environment

Bertrand and Mullainathan (2004) - Model Limitations and Suggested Corrections

Taste Discrimination - Employee/Coworker

Coworkers require premium to work with non-preferred group (d_W)

- Similar to compensating wage differential
- Example: Men who don't like being supervised by women

Employees with taste discrimination against another 'group' of employees may have lower productivity or moral if forced to work in uncomfortable environment.

Reluctance to teach/help coworker (i.e. informal on-the-job training)

Employer Response to Employee Discrimination

Segregate workforce

- Premium no longer necessary
- May be unprofitable
 - Recruitment/training costs
- Against the law

Market wide wage differentials

- Size of wage differential depends on distribution and intensity of employees discriminatory tastes and supply of NP workers

Arrow (1971) - Employee/Coworker

Two types of workers: Foremen and floor workers

Foremen: Prefer working with W

- Choose job based on wage and $\frac{W}{B}$ ratio
- Assume all foreman have the same utility function

Results:

- Even if firms have no discriminatory tastes, they will not hire B and W workers at equal wages since there is a lower supply of W
- W is worth more than MP the the employer while B is worth less than MP
- Wage differential increases with importance of the share of foremen on output relative to floor workers

Levitt (2004) - “Testing Theories of Discrimination: Evidence from *Weakest Link*”

Constructed data on the voting patterns of participants on the show *Weakest Link* to test for taste and statistical discrimination

Research Question: If participants deviate from the “optimal” voting strategy, does it occur based on taste or statistical discrimination?

Levitt (2004) - *Weakest Link*

Video:

- <http://www.youtube.com/watch?v=Ov8W6GIClxc>

Game Setup:

- Money increases with consecutive correct answers
- Can “bank” before turn
- Vote off 1 player each round
- Head-to-head final round where winner-takes-all

Levitt (2004) - Optimal Strategy

- Optimal action will depend on actions of others and previous round performances
- “Prize-building” effect dominant early in game
 - Vote off weakest players to increase prize
 - Weakens over rounds
- “Weak-final-round-opponent” strategy increases over time
 - Vote off strongest competition before final round
 - Want to face easiest competition in winner-take-all final match

Levitt (2004) - Discriminating Strategy

Expected strategies of discriminating participants:

- Taste-based discrimination: more likely to vote off targeted group in all rounds
- Information-based (statistical) discrimination: more likely to vote off targeted group in early rounds but less likely in later rounds

Levitt (2004) - Data

- All shows aired prior to January 2003
- 25 prime-time and 136 daytime shows
- Blacks overrepresented
- Asians and Hispanics underrepresented
- Disproportionate share from California
- More young than old contestants

Levitt (2004) - Statistics

Explanations of Why Contestants Cast Their Votes

| Round | Bad Play | Good Play | Personal | | |
|-------|----------|-----------|-----------------|---------|-------|
| | | | Characteristics | Revenge | Other |
| 1 | 59.7 | 2.9 | 28.1 | 0.0 | 9.4 |
| 2 | 67.3 | 2.0 | 15.0 | 6.5 | 9.2 |
| 3 | 59.8 | 6.1 | 15.2 | 7.6 | 11.4 |
| 4 | 36.8 | 32.3 | 14.3 | 7.5 | 9.0 |

Personal characteristics largest in first round → lack of information

Voting off due to bad play decreases in higher rounds

Voting off due to good player increases dramatically in last round

Levitt (2004) - Statistics II

| Raw Data on Votes Received | | | | | | | |
|----------------------------|------|--------|-------|-------|-------|----------|---------|
| Round | Male | Female | White | Black | Asian | Hispanic | Age 50+ |
| Early | 1.05 | 0.95 | 0.98 | 1.10 | 0.62 | 1.29 | 1.32 |
| Middle | 1.00 | 1.00 | 1.00 | 0.93 | 1.24 | 1.38 | 1.27 |
| Final | 1.02 | 0.98 | 1.02 | 0.97 | 0.83 | 0.71 | 1.50 |

Asians had higher proficiency: expect less votes early and more in later rounds

Hispanics receive more votes early and less in later rounds: evidence for information-based discrimination

Age 50+ receive higher votes in all rounds: evidence for taste-based discrimination

Levitt (2004) - Regression Analysis

Dependent variable: Votes

- Expect 1 per round

Independent variables:

- Contestant characteristics [race, gender, age, education, residence]
- Dynamic variables (performance in previous round)
- Dummy variables for rounds and type of show

Levitt (2004) - Regression Results

- Confirmation of strategy structure for poor performance
 - Poor performers receive more votes in early rounds and less in late rounds
- Previously good performers get same number of final-round votes as previously poor performers (unexpected)
- Possible explanations:
 - Host pressure
 - Lack of skill or time to correctly identify strong players
 - Belief that past performance is not an indicator of future performance

Levitt (2004) - Regression Results II

- Revenge motive holds
- Participants with Doctorates get fewer votes early and more late
 - Statistical discrimination?
- Average contestant gets 30-40% more votes if Hispanic or above age 50
 - Taste discrimination?
- Men vote more for women and vice versa
 - Taste discrimination?

