

Lectures Notes on Discrimination and Affirmative Actions

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1 Introduction

Wage inequality, and in particular, racial income inequality, is an important question in public economics. Numerous empirical studies have established that when wages are regressed on a bunch of variables that should matter for productivity (schooling, experience, union membership etc.) and dummy variables for race and sex, the coefficient for the dummies usually turn out to be significantly different from zero. While this type of analysis may under- or over- state the extend of racial discrimination, it motivates the theoretical studies on discrimination. [See Cain’s (1986) Handbook of Labor Economics survey article for more details of this empirical labor literature, and Section 4.1 for some problems in interpreting the results in this empirical literature.]

Recently disparate treatment received by different racial and/or gender groups in housing, mortgage lending, retailing, policing, judicial system, and even organ transfers have caused tremendous amount of publicity.

It is important to know the extent of and the reasons for disparate treatments before the best policy to help the minorities can be made.

2 Theoretical Models of Discrimination

2.1 Taste-Based Discrimination

The modern economics literature on discrimination started by Becker (1959) and his work is probably still the most well-known contribution. Becker studied several simple models of discrimination, which all had in common that the driving force behind discrimination are racist preferences (or racial animus) by some agents in the model. One simple version of the model (due to Arrow 1973) is as follows:

- Price taking firms that produce output from labor input. The production function is

$$y = f(L),$$

where L is the total labor input;

- Two groups of workers, B and W;
- Each agent supplies labor inelastically at \bar{L}_B and \bar{L}_W respectively for B and W;
- Suppose that the wages for B and W are respectively w_W and w_B ;
- Suppose that
- Suppose that workers' labor are perfect substitutes. Then the firms' profit function when is

$$\pi(L_B, L_W) = f(L_B + L_W) - w_B L_B - w_W L_W$$

- Suppose that firm owners have identical, but possibly racist preference

$$u(\pi, L_B, L_W).$$

A utility-maximizing firm owner solves

$$\max_{\{L_B, L_W\}} u(\pi(L_B, L_W), L_B, L_W).$$

The first order conditions are

$$\begin{aligned} \frac{\partial u(\pi, L_B, L_W)}{\partial \pi} [f'(L) - w_B] + \frac{\partial u(\pi, L_B, L_W)}{\partial L_B} &= 0 \\ \frac{\partial u(\pi, L_B, L_W)}{\partial \pi} [f'(L) - w_W] + \frac{\partial u(\pi, L_B, L_W)}{\partial L_W} &= 0 \end{aligned}$$

In equilibrium labor supply must equal labor demand, hence

$$w_W - w_B = \frac{1}{\frac{\partial u(\pi, \bar{L}_B, \bar{L}_W)}{\partial \pi}} \left(\frac{\partial u(\pi, \bar{L}_B, \bar{L}_W)}{\partial L_W} - \frac{\partial u(\pi, \bar{L}_B, \bar{L}_W)}{\partial L_B} \right).$$

Hence $w_W - w_B$ whenever

$$\frac{\partial u(\pi, \bar{L}_B, \bar{L}_W)}{\partial L_W} > \frac{\partial u(\pi, \bar{L}_B, \bar{L}_W)}{\partial L_B}$$

meaning that whites earn higher wages whenever the employers like whites more than blacks, which is not particularly surprising. However, this does not mean that taste-based discrimination is not important empirically.

2.2 Statistical Discrimination

The literature on statistical discrimination was started by Phelps (1972) and Arrow (1973). There are a lot of variants, but all models have one thing in common: group identity (which the firms do not directly care about) is used as a proxy for productivity (which the firms do care about). The assumption that the firms do not directly care about the workers' racial (or gender) identity is the distinguishing characteristic from the aforementioned Becker's model of taste-based discrimination.

2.2.1 Phelps (AER, 1972)

Phelps (1972) is a model of discrimination driven by differences in information technology (to use a recent buzz word), namely, the signal that is used by the firms to infer about a worker's unobserved productivity is less informative for group B members than for group W members.

- Firms are competitive and risk neutral;
- Workers differ both in terms of ability (or productivity) a , which is not observed by the firms. For illustration, assume that in both group B and W , a is distributed according to

$$N(\mu_a, \sigma_a^2).$$

- Firms, however, observe a noisy signal, θ_i , of worker i 's ability, a_i . Specifically,

$$\theta_i = \begin{cases} a_i + \varepsilon_{iB} & \text{if } i \text{ is Black} \\ a_i + \varepsilon_{iW} & \text{if } i \text{ is White.} \end{cases}$$

where $\varepsilon_{iB} \sim N(0, \sigma_B^2)$, and $\varepsilon_{iW} \sim N(0, \sigma_W^2)$. Hence θ_i is an unbiased signal of a_i , but the precision of the signal may depend on the group identity;

Since it is assumed that firms are risk neutral and competitive, each worker will be offered a wage which equals his expected productivity (ability) conditional on the signal θ_i . Using the standard results on Bayesian updating (see for example, page 167 of DeGroot 1970), we obtain

$$w(\theta_i) = \begin{cases} \frac{\sigma_B^2}{\sigma_a^2 + \sigma_B^2} \mu_a + \frac{\sigma_a^2}{\sigma_a^2 + \sigma_B^2} \theta_i & \text{if } i \text{ is Black} \\ \frac{\sigma_W^2}{\sigma_a^2 + \sigma_W^2} \mu_a + \frac{\sigma_a^2}{\sigma_a^2 + \sigma_W^2} \theta_i & \text{if } i \text{ is White.} \end{cases}$$

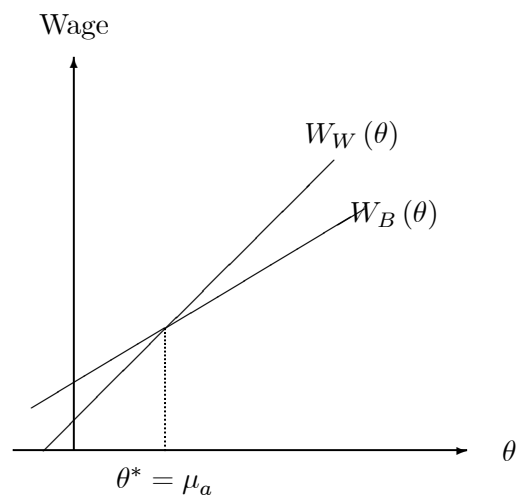


Figure 1: Wage Offers in Phelps Model

Hence if, $\sigma_B^2 > \sigma_W^2$, (due, possibly, to the fact that most firms are White and they are better in interpreting signals generated by White workers), then we have the following implication: [See Figure 1 for an illustration]

- Wages are lower for high scoring blacks than for high scoring whites (signals above the prior mean ability μ_a);
- Wages are higher for low scoring blacks than for low scoring whites (signals below μ_a);
- Average wages are equal for the two groups (unless if there are difference in the distribution of intrinsic ability a across the groups).

