

Part VB: Discrimination Evidence

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Measuring Discrimination

- Wage differentials between two groups (e.g., men and women) (may) result from either/both
 - ① Labor market discrimination
 - ② Pre-market differences
- A common empirical goal is to determine the percentage of a wage gap which is attributable to labor market discrimination.
- The Oaxaca-Blinder decomposition is a fairly intuitive method for estimating the role of labor market discrimination on wages.

Measuring Discrimination

- Suppose we observe that
 - 1 white workers have a higher average wage than black workers, $\bar{w}_W > \bar{w}_B$
 - 2 white workers have higher average years of schooling, $\bar{s}_W > \bar{s}_B$

- “Raw” mean wage differential:

$$\Delta w = \overline{w}_W - \overline{w}_B > 0$$

- What causes wage gap? A characteristic relevant to productivity (schooling) or a characteristic irrelevant to productivity (race)?

Measuring Discrimination

- Consider a simple linear wage-schooling locus for each race:

$$w_W = \alpha_W + \beta_W S_W$$

$$w_B = \alpha_B + \beta_B S_B$$

- Interpretation of coefficients:
 - 1 α_i : Wage for worker of type i with $S = 0$
 - 2 β_i : Return to schooling for each additional year for worker of type i

Measuring Discrimination

- Why might $w_W > w_B$? Either or both
 - 1 $\alpha_W - \alpha_B > 0$: There is a wage premium for zero-skill white workers relative to zero skill black workers
 - 2 $\beta_W - \beta_B > 0$: White workers receive a higher return to schooling than black workers

Measuring Discrimination

- Mean wages for each worker type:

$$\overline{w}_W = \alpha_W + \beta_W \overline{S}_W$$

$$\overline{w}_B = \alpha_B + \beta_B \overline{S}_B$$

- Goal: Decompose wage differential into a “discrimination” component and a “pre-market” component.
 - Pre-market: How much of the wage differential is due to differences in mean schooling levels?
 - Discrimination: How much of the wage differential is attributable to the structure of the wage equation? (i.e., do we see that $\alpha_W > \alpha_B$ or $\beta_W > \beta_B$?)

- We can write the wage differential as

$$\overline{w}_W - \overline{w}_B = (\alpha_W - \alpha_B) + (\beta_W - \beta_B)\overline{s}_B + (\overline{s}_W - \overline{s}_B)\beta_W$$

- Pre-market component: $(\bar{S}_W - \bar{S}_B)\beta_W$
- Discrimination component: $(\alpha_W - \alpha_B) + (\beta_W - \beta_B)\bar{S}_B$

Measuring Discrimination

- Average black worker is paid

$$\overline{w}_B = \alpha_B + \beta_B \overline{S}_B$$

- If the average black worker were “treated as a white worker,”

$$w_B^* = \alpha_W + \beta_W \overline{S}_B$$

- Discrimination component: $w_B^* - \overline{w}_B$
- Pre-market component: $\overline{w}_W - w_B^*$

Measuring Discrimination

Example

Suppose that the average schooling level for white workers is 10 years and for black workers it is 6.7 years. If the wage equations are given by

$$w_W = 5 + .5S_W$$

$$w_B = 4 + .45S_B$$

*how much of the wage differential is due to discrimination?
Pre-market factors?*

Measuring Discrimination

- This gives us an accurate decomposition of our wage differential if we've modeled the situation correctly.
- We often observe experience, schooling, race, and other demographics in data sets.
- We rarely observe (i) quality of education or (ii) academic field of study. But, some studies have employed these measures.
- Several other reasons this is not great, but the intuition is important and it can be a reasonable first approximation.

Readings

- Borjas 9.8

Empirical Analysis of Discrimination

- Empirically testing for labor market discrimination can be difficult
- Often measured as the difference in outcomes between two groups conditional on productive characteristics
- Earnings model: $Y = \alpha M + \beta X + \varepsilon$
 - βX captures set of productive characteristics and their returns
 - M is an indicator for minority status (uncorrelated with ε)
 - $\alpha < 0$ measures discrimination