Levitt (2004) - Model Limitations

- Not a market - no choice of whom you interact with
- Individuals highly selective and not representative of underlying population
 - Entertainment quality large factor in selection process
- Televised audience
 - Participants may withhold racist views
- Vote depends on own views but also beliefs about how others will vote

Levitt (2004) - Model Limitations

- Revenge effect may cloud discrimination
- Host pressure to vote for weakest link
- Disproportionate share of participants from California (societal differences)
- Contestants self-reported personal information (occupation, education, etc.)

Levitt (2004) - Model Limitations and Suggested Corrections

Taste Discrimination - Customer

Customer acts as if there exists a non-pecuniary cost associated with purchasing a good or service from a specific “type” of person (NP)

Non-preferred seller will sell less

Nardinelli and Simon (1990) - "Customer Racial Discrimination in the Market for Memorabilia: The Case of Baseball"

Used data on the 1989 price of baseball cards issued in 1970 to examine if consumers discriminate based on the race of the player.

Athletics - have direct measures of productivity (ability) that are separate from consumer discrimination

Nardinelli and Simon (1990)

Productivity differences have two sources:

- Discrimination
- Ability
 - Typically hard to measure
 - Athletics is one area with ability "measures"

Previous sports analysis has focused on wage differentials

- Issues with separating employer, coworker, and customer discrimination

Nardinelli and Simon (1990) - Baseball Card Data

- Prices from Beckett's *Official 1989 Price Guide to Baseball Cards*
- Supply fixed for cards and diminishes over season
- Price determinants for baseball cards:
 - Career performance (primary determinant)
 - Scarcity of card
- 1970 mint Topps baseball cards priced in 1989
- Used each statistic separately rather than single-index

Nardinelli and Simon (1990) - Baseball Card Data II

Player statistics: Macmillan *Baseball Encyclopedia*

“Common Player” cards:

- Cards at the minimum price that is unrelated to performance
- Censored prices
 - Adjust model to account for data limitation

Nardinelli and Simon (1990) - Regression

Dependent variable:

$$\log \left[\frac{\text{price}}{\text{common card price}} \right] = \log(\text{price}) - \log(\text{common player price})$$

Independent variables (expected sign):

- Hitters:
 - Hits (+), Doubles (+), Triples (+), Home Runs (+), Walks (+), Stolen Bases (+), At Bases (-), Seasons (-), Postseason games (+), Black (?), Hispanic (?), Position Dummy
- Pitchers:
 - Wins (+), Losses (-), Saves (+), Complete Games (+), Earned Runs (-), Strikeouts (+), Walks (-), Innings pitched (?), Hits (-), Postseason innings (+), Black (?), Hispanic (?)

Nardinelli and Simon (1990) - Regression Results

Card price relative to a white player with comparable ability

- Hitters:
 - Non-white: 10% less
 - Black: 6.4% less
 - Hispanics: 17% less
 - Card price for Black and Hispanic hitters significantly different
- Pitchers:
 - Non-white: 13% less
 - Black: 16% less
 - Hispanic: 12% less
 - Card price for Black and Hispanic pitchers not significantly different

Nardinelli and Simon (1990) - Regression Results II

Outlier effect?

- Do results hold for all levels of ability or are they driven by “superstar” end?
- Hitters: same results
- Pitchers:
 - Non-white variable still significant [differ from white player prices]
 - Black and Hispanic variables insignificant (sample size)
 - Preferences for Black versus Hispanic pitchers only visible at superstar end of the market

Effect of being non-white stronger for pitchers

- Visibility of pitcher

Nardinelli and Simon (1990) - Model Limitations

- Functional form and choice of explanatory variables may be important determinants of sign and significance of race variables in studies of discrimination
- Limitation of baseball card analysis
 - Small market
 - Not a commodity purchased by most households
- May not be able to completely separate customer discrimination and ability measures
 - Employer or customer discrimination during performance time may influence confidence and performance
- Employer discrimination may influence selection

Nardinelli and Simon (1990) - Model Limitations and Suggested Corrections

Borjas and Bronars (1989) - "Consumer Discrimination and Self-Employment"

Develop a (complicated) theoretical model of consumer discrimination

- Taste discrimination
- Consumers have incomplete information about price of good and race of seller - must incur cost to obtain information

Used 1980 US Census data to test effect of consumer discrimination and incomplete information on self-employment and salaried employment of white men and minority men

Borjas and Bronars (1989) - Data

- 1980 US Census of Population
- White, Black, Asian and Hispanic Men employed in non-agricultural industries
- Clear differences in probability of self-employment and earnings

| Summary Statistics | | | |
|---------------------------|-----------------------------|-----------------------------|------------------------|
| Group | Self-Employment Probability | Self-Employed Earnings (ln) | Salaried Earnings (ln) |
| Whites | .118 | 5.842 | 5.849 |
| Blacks | .045 | 5.371 | 5.466 |
| Hispanics | .070 | 5.558 | 5.465 |
| Asians | .119 | 5.792 | 5.646 |

Borjas and Bronars (1989) - Results

- Lower earnings for self-employed minority men relative to self-employed white men
- Smaller gains to self-employment for able minority men relative to able white men
- Minorities have much lower incentive to become self-employed
- Able minority men more likely to select into salary jobs
- Able white men more likely to select into self-employment

Readings for Next Section

Statistical Discrimination:

- Aigner and Cain (1977) [175-180 only]
- Pinkston (2006)
- Ladd (1998)