We note that white workers with the same signals are treated differently depending on group identity, this may, or may not be viewed as discrimination.

2.2.2 Arrow (1973)

Arrow (1973) is the first to lay out the necessary ingredients of a theory of “self-fulfilling prophecy” with endogenous skill acquisition decisions to interpret discriminatory outcomes. He mentioned the following important ingredients of such a statistical discrimination theory: (1) the employers should be able to costlessly observe a worker’s race; (2) the employers must incur some cost before he can determine the employee’s true productivity (otherwise,

there is no need for surrogate information); (3) the employers must have some preconception of the distribution of productivity within each of the two groups of workers. Arrow then proposed the following model:

- Each firm has two kinds of jobs, skilled and unskilled and they are complementary to each other. I think he means that the firm has a production function $f(L_s, L_u)$ where L_s skilled labor and L_u is the unskilled labor, and f is a constant returns to scale production function
- All workers are qualified to perform unskilled jobs; but only a proportion p_w of whites and a proportion of p_b of blacks are skilled. The firm must pay a cost r to find out whether the worker is skilled or not, and the firm knows eventually whether a worker is qualified or not.
- Arrow's model has some problem with the way he perceives the wage determination: his notion of a competitive wage in the skilled job is a contract that pays a worker from group $j = b, w$ a wage $w_j > 0$ if a worker is revealed to be qualified, and 0 otherwise; on the other hand the firm always pays a wage w_u to any worker on the unskilled job.
- Arrow claims that competition among firms will result in a zero profit condition, hence

$$\begin{aligned} r &= p_w [f_1(L_s, L_u) - w_w] \\ r &= p_b [f_1(L_s, L_u) - w_b]. \end{aligned}$$

Hence

$$w_w = \frac{p_b}{p_w} w_b + \left(1 - \frac{p_b}{p_w}\right) f_1(L_s, L_u).$$

If for some reason $p_b < p_w$, then $w_b < w_w$.

- The wage on the simple task for both groups is

$$w_u = f_2(L_s, L_u).$$

COMMENTS: I think Arrow had all the ideas right, but his model of wage determination is simply not consistent: since $w_u > 0$ and any unqualified worker who is hired on the skilled job will eventually get a wage 0, why would any unqualified worker agree to be hired on the skilled job in the first place?

However, neglecting the above problems with the model, we have:

- Blacks are paid a lower wage in the skilled task if they are believed to be qualified with a lower probability;
- The explanation of discriminatory behavior is shifted from preferences to beliefs.

Arrow then proceed to provide an explanation for why p_w and p_b differ in equilibrium even though there are no intrinsic differences between groups. Since Arrow's model is problematic in details we will not go through the details, but he assumes that

- A worker becomes qualified as a result of a costly (unobservable) investment;
- Workers invest in skills if the gains of doing so outweighs the costs. Arrow takes the gains to be $w_j - w_u$ (which is obviously inconsistent with the labor market equilibrium condition). Suppose the distribution of skill investment cost is given by $G(\cdot)$. Then the proportion of skilled workers will be $G(w_j - w_u)$. And equilibrium requires that

$$p_j = G(w_j - w_u).$$

- Arrow then notes that the system can easily have symmetric as well as asymmetric equilibria. The intuition for the asymmetric equilibria is simple: if very few workers invest in a particular group, the firms will rationally perceive this group as unsuitable for the skilled task and equilibrium wages in the skilled task will be low, which will in turn give little incentive for the workers from this group to invest.

Arrow is clearly aware of the logical inconsistency in his model:

“I believe these results are only the barest fragment of what could be found with better and more detailed systems in which there is an interaction between reality and perception of it. One must consider still more precisely how individual employers acquire knowledge which will modify their initial estimates of distributions as differing between groups and in turn the effects of these perceptions on the market and therefore on any incentives to modify those abilities.”

2.2.3 Coate and Loury (AER, 1993)

The main point of Coate and Loury (1993) is to present a theoretical analysis of affirmative actions, mainly to understand the incentive effects of affirmative action policies on agents' incentive to invest in skills. To do that, they first have to present a theoretical model of why market discrimination against the blacks occurred in the first place. They view it as a statistical discrimination. Their model is an improvement upon Arrow, yet still leaves the wage determination exogenous.

COATE AND LOURY MODEL

- There are more than two competitive firms, and a continuum of workers with unit mass;
- The workers belong to one of two identifiable groups, B or W, with $\lambda \in (0, 1)$ be the fraction of W in the population;
- [Linear Production Function] There are two tasks, a complex task (task one in the paper) and a simple task (task zero in the paper); the complex task can be successful performed only by qualified workers. The productivities of (or the firms' net return from) qualified and unqualified workers on the two tasks are summarized by the following table:

		Tasks	
		Complex	Simple
Workers	Qualified	$x_q > 0$	0
	Unqualified	$-x_u < 0$	0

- Workers are born to be unqualified, but they can become qualified through some costly ex ante investment [The interpretation of investment can be working hard while in school, learning good manners and being disciplined etc.]. The skill investment cost c is heterogenous across workers and is distributed according to CDF $G(\cdot)$ which is assumed to be continuous and differentiable.
- Workers' skill investment decisions are unobservable by the firms. Instead, firms observe a noisy signal θ of the worker's qualification: The signal θ is drawn from $[0, 1]$ according to PDF $f_q(\theta)$ if the worker is qualified, and according to $f_u(\theta)$ if he is

unqualified. Assume monotone likelihood ratio property on the testing technology:

$$l(\theta) = \frac{f_q(\theta)}{f_u(\theta)}$$

is strictly increasing and continuous [for expositional simplicity only, can be weakened]. This MLRP simply says that a worker with a higher θ is more likely to be qualified than one with a lower θ .

- **[Part of CL Model that is Not Satisfactory]** A worker gets a net benefit ω if he is assigned to the complex task, and 0 if he is assigned to the simple task. [The particular wage values are normalization and hence with no loss of generality. This exogenous wage assumption prevents them from asking questions about how wages will react to affirmative action policies.]

To summarize, in Coate and Loury's model, the two groups are identical in all fundamentals except the group size, which could be equated as well. The only reason $\lambda = 1/2$ is that they later would like to talk about employment quota.

TIMING OF THE GAME:

- STAGE 1: Nature chooses workers' types c ;
- STAGE 2: Workers make (unobservable) skill investment decisions;
- STAGE 3: Test results $\theta \in [0, 1]$ observed by firms;
- STAGE 4: Firms decide how to assign the workers to the two tasks.

EQUILIBRIUM

We solve the equilibrium of the model from backwards.