Empirical Analysis of Discrimination

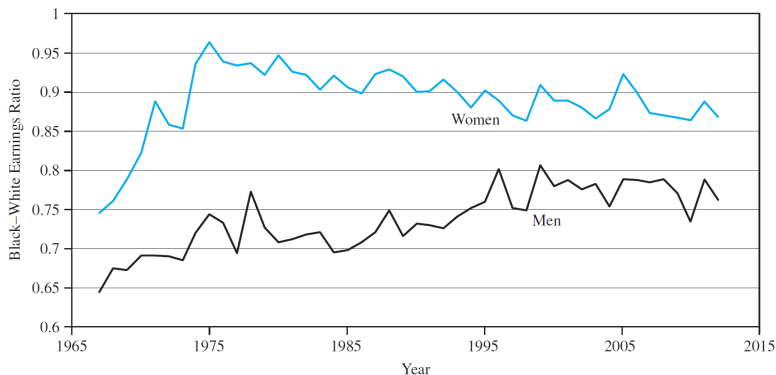
- Potential issues:
 - Variable choice: Including endogenous X 's (e.g., schooling and occupation) will reduce gap size
 - Pre-market discrimination could reduce X for minorities (e.g., lower perceived returns to education \Rightarrow lower education \Rightarrow lower wages)
 - Omitted variable bias: Productivity/skills may not be completely captured by X
 - Selection into labor force: lower LFPR among minorities may mask even larger wage gap
 - Time effects
 - Historical changes in the wage gap
 - Life-cycle effects (e.g., due to statistical discrimination)
 - Distributional effects: Wage gap may vary substantially along earnings distribution

Empirical Analysis of Discrimination

- Commonly used methods to estimate discrimination:
 - Regression studies
 - Audit studies
 - Difference-in-differences
 - Lab experiments

The Black-White Wage Gap

Sources: U.S. Bureau of the Census, "Historical Income Tables—People," Table P-38. "Full-Time Year-Round Black and White Workers by Median Earnings and Sex." www.census.gov/hhes/www/income/data/historical/people/. The earnings refer to the median earnings of full-time, full-year workers aged 15 or above.



The Black-White Wage Gap

- Why has the black-white gap decreased? Major proposed theories:
 - 1 Increasing levels of human capital accumulation in the black population
 - 2 Affirmative action programs
 - Large increase in black employment
 - Impact on wages less clear
 - 3 Decreasing black labor force participation
 - 4 Unobserved skill differences
 - Neal & Johnson (1996)

The Black-White Wage Gap

- How much of the wage difference is due to discrimination?
- Choice of controls has a large effect on measure of discrimination

Source: Joseph G. Altonji and Rebecca M. Blank, "Race and Gender in the Labor Market," in Orley Ashenfelter and David Card, editors, *Handbook of Labor Economics*, vol. 3C, Amsterdam: Elsevier, 1999, Table 5. The log wage differential between any two groups can be interpreted as being approximately equal to the percentage wage differential between the groups.

	Controls for Differences in Education, Age, Sex, and Region of Residence	Controls for Differences in Education, Age, Sex, Region of Residence, <i>and</i> Occupation and Industry
Raw log wage differential	-0.211	-0.211
Due to differences in skills	-0.082	-0.114
Due to discrimination	-0.134	-0.098

The Black-White Wage Gap

- Mixed evidence on scope of statistical discrimination
- Altonji & Pierret (2001): Little evidence for statistical discrimination in wages on the basis of race
- Fryer, et al (2013): At least 1/3 of black-white wage gap explained by labor market discrimination
 - Unemployed blacks receive significantly lower wage offers than whites.
 - Wage gap of black workers decreases as black workers' tenure at a firm rises

The Black-White Wage Gap

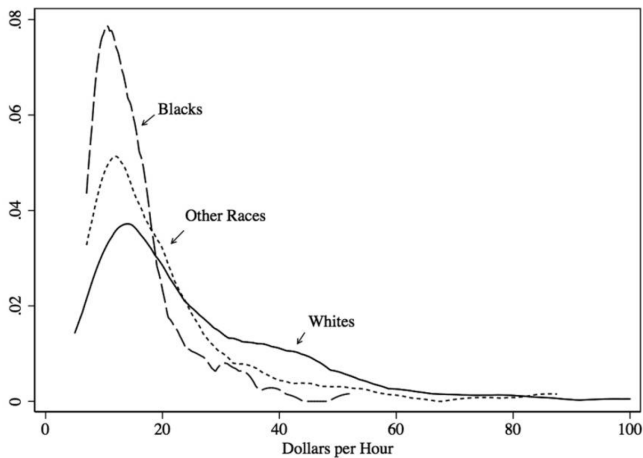


Figure: Source: Fryer, et al (2013)

Neal & Johnson (1996)

- “The Role of Premarket Factors in Black-White Wage Differences”
- Prior research focused on explaining wage gap by controlling for observable productivity characteristics
- Residual “unexplained” wage difference taken as measure of labor market discrimination
- Issue: Many characteristics are endogenous and can be affected by labor market discrimination
 - Occupation, college choice, experience, etc. can all be affected by current and past discrimination

Neal & Johnson (1996)

- Another issue: Does not account for differences in skill level between blacks and whites entering the labor market
 - Controlling for schooling may not entirely capture skill differentials
 - Schooling may overstate skill level of black workers given that black children exhibit lower levels of achievement than whites in the same grade
- Neal & Johnson approach:
 - Everything relevant for wages that happens after secondary school can be affected by discrimination \Rightarrow should exclude these variables from earnings equation
 - Human capital attained by late teens is “pre-determined” and affects future education and earnings

Neal & Johnson (1996)

- Used National Longitudinal Survey of Youth and examined workers in their late 20s
- Measure of human capital: AFQT exam (administered before labor market entry)
- Earnings equation estimated:

$$\log(w) = \alpha + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta_3 \text{Race} + \beta_4 \text{AFQT} + \beta_5 \text{Schooling}$$

Neal & Johnson (1996)

TABLE 1
LOG WAGE REGRESSIONS BY SEX

	MEN (<i>N</i> = 1,593)			WOMEN (<i>N</i> = 1,446)		
	(1)	(2)	(3)	(4)	(5)	(6)
Black	-.244 (.026)	-.196 (.025)	-.072 (.027)	-.185 (.029)	-.155 (.027)	.035 (.031)
Hispanic	-.113 (.030)	-.045 (.029)	.005 (.030)	-.028 (.033)	.057 (.031)	.145 (.032)
Age	.048 (.014)	.046 (.013)	.040 (.013)	.010 (.015)	.009 (.014)	.023 (.015)
AFQT	...	...	.172 (.012)	...	...	.228 (.015)
AFQT ²	...	...	-.013 (.011)	...	...	.013 (.013)
High grade by 1991	...	.061 (.005)	...	...	.088 (.005)	...
<i>R</i> ²	.059	.155	.168	.029	.191	.165

NOTE.—The dependent variable is the log of hourly wages. The wage observations come from 1990 and 1991. All wages are measured in 1991 dollars. If a person works in both years, the wage is measured as the average of the two wage observations. Wage observations below \$1.00 per hour or above \$75 are eliminated from the data. The sample consists of the NLSY cross-section sample plus the supplemental samples of blacks and Hispanics. Respondents who did not take the ASVAB test are eliminated from the sample. Further, 163 respondents are eliminated because the records document a problem with their test. All respondents were born after 1961. Standard errors are in parentheses.

Neal & Johnson (1996)

- Three quarters of the male black-white wage gap explained by AFQT differences.
- All of the female black-white wage gap explained by AFQT differences
- Implication: the black-white wage gap reflects a skill gap, which in turn could exist due to differences in family and school environments.

Neal & Johnson (1996)

- Potential issues:
 - Criticism of many cognitive tests is that they are racially biased, thus underpredicting productivity or job performance for blacks relative to whites.
 - AFQT unlikely to suffer from such a problem. In 1991, National Academy of Sciences completed review of test for racial fairness and concluded it predicts job performance well, and is racially unbiased.
 - Models of discrimination suggest blacks with more skill have more difficulty distinguishing themselves to employers than highskill whites, and thus the payoff to acquiring skill is lower for blacks
 - LFPR for black men are lower than for white men \Rightarrow exclusion of nonparticipants may understate the true differences in wage offer

Altonji and Pierret (2001)

- “Employer Learning and Statistical Discrimination”
- Do employers statistically discriminate among young workers on the basis of easily observable variables, such as education and race?
- As firms learn about worker productivity, the coefficients on the easily observed measures of productivity should rise, while those on hard-to-observe correlates of productivity should rise

Altonji and Pierret (2001)