Consider **STAGE 4**. Suppose that a firm sees a worker with signal θ from a group where a fraction π has invested in skills. The posterior probability that such a worker is qualified is given by [via simple Bayes rule]:

$$p(\theta; \pi) = \frac{\pi f_q(\theta)}{\pi f_q(\theta) + (1 - \pi) f_u(\theta)}.$$

Hence the expected profit for the firm if it assigns such a worker to the complex task is

$$p(\theta; \pi) x_q - [1 - p(\theta; \pi)] x_u$$

while the profit is zero if it assigns the worker to the simple task. Hence the firm will assign this worker to the complex task if and only if

$$\begin{aligned} p(\theta; \pi) x_q - [1 - p(\theta; \pi)] x_u &\geq 0 \\ \Leftrightarrow \frac{x_q}{x_u} &\geq \frac{1 - \pi}{\pi} \frac{f_u(\theta)}{f_q(\theta)}. \end{aligned}$$

Since f_q/f_u is assumed to be monotonically increasing in θ , the above inequality holds if and only if

$$\theta \geq \tilde{\theta}(\pi)$$

where $\tilde{\theta}(\pi)$ is determined as follows:

- If the equation

$$\frac{x_q}{x_u} = \frac{1 - \pi}{\pi} \frac{f_u(\theta)}{f_q(\theta)} \quad (1)$$

has a solution [which will be unique due to MLRP], $\tilde{\theta}(\pi)$ is the unique solution;

- If $x_q/x_u > (1 - \pi) f_u(\theta) / \pi f_q(\theta)$ for all $\theta \in [0, 1]$, then $\tilde{\theta}(\pi) = 0$;
- Otherwise, $\tilde{\theta}(\pi) = 1$.

It is clear that whenever $\tilde{\theta}(\pi)$ is interior, we have

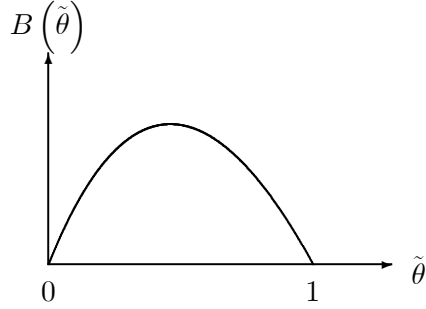
$$\frac{d\tilde{\theta}(\pi)}{d\pi} = -l'(\tilde{\theta}(\pi)) \frac{x_u}{x_q} \frac{1}{\pi^2} < 0.$$

This is intuitive: the higher the prior probability that a worker is qualified, the firms will be more willing to give the benefit of doubts to the workers.

TO SUMMARIZE: In the task assignment stage, the firm will follow a cutoff rule $\tilde{\theta}(\pi)$: workers with signal θ higher than $\tilde{\theta}$ will be assigned to the complex task and those with signals lower than the cutoff will be assigned to the simple task. Moreover, the cutoff $\tilde{\theta}(\pi)$ is weakly decreasing in π , the fraction of skilled which is weakly decreasing in π , the fraction of skilled workers in that group.

Now we analyze the workers' optimal skill investment decision at STAGE 2, given the firms' sequentially rational behavior in STAGE 4. Suppose that in STAGE 4, the firms follow a cutoff rule at $\tilde{\theta}$. If a worker with cost c decides to invest in skills, his expected payoff will be

$$\left[1 - F_q(\tilde{\theta})\right] \omega - c$$

Figure 2: Benefits to Invest in Skills as a Function of the Cutoff $\tilde{\theta}$

If he does not invest in skills, his expected payoff will be

$$\left[1 - F_u(\tilde{\theta})\right] \omega.$$

Hence a worker with cost c will invest if and only if

$$c \leq B(\tilde{\theta}) \equiv \left[F_u(\tilde{\theta}) - F_q(\tilde{\theta})\right] \omega.$$

This implies that the fraction of workers who rationally invests in skills *given a cutoff* $\tilde{\theta}$ is

$$G(B(\tilde{\theta})) = G\left(\left[F_u(\tilde{\theta}) - F_q(\tilde{\theta})\right] \omega\right). \quad (2)$$

A few observations about the benefit function $B(\cdot)$ is useful. Note that

$$B'(\tilde{\theta}) = \omega \left[f_u(\tilde{\theta}) - f_q(\tilde{\theta})\right]$$

is positive if and only if $l(\tilde{\theta}) < 1$. Hence it is a single peaked function. Moreover, $B(0) = B(1) = 0$. The function $B(\cdot)$ is depicted in Figure 2.

An *equilibrium* of the game is simply $(\tilde{\theta}_j^*, \pi_j^*)$, $j = B, W$ such that for each j ,

$$\begin{aligned} \tilde{\theta}_j^* &= \tilde{\theta}(\pi_j^*) \\ \pi_j^* &= G\left(B(\tilde{\theta}_j^*)\right), \end{aligned}$$

where $\tilde{\theta}(\cdot)$ and $G(B(\cdot))$ are defined by (1) and (2) respectively.

Equivalently, we could redefine the equilibrium of the model as π_j^* , $j = B, W$, that satisfy

$$\pi_j^* = G\left(B\left(\tilde{\theta}(\pi_j^*)\right)\right). \quad (3)$$

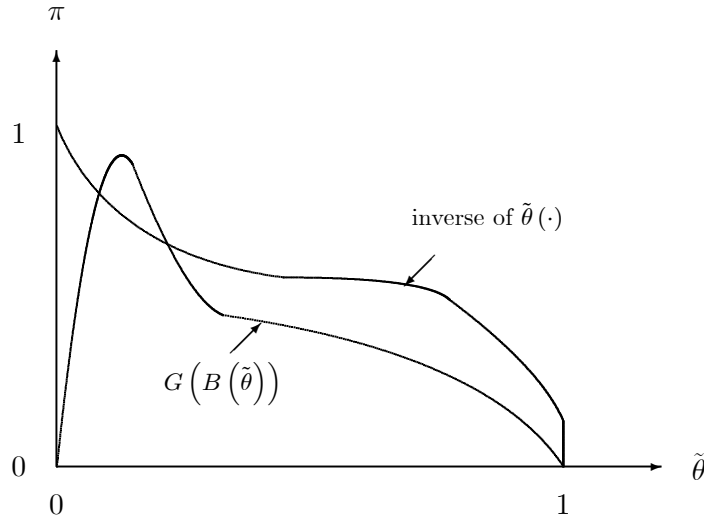


Figure 3: Multiple Equilibria

From the above definition of equilibrium, we see that the only way to rationalize discriminatory outcome for the blacks and whites is when the above equation has multiple solutions. In fact, nothing so far guarantees existence of non-trivial equilibria (equilibria where $\pi_j^* \neq 0$). Coate and Loury then proceed to provide (not too special) circumstances under which the model admits discriminatory equilibria, hence it provides an explanation for discrimination with ex ante identical groups. [See Figure 3.]