- Basic model:
 - Firms form expectations of productivity over observable characteristics
 - They do not observe true productivity, but do observe a “noisy” signal each period
- Implications:
 - As employers learn about productivity, easily observed correlates of productivity will receive less weight and unobserved correlates get more weight
 - If firms use race to statistically discriminate, should have less weight as firms observe true productivity
 - If firms do not use race, then race differential will widen as experience accumulates (because race proxies for productivity and info is not used by employers)

Altonji and Pierret (2001)

- Evidence suggests that employers do not use race to statistically discriminate at beginning of employment, but gaps emerge as obtain additional legal information on worker productivity
- Other alternative explanations:
 - Differential benefits from on the job training related to productivity
 - Discrimination-related differences in access to training
 - Taste-based discrimination could become more important in higher-level positions
- As firms obtain more information about worker, pay becomes more dependent on productivity and less on easily observable credentials (ex: schooling)
- Potential issue: Do not consider possible discrimination in hiring

Bertrand & Mullainathan (2004)

- “Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination”
- Send resumes in response to help-wanted ad and measure call-back rates after randomly assigning white and African-American sounding names
- Also vary quality of resumes
- Other common way to study hiring discrimination: audit studies
 - Both members need to be identical in all dimensions that affect productivity other than race (is this possible?)
 - Not double-blind (auditors know purpose of study)
 - Extremely expensive

Bertrand & Mullainathan (2004)

- Experiment from July 2001-Jan 2002 in Boston and July 2001-May 2002 in Chicago
- Use ads in Sunday editions of Boston Globe and Chicago Tribune in appropriate occupations
- Randomly sample 2 high-quality and 2 low-quality resumes for each ad
- Compare callback/email response rates between the two groups
- Issues:
 - Cannot capture wage discrimination or whether the applicant actually gets job
 - Resumes do not directly report race
 - Some employers may not notice names
 - Names may not be representative of average AfricanAmerican

Bertrand & Mullainathan (2004)

TABLE 1—MEAN CALLBACK RATES BY RACIAL SOUNDINGNESS OF NAMES

	Percent callback for White names	Percent callback for African-American names	Ratio	Percent difference (<i>p</i> -value)
Sample:				
All sent resumes	9.65 [2,435]	6.45 [2,435]	1.50	3.20 (0.0000)
Chicago	8.06 [1,352]	5.40 [1,352]	1.49	2.66 (0.0057)
Boston	11.63 [1,083]	7.76 [1,083]	1.50	4.05 (0.0023)
Females	9.89 [1,860]	6.63 [1,886]	1.49	3.26 (0.0003)
Females in administrative jobs	10.46 [1,358]	6.55 [1,359]	1.60	3.91 (0.0003)
Females in sales jobs	8.37 [502]	6.83 [527]	1.22	1.54 (0.3523)
Males	8.87 [575]	5.83 [549]	1.52	3.04 (0.0513)

Notes: The table reports, for the entire sample and different subsamples of sent resumes, the callback rates for applicants with a White-sounding name (column 1) an African-American-sounding name (column 2), as well as the ratio (column 3) and difference (column 4) of these callback rates. In brackets in each cell is the number of resumes sent in that cell. Column 4 also reports the *p*-value for a test of proportion testing the null hypothesis that the callback rates are equal across racial groups.

Bertrand & Mullainathan (2004)

- Apparent low chance of callback for African Americans
- Cannot improve chances by improving observable skills or credentials
 - Training programs not enough to alleviate racial gap in labor market outcomes
- Potential confounder:
 - Are employers discriminating on social background which is reflected in race rather than name?
 - Would expect that blacks would be helped more by better addresses than whites, but not the case

The Black-White Wage Gap

- Recently, role of explicit labor market discrimination has likely diminished
- Racial differences in social and economic outcomes are greatly reduced after accounting for educational achievement (Fryer 2011)
- Public school quality tends to be lower in poor, predominantly black areas (inner cities vs. suburbs)
- Achievement gaps as measured by exam scores observed in nearly every grade and on occasion increase with years of schooling
- Policies which work to improve early-childhood schooling outcomes are very important to close wage gaps

The Male-Female Wage Gap

- Oaxaca decompositions ignore a key determinant of female earnings: different labor market histories.
- Discontinuity in women's labor market attachment may help explain a substantial part of the gender wage gap.