Proposition 1 *If there exist $\tilde{\theta}$ such that*

$$G(B(\tilde{\theta})) > \frac{f_u(\tilde{\theta})/f_q(\tilde{\theta})}{x_q/x_u + f_u(\tilde{\theta})/f_q(\tilde{\theta})},$$

then there exist at least two non-zero solutions to Equation (3).

Thus Coate and Loury demonstrate that statistical discrimination is a logically consistent notion in their model.

- Discrimination in this model can be viewed as a coordination failure: Removing discrimination is achieved if somehow blacks and the firms can all be coordinated on the good equilibrium. There is no conflict of interests among the whites and blacks concerning affirmative actions.

- Equilibria are Pareto ranked: The higher the fraction of investors, the higher are the profits to the firms and the higher are the expected net payoff for the workers.

Exercise 1 *Show that equilibria are Pareto ranked in Coate and Loury Model.*

2.3 Discrimination Due to Inter-Group Interactions

2.3.1 Moro and Norman (2001)

Moro and Norman's (2001) paper builds upon Coate and Loury. The main changes are:

- They introduce an aggregate production function

$$y(C, S)$$

where C is the total quantity (measure) of qualified workers who are employed on the complex task, and S is the total quantity of workers on the simple task; Standard neoclassical assumptions are imposed on $y(\cdot, \cdot)$: concavity, strictly increasing in both arguments and constant returns to scale.

- Wages are endogenously determined. Specifically, they assume that firms compete for workers by offering wages schedules as a function of θ , the test signal observed.

Note that a linear production function in the form of $y(C, S) = C + S$ is special case of the model, we can ask what happens to CL's model if only the wages are endogenized. Indeed with a linear production function, endogenizing wages do not change much of CL's results: discriminatory equilibrium may still arise as a result of two groups coordinating on different equilibria.

Once $y(\cdot, \cdot)$ is not linear, however, new insights emerge. In particular, the two groups now interact with each other through the production function, and the wages offered to blacks will depend not only on the firms' belief about the proportion of skilled workers among blacks, but also on the firms' belief about the proportion of skilled workers among whites. This creates externality between the two groups: in particular, they show that as the proportion of skilled workers in group W increases, the incentive to invest in skills among group B workers decrease. It is this inter-group externality that generates discriminatory outcome as a result of *specialization*: for example, the outcome that whites specializes in the

complex task and the blacks in the simple task can be sustained as an equilibrium because of the inter-group externality in the skill investment incentives.

A very nice feature unique to this model is that when affirmative action is imposed, both groups are going to be affected; hence one can naturally rationalize the conflict of interests we see in the debates of affirmative actions. Recall in CL's model, because blacks are treated badly because they are simply in the wrong equilibrium, the whites would not be affected whatsoever if the blacks move to the same equilibrium as the whites. In Moro and Norman, moving to a symmetric equilibrium will lower the whites welfare relative to what they obtains in the asymmetric equilibrium.

2.3.2 Mailath, Samuelson and Shaked (AER, 2000)

Theories of statistical discrimination is based on information friction in the labor: race-dependent hiring policies are followed because race is used as a proxy for information about the workers' skills. Paradoxically, statistical discrimination models do not yield economic discrimination: all workers are paid their marginal product and given skills, color plays no role in explaining wages. Another feature (with the exception of Moro and Norman 2001 above) is that black and white labor markets are not integrated.

MSS instead propose a model of an integrated labor market and focus on search friction instead of information friction.

THE MODEL

- A continuum of firms and workers. Firms and workers' die with Poisson rate δ and they are replaced by identical new firms and workers [cloning]. The total population of both workers and workers are 1;
- Continuous time, with interest rate r ;
- All firms are identical, and workers come with a label, red or green, that has no direct payoff implication. Assume that half of the population has red label;
- Upon entering the market, each worker makes skill acquisition decision. If one acquires skills, he can enter the skilled sector of the economy. **Whether a worker is skilled or not is observed to the firms;**

- Workers differ in the opportunity cost of acquiring skills, $c \geq 0$, and in the population c is distributed according to CDF G ;
- Each firm can hire at most one worker. If a firm employs a skilled worker, regardless of his color, a flow surplus of x is generated; the flow surplus from hiring an unskilled labor is 0;
- **Search Friction:** Vacant firms (firms without employees) and unemployed workers match through searches. [The firm can choose to search both groups, or only one group, not the search intensity itself]
 - Suppose that a firm searches for both colors of workers, and suppose that the proportion of the skilled workers in the population is H_W and the unemployment rate of skilled workers is ρ_W , then the process describing meetings between unemployed skilled workers and the searching firm follows a Poisson process with meeting rate $\lambda_F \rho_W H_W$ where the parameter λ_F captures the intensity of firm search.
 - If instead, the firm searches only green workers with intensity λ_F , then the meeting rate between the firm and the green skilled workers is given by $2\lambda_F \rho_G H_G$;
 - Unemployed skilled workers simultaneously search for vacant firms with intensity λ_W and the meetings generated by workers search follow a Poisson process with rate $\lambda_W \rho_F$ where ρ_F is the vacancy rate of the firms.
- When an unemployed worker and a vacant firm match, they bargain over the wage with one of them randomly drawn to propose a take-it-or-leave-it offer.

Besides the symmetric steady state equilibrium, they are interested in asymmetric steady state equilibrium. Suppose that firms search only for green workers. Hence skilled green workers will earn higher wages than skilled red workers not only because their match rate will be higher, but also because once matched with a firm, the green worker can demand, or will be offered, a higher wage because his continuation utility is higher. Hence the incentive to invest in skills are higher for the green workers. The question is, will firms find it optimal to only search for green workers? The trade-off is as follows: on the one hand, once a firm is matched with a skilled red worker, the wage a skilled red demands is lower, this will

create incentive for searching for red workers; on the other hand, when the red workers' incentive to invest in skills is low, the proportion of skilled red workers will be lower, so the probability of being matched with a red skilled worker if the firm searches also the red workers is low, this creates incentives against searching for red workers. They show that under some conditions asymmetric steady state equilibrium can be sustained.

What are the differences from other papers? In the asymmetric equilibrium of MSS, the skilled red and green workers are equally productive (since their skills are perfectly observable), yet they are offered different wages (which is economic discrimination).

3 Affirmative Actions

3.1 Origins of Affirmative Action

The affirmative action policy developed during the 1960s and 1970s in two phases that embodied conflicting traditions of government regulations:

The first phase, culminating in the Civil Rights Act of 1964 and the Voting Rights Act of 1956, was shaped by the presidency and Congress and emphasized nondiscrimination under a "race-blind Constitution". The second phase, shaped primarily by federal agencies and courts, witnessed a shift toward minority preferences during the Nixon administration. The development of two new agencies created to enforce the Civil Rights Act, the Equal Employment Opportunity Commission under Title VII and the Office of Federal Contract Compliance under Title VI, demonstrates the tensions between the two regulatory traditions and the evolution of federal policy from non-discrimination to minority preferences under the rubric of affirmative action. The results has strengthened the economic and political base of the civil rights coalition while weakening its moral claims in public opinion.

CIVIL RIGHTS ACT OF 1964: The main intensions of Civil Rights Act of 1964 were "the destruction of legal segregation in the South and a sharp acceleration in the drive for equal rights for women". Title VII [known as the Fair Employment Commission Title or FEPC title] of the Act would create the Equal Employment Opportunity Commission (EEOC) to police job discrimination in commerce and industry with the intension to destroy the segregated political economy of the South and enforce nondiscrimination throughout the nation. Title VI of the Act [known as the Contract Compliance Title] "prohibit discrimination in programs receiving funds from federal grants, loans or contracts."

It clearly bans discrimination: “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance.” Contract compliance was backed by the authority to cancel the contracts of failed performers and ban the contractors from future contract work. Specter of bureaucrats telling businesses whom to hire under Title VII was raised during the congressional debates prior to the passage of the Civil Rights Act. Majority Leader of the time Hubert Humphrey promised to eat his hat if the civil rights bill ever led to racial preferences. The Civil Rights Act of 1964 was signed by President Lyndon Johnson into law on 2 July.

AFFIRMATIVE ACTION: It turns out that Title VI of the Civil Rights Act of 1964 was the sleeper than leads to the affirmative action. In September 1965, President Johnson issued Executive Order 11246. This order intended to create new enforcement agencies to implement Title VI in the Civil Rights Act, and it repeated nondiscrimination. The Office of Contract Compliance (OFCC) established by the Labor Department to implement Executive Order 11246. It designed a model of contract compliance based on a metropolitan Philadelphia plan, which requires that building contractors submit “pre-award” hiring schedules listing the number of minorities to be hired, with the ultimate goal to make the proportion of blacks in each trade equal to their proportion of metropolitan Philadelphia’s workforce (30%). This Philadelphia plan was ruled in November 1968 to violate federal contract law. But in 1971 under the Nixon administration, the Supreme Court affirmed that the minority preferences of the Philadelphia did not violate the Civil Rights Act. The EEOC who is in charge of the implementation of Title VII, followed a similar strategy, it issued guidelines to employers to use statistical proportionality in employee testing. In 1972, Congress extended the EEOC’s jurisdiction to state and local governments and education institutions (which were exempt in 1964). Affirmative action is full-blown. Contrary to its original content, Johnson’s Executive Order 11246 became known as the beginning of affirmative action.

The original rationale for affirmative action was to right the historical wrong of institutional racism and stressed its temporary nature. In 1978, in *Regents of the University of California v. Bakke*, Supreme Court Justice Harry Blackmun was apologetic about supporting a government policy of racial exclusion: “I yield to no one in my earnest hope that the time will come when an affirmative action program is unnecessary and is, in truth, only

a relic of the past.” He expressed the hope that it is a stage of transitional inequality and “within a decade at most, American society must and will reach a stage of maturity where acting along this line is no longer necessary”.

3.2 Theoretical Studies of the Effect of Affirmative Action

3.2.1 Coate and Loury’s Patronizing Equilibrium

Coate and Loury model affirmative action an employment quota, requiring that the proportion of blacks on the complex task (which pays a higher wage in their model) be equal to the proportion of blacks in the population. As before, suppose λ is the size of white population. Suppose that the proportion of skilled workers are respectively π_B and π_W among blacks and whites. Then facing the employment quota, the firms’ task assignment problem becomes

$$\begin{aligned}
 & \max_{\{\tilde{\theta}_W, \tilde{\theta}_B\}} \lambda \left\{ \pi_W \left[1 - F_q \left(\tilde{\theta}_W \right) \right] x_q - (1 - \pi_W) \left[1 - F_u \left(\tilde{\theta}_W \right) \right] x_u \right\} + & (4) \\
 & (1 - \lambda) \left\{ \pi_B \left[1 - F_q \left(\tilde{\theta}_B \right) \right] x_q - (1 - \pi_B) \left[1 - F_u \left(\tilde{\theta}_B \right) \right] x_u \right\} \\
 & \text{s.t.} \quad \underbrace{\pi_W \left[1 - F_q \left(\tilde{\theta}_W \right) \right] + (1 - \pi_W) \left[1 - F_u \left(\tilde{\theta}_W \right) \right]}_{\text{probability a random white assigned to the complex task}} \\
 & \quad \underbrace{\pi_B \left[1 - F_q \left(\tilde{\theta}_B \right) \right] + (1 - \pi_B) \left[1 - F_u \left(\tilde{\theta}_B \right) \right]}_{\text{probability of a random black assigned to the complex task}} \\
 & = \quad \pi_B \left[1 - F_q \left(\tilde{\theta}_B \right) \right] + (1 - \pi_B) \left[1 - F_u \left(\tilde{\theta}_B \right) \right]
 \end{aligned}$$

An equilibrium under affirmative action is a pair of beliefs (π_B^*, π_W^*) and cutoffs $(\tilde{\theta}_B^*, \tilde{\theta}_W^*)$ such that:

- $(\tilde{\theta}_B^*, \tilde{\theta}_W^*)$ solves problem (4) given (π_B^*, π_W^*) ;
- $\pi_j^* = G \left(B \left(\tilde{\theta}_j^* \right) \right)$ for $j = B, W$.

CL showed that there are circumstances under which affirmative action removes all discriminatory equilibria. But their conditions are rather difficult to interpret. I think the most important of their analysis is to show that so-called *patronizing equilibrium* may arise as a result of affirmative action. The idea is very simple: to comply with the affirmative action policy (assuming $\pi_B < \pi_W$ is unchanged by the policy for a little while), the standards for blacks must be lowered and the standards for whites must be raised to comply with

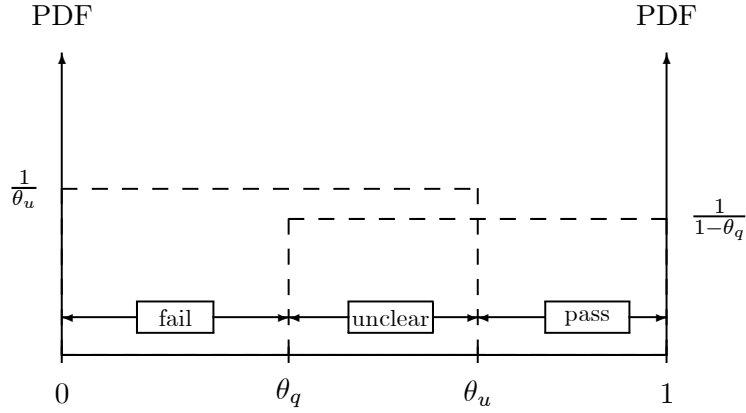


Figure 4: Signal Distributions in the Example of Patronizing Equilibrium

the employment quota. Thus, it is now easier for blacks to be assigned to the good job (harder for whites) irrespective of whether a particular worker invested or not. Since the incentives to invest depend on the expected wage difference if one is skilled versus if one is unskilled, whether the above change will increase or decrease blacks' incentive to invest in skills depends on the particularities of the distributions f_q and f_u .