Source: Joseph G. Altonji and Rebecca M. Blank, "Race and Gender in the Labor Market," in Orley Ashenfelter and David Card, editors, *Handbook of Labor Economics*, vol. 3C, Amsterdam: Elsevier, 1999, Table 5. The log wage differential between any two groups can be interpreted as being approximately equal to the percentage wage differential between the groups.

	Controls for Differences in Education, Age, Sex, and Region of Residence	Controls for Differences in Education, Age, Sex, Region of Residence, <i>and</i> Occupation and Industry
Raw log wage differential	-0.286	-0.286
Due to differences in skills	-0.008	-0.076
Due to discrimination	-0.279	-0.211

The Male-Female Wage Gap

- Goldin (2014): A Grand Gender Convergence: Its Last Chapter
- Many high-skill occupations place wage premiums on:
 - Quantity of hours worked
 - Working specific hours (not flexible, example 8 AM - 6 PM)
- Rigid job structures \Rightarrow large punishment for taking time off to raise kids.

The Male-Female Wage Gap

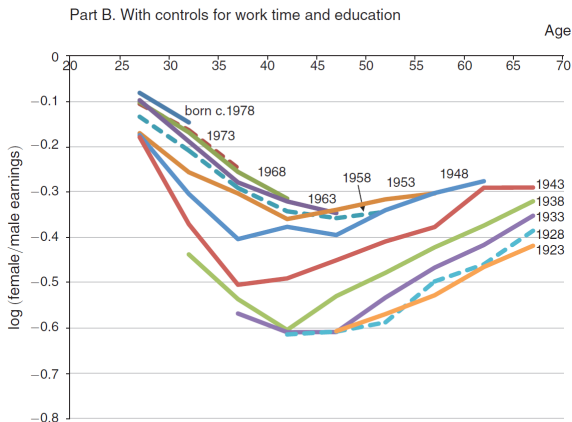


FIGURE 1. RELATIVE EARNINGS OF (FULL-TIME, FULL-YEAR) COLLEGE GRADUATE MEN
AND WOMEN FOR SYNTHETIC COHORTS: BORN 1923 TO 1978

Figure: Goldin (2014)

The Male-Female Wage Gap

- Big finding in recent years: After controlling for other relevant characteristics, gender gap is very small for women without children, and sizeable for women with children.
- Implication: Our labor market doesn't so much directly punish women for being women (though anecdotes of this are easy to find), as it punishes them for taking time off to raise children.

The Male-Female Wage Gap

- Policy implications?
 - Equal pay policies not sufficient to close gender gap, need fundamental change in structure of jobs.
 - Many have proposed mandatory maternity leave. Might help, but as paid vs. unpaid leave does not affect experience accumulation, effects might not necessarily be great in terms of closing gender gap

The Male-Female Wage Gap

- Another possible reasons for gender wage gap: Occupational crowding

Occupation	Percent Female	Median Weekly Earnings
Carpenters	1.6%	\$623
Aircraft mechanics	3.8	980
Truck drivers	5.2	686
Police and sheriff's patrol officers	15.5	961
Chemical engineers	18.4	1,505
Architects	25.3	1,209
Lawyers	32.4	1,757
Physicians	32.2	1,975
Security guards	21.9	507
Cooks	41.5	393
Postal clerks	49.6	915
Financial managers	54.7	830
Real estate sales	54.6	820
Teachers: secondary school	54.9	987
Teachers: elementary school	81.9	946
Maids and housemen	89.8	387
Tellers	87.0	487
Child care workers	95.0	400
Receptionists	91.5	530
Teachers: kindergarten	97.8	621

Figure: Source: Borjas

- “The majority of the current earnings gap comes from within occupation differences in earnings rather than from between occupation differences” (Goldin 2014)

Readings

- Borjas 9.7; 9.9 - 9.11
- Altonji & Pierret (2001). Employer Learning and Statistical Discrimination. *The Quarterly Journal of Economics*
- Bertrand & Mullainathan (2004). Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination. *The American Economic Review*
- Fryer, Roland, et al (2013). Racial Disparities in Job Finding and Offered Wages. *Journal of Law and Economics*
- Fryer (2010). Racial Inequality in the 21st Century: The Declining Significance of Discrimination. Working Paper.
- Goldin (2014). A Grand Gender Convergence: Its Last Chapter. *The American Economic Review*
- Neal & Johnson (1996). The Role of Premarket Factors in Black-White Wage Differences. *Journal of Political Economy*