AN EXAMPLE OF PATRONIZING EQUILIBRIUM:

- Suppose that the skill investment cost c is uniform on $[0, 1]$;
- The test technology is

$$f_q(\theta) = \begin{cases} \frac{1}{1-\theta_q} & \text{if } \theta \in [\theta_q, 1] \\ 0 & \text{otherwise,} \end{cases}$$

$$f_u(\theta) = \begin{cases} \frac{1}{\theta_u} & \text{if } \theta \in [0, \theta_u] \\ 0 & \text{otherwise,} \end{cases}$$

where $\theta_u > \theta_q$. [See Figure 4]

If $\theta > \theta_u$, we say that it is a “pass” score; if $\theta < \theta_q$, we say that it is a “fail” score; otherwise, we say that the score is “unclear”.

Discriminatory Equilibrium. We first analyze the equilibrium of this example with no affirmative action. Clearly the firm will assign workers with “pass” score to the complex task and those with “fail” score to the simple task. The decision to make is regarding those workers with “unclear” scores.

- The probability that a qualified worker gets an “unclear” score is

$$p_q = \frac{\theta_u - \theta_q}{1 - \theta_q}$$

and that for an unqualified worker is

$$p_u = \frac{\theta_u - \theta_q}{\theta_u}$$

- Suppose that the prior that a worker is qualified is π . Then the posterior probability that a worker with an unclear score is qualified is

$$\xi = \frac{\pi p_q}{\pi p_q + (1 - \pi) p_u}.$$

Hence the employer will assign a worker with unclear scores to the complex task if and only if

$$\xi x_q - (1 - \xi) x_u \geq 0 \Leftrightarrow \pi \geq \hat{\pi} = \frac{p_u/p_q}{x_q/x_u + p_u/p_q}.$$

We will say that a firm follows a *liberal* policy for group i if it assigns all group i workers with unclear test score to the complex task, i.e. if $\tilde{\theta} = \theta_q$; we say that a firm follows a *conservative* policy for group i if it assigns all group i workers with unclear test to the simple task, i.e. if $\tilde{\theta} = \theta_u$.

- When can a liberal policy be an equilibrium? Under a liberal policy, the benefit from skill investment is given by

$$B(\theta_q) = \omega(1 - p_u)$$

because if he is skilled, he will be assigned with probability one to the complex task and if he is unskilled, the probability is p_u . Hence the proportion of skilled workers in response to a liberal policy is

$$\pi_l = B(\theta_q) = \omega(1 - p_u).$$

Similarly, under a conservative policy, the benefit of skill investment is

$$B(\theta_u) = \omega(1 - p_q).$$

Hence the proportion of skilled workers in response to a conservative policy is

$$\pi_c = B(\theta_u) = \omega(1 - p_q).$$

Hence the liberal policy is an equilibrium if $\pi_l \geq \hat{\pi}$ and the conservative policy is an equilibrium if $\pi_c < \hat{\pi}$.

- Hence in the absence of AA, if $\pi_c < \hat{\pi} < \pi_l$, then $(\pi_B, \pi_W) = (\pi_c, \pi_l)$ is an equilibrium outcome. In this equilibrium, firms hold a negative stereotype toward blacks.

Affirmative Action: Suppose that we are in such an equilibrium and affirmative action policy in the form of employment quota is imposed. What happens? Compliance with the AA employment quota requires either more B's or less W's be assigned to the complex task. Given $(\pi_B, \pi_W) = (\pi_c, \pi_l)$, if the firm assigns a failing B to complex task, it loses x_u unit of profits; if the firm assigns an unclear W to the simple task, it loses

$$\frac{\pi_l p_q}{\underbrace{\pi_l p_q + (1 - \pi_l) p_u}_{\equiv \xi_l}} x_q - \frac{(1 - \pi_l) p_u}{\pi_l p_q + (1 - \pi_l) p_u} x_u.$$

If $\lambda [\xi_l x_q - (1 - \xi_l) x_u] > (1 - \lambda) x_u$, then the firm would rather put failing B's into the complex task than putting unclear W's to the simple task to satisfy the employment quota.

Suppose that the firms still follow the following assignment policies:

- for the whites, the original liberal policy, i.e. assign all pass or unclear W workers to the complex task. Under this policy, we still have $\pi_W = \pi_l$;
- for the blacks the firms follow the following policy: assign all pass or unclear B workers to the complex task, **and** with probability $\alpha(\pi_B)$ assign failing B workers to the complex task, where $\alpha(\pi_B)$ is chosen to satisfy the employment quota requirement:

$$\begin{aligned} \pi_l + (1 - \pi_l) p_u &= \pi_B + (1 - \pi_B) [p_u + (1 - p_u) \alpha(\pi_B)] \\ \Leftrightarrow \alpha(\pi_B) &= \frac{\pi_l - \pi_B}{1 - \pi_B}. \end{aligned}$$

We say that the firms are “patronizing” the worker if he assigns a failing worker to the complex task. Hence the firms are patronizing the blacks.

Now consider B's best response to the firms' assignment policy described above. Anticipating being patronized with probability α , the return from investing in skills for a B worker is given by

$$\omega - [p_u + (1 - p_u) \alpha] = \omega (1 - \alpha) (1 - p_u) = (1 - \alpha) \pi_l$$

Hence (π_B, π_l) (assuming $\pi_l > 1/2$) can be sustained as an equilibrium under AA if and only if $\pi_B \leq \pi_l$ and π_B satisfies

$$\pi_B = [1 - \alpha(\pi_B)] \pi_l = \frac{(1 - \pi_l) \pi_l}{1 - \pi_B}.$$

This equation has two solutions: $\pi_B = \pi_l$ or $\pi_B = 1 - \pi_l$. In the first solution, color-blind equilibrium (the employer is liberal toward both groups); in the second solution, the firms continue to see B's as less productive and patronize the B's to fulfil the AA mandates.

3.2.2 Moro and Norman (2001)

Moro and Norman introduced affirmative action (in the form of employment quota as in CL) into their specialization-driven model of statistical discrimination. Because of the inherent interaction between these groups, affirmative action has redistributive consequences (which differs from the effect of affirmative action in CL, in which redistribution between the groups is absent: either blacks are made better off, or the whites are made worse off, but not at the same time.) Because in their model wages are endogenous, they can also study the effect of affirmative action on wages.

In an admittedly styled model, they demonstrate the possibility that affirmative action may increase the inequality between groups. The rough intuition is as follows: the partial equilibrium effect of affirmative action (assuming that affirmative action does not affect the proportion of skilled workers in the population) typically is to reduce the wage in the unskilled job for the discriminated group and increase the wage in the unskilled job for the other group. Changes in investment behavior tend to mitigate the partial equilibrium effects, but nothing guarantees that the responses in terms of changes in human capital investments are large enough to reverse the initial effect.

The message from Moro and Norman is similar to Coate and Loury: we need to worry about possible perverse effects of incentives of affirmative actions, as well as possible unintended consequences to the intended beneficiaries.

3.2.3 Fang and Norman (2001)

We are motivated by the deteriorating (i.e. increasing) Chinese/Malay income inequality in Malaysia despite the fact that wide-ranging preferential policies are granted to the ethnic Malays under the New Economic Policy from 1970. Why the preferentially treated Malays did not catch up the Chinese, but instead falls further behind? We make the following assumptions:

- There are two sectors, a private sector and a government sector;

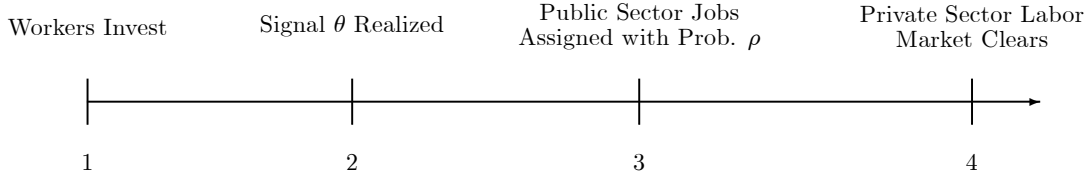


Figure 5: Timing of The Events.

- The private sector is competitive. The technology in the private sector is that a skilled worker can produce β units of output and an unskilled worker can produce 0;
- The public sector offers a fixed wage g to any worker who is hired, but there is rationing of public sector jobs: if applying, the probability of getting hired is $\rho \in [0, 1]$, where ρ is treated as exogenous in our analysis. Workers who apply for but are unsuccessful in obtaining public sector employment can return to and obtain a job in the private sector without waiting.
- A continuum of workers with unit mass in the economy and they have heterogeneous skill investment costs c , distributed in the population according to a continuous cumulative distribution $J(\cdot)$ with support $[\underline{c}, \bar{c}]$.

TIMING:

1. In the first stage, each worker $c \in [\underline{c}, \bar{c}]$ decides whether to invest in the skills. This binary decision is denoted by $s \in \{0, 1\}$ where $s = 0$ stands for no skill investment and $s = 1$ for skill acquisition. If a worker chooses $s = 1$. Skill acquisitions are *not* perfectly observed by the firms.
2. In the second stage, the worker and the firms observe a noisy signal $\theta \in \{h, l\} \equiv \Theta$ about the worker's skill acquisition decision. We assume:

$$\Pr[\theta = h|s = 1] = \Pr[\theta = l|s = 0] = p > 1/2.$$

3. In the third stage, after observing the noisy signal θ , the worker decides whether to apply for the public sector job. If applying, she is accepted for employment in the public sector with probability ρ .

4. If she did not get employed in the public sector, she will, in the fourth stage, return to the private sector, where firms compete for her services by posting wage offers $w_i : \Theta \rightarrow \mathbb{R}_+$. After observing the wage offers, she decides which firm to work for, clearing the private sector labor market.

To make things interesting, we let the wage in the public sector g to be larger than any wage in the private sector, that is, the public sector jobs are good paying jobs. We think this is probably a reason for the government to reserve the public sector jobs to local majorities. We interpret the affirmative action (in the case of Malaysia, government-mandated discrimination) as follows: the government set $\rho = 0$ for the Chinese and $\rho > 0$ for the Malays. We investigate the general equilibrium effect of ρ , a policy imposed on the hiring in the public sector, on the incentives to invest in skills that are useful in the private sector, and in particular, we ask whether it is possible that the Malays may actually be made worse off, on average, by the preferential policy.

We show that giving a group preferential access to high paying public sector jobs dampens the incentives for skill investment valuable in the private sector. If the informational free riding problem in the private labor is sufficiently severe, it is possible that the adverse indirect effect due to the exacerbated informational free riding may dominate the favorable direct effects. The punch line is that affirmative action policy in the form of giving preferential treatments

3.3 Evaluation of the Effects of Affirmative Action

3.3.1 Donohue and Heckman (1991)

Donohue and Heckman (1991) provide a broad overview of the impacts of Civil Rights policy on the economic status of blacks. There are some important difficulties in assessing the effects of a government policy: first, the most intractable difficulty in assessing the impact of any law is to distinguish the effects of government intervention from those stemming from changes in the underlying attitudes that led to the passage of the legislation in the first place; second, specific to federal intervention such as the Civil Rights Act and affirmative action, the law is applied uniformly in all states, and thus one can not exploit cross-state variations in legislations. [This is in contrast to welfare reform, for example, where there are lots of cross-state variations that can be exploited.]

To partially solve the first difficult, Donohue and Heckman focus on the comparison of the economic progress of the blacks in the South and in the other regions in the U.S. They reason as follows: by noting that black relative improvement was most rapid in the South, they can counter the argument that the laws themselves were mere manifestation of preexisting social changes. Federal activity was imposed on the South and had its greatest apparent effect in the region that resisted it the most.

To partially solve the second difficulty, Donohue and Heckman focus on cross-time variation, in particular, the black economic progress in pre-1964 era and that after 1965.

Their main findings on males are as follows

- There is an upward jump in the time series of black earnings and wages beginning in the mid-1960s;
- The South was the region of the greatest black economic advance in the period 1960-1970, accounting for at least two-thirds of the increase in black economic status over the decade;
- There is evidence of substantial desegregation of firms in the South during 1965-1970 period;
- The black economic progress following the passage of Title VII coincided with a sharp drop in the outflow of blacks from the South and even led to black migration into that region between 1970 and 1980.
- During the seventy-year period from 1920-1990, there are two periods of rapid relative black progress - the period of rebound from the Great Depression brought on by the World War II and the 1965-1975 period;
- Regarding the mechanism underlying the episodic improvement of black economic status in the 1965-1975 period:
 - Black migration contributed little and relative increases in the *quantity* of black education contributed modestly to black progress after 1965;
 - The main cause of the observed black relative economic gains during this period are relative black increases in the returns to education. The reason for the increase in the returns to education could either be relative improvements in

schooling quality for the blacks, or changes in the demand for black labor induced by declining racial discrimination, government civil rights policy, or tight labor markets. There is no consensus as to what caused the increase in the blacks' returns to education.

3.3.2 Moro (2001)

Moro (2001) wants to ask the following question: after 1964, the relative economic status of blacks have improved substantially. Was the improvement of the black economic status is a result of the blacks being coordinated on a less discriminatory equilibrium due to the Civil Rights policies?

To this end, Moro estimated a structural model of labor market discrimination for different points in time after 1964 (namely, 1965, 1980, 1995). His structural model is an extension of Moro and Norman's theoretical model allowing for ability heterogeneity. With the estimates of the structural parameters, Moro numerically solves for the other equilibria that can be admitted under these parameter estimates, and ask what equilibrium corresponds to the actual outcome? Is it the least discriminatory, or most discriminatory, or anything in the middle? In particular, has there been change in the severity of discrimination in the selected equilibrium in the three points in time?

He finds that it has always been the equilibrium with the least wage inequality that have been selected whenever estimated parameters are consistent with multiple equilibria. He then concludes that self-fulfilling expectations did not exacerbate wage differentials in the U.S. and that the decline in wage inequalities experienced in the U.S. economy can not be attributed to changes in equilibrium selection, but rather changes in fundamentals of the economy is responsible.

4 Empirical Studies of Discrimination

4.1 Traditional Regression Analysis and Its Problems

See for example, the Boston Fed study: "Mortgage Lending in Boston: Interpreting HMDA Data", by Alicia Munnell, Geoffrey Tootell, Lynn Browne and James McEneaney, AER March 1996.

4.2 Market Test: Becker (1993)

Gary Becker, in a op-ed piece for *Business Week* in 1993 criticizes the Fed-Boston study on mortgage discrimination against black and Hispanic applicants by banks. The Fed-Boston study examine whether rates of denial to minority applicants for mortgage exceed those to whites with similar income, credit histories, and various other characteristics. They found that after controlling for these observable characteristics, black and Hispanic applicants are more likely denied mortgage. Becker argued that omitted variables, such as record indicating chronic late payments, could very well explain the differences in lending rates between groups.

Becker seems to view discrimination only those motivated by racial animus:

“An employer discriminates when he refuses to hire applicants from a group even though they would produce more profit than those who are hired. Employees discriminate if they refuse to work alongside members of a group even though they can earn more by doing that. The corollary here is that if a company chooses not to hire members of a group, *its decisions may not be discriminatory if hiring others who are cheaper or more productive results in more profits.*”

He then proposed an approach to detect if there is racial animus (or taste baste discrimination) in bank lending:

“If banks do discriminated against blacks and other groups, they would impose stricter standards on loan to them than to whites with truly comparable credit backgrounds. The banks would be willing to finance only the most profitable of African-American applications. Were that the case, the mortgage loans approved for minority applications should be more profitable than loans to whites, not less profitable or even equally profitable.”

He then suggests that we look at the **average** default rates of accepted loans for blacks, Hispanics and whites. If the average default rate for the blacks are smaller than for the whites, then it is a market outcome indication of discrimination against the blacks: the banks are imposing a higher standard on the blacks than that on the whites.

CRITIQUE: There is no doubt that Becker raised a very creative way of detecting discrimination by looking at the market outcomes. However, his suggestion of looking at

the **average** default rates is not consistent with theory and will lead to mistaken conclusions. To see this point, we suppose that the distribution of default probabilities among the blacks and whites are respectively given by $G_B(b)$ and $G_W(b)$. If a bank loans a dollar to a white borrower and if he does not default, the bank receives $(1+r)$, while if he defaults, the bank gets zero. Suppose that the bank has a racial animus against black borrowers valued at $0 \leq t \leq r$. Suppose that the bank observes the default probability of borrowers perfectly. Then the bank will lend the dollar to whites if

$$(1+r)(1-b) \geq 1 \Leftrightarrow b \leq b_W^* = \frac{r}{1+r},$$

and it will lend to the blacks if

$$(1+r)(1-b) - t \geq 1 \Leftrightarrow b \leq b_B^* = 1 - \frac{1+t}{1+r}.$$

Clearly, if $t > 0$, then $b_W^* > b_B^*$. That is, the *marginal* white that is granted the loan will have a higher default probability if the bank discriminates against blacks. What about the average default rates among the whites and blacks who are granted the loan? The average default rate among the white and black borrowers (who obtain loans) are respectively

$$\bar{b}_W = \frac{\int_0^{b_W^*} b dG_W(b)}{G_W(b_W^*)},$$

$$\bar{b}_B = \frac{\int_0^{b_B^*} b dG_B(b)}{G_B(b_B^*)}.$$

If $G_B(b) \neq G_W(b)$, then $\bar{b}_W > \bar{b}_B$ does not follow from $b_W^* > b_B^*$. To see this, consider the simplest example, let the distribution of blacks' default rates be

2%	4%	5%	$\geq 10\%$
0.1	0.3	0.2	0.4

and the distribution of whites' default rates be

2%	4%	5%	$\geq 10\%$
0.3	0.1	0.2	0.4

Suppose that the threshold default rates banks use in granting loans are 4% for blacks and 5% for whites [so in the margin the banks are discriminating against the whites]. But

if we calculate the average default rates among the black and white borrowers, we will find that

$$\bar{b}_B = 3.5\%, \bar{b}_W = 3.33\%.$$

Hence we find that on average the default rates is lower among the white borrowers, which will lead to a clearly misleading conclusion that the whites are being discriminated!

To summarize: Economic theory suggests that if employers, or banks, have racial animus against a minority group, then the *marginal minority worker, or borrower, should perform better than the marginal majority worker, or borrower.*

The paper by Smart and Waldfogel (1996) asked the question whether there is discrimination against articles written by minority researchers by comparing the citation rates for articles written by minorities and by whites. It suffers from the problem we identify here. Most of the literature growing out of Becker's suggestion has largely focused on comparing average outcome, which, as we argued, is wrong. It is indeed quite difficult to identify the marginal borrowers, or marginal employees, etc. Fang and Hu (in progress) attempt to identify the marginal borrowers using the mortgage application scores and the mortgage company's internal thresholds in the scores. We try to investigate if the scoring system that this large mortgage company is possibly discriminatory.

Ayres and Waldfogel (1994) Ayres and Waldfogel (1994) applied the idea of outcome test to investigate if judges are biased against black defendants in their bail amount setting.

In Connecticut, when police arrest a defendant, they must either release him/her on a written promise to appear in court, or set a money bail amount. If they set monetary bail, the defendant may arrange terms with a bail bond dealer (or arrange the money by himself). Professional bond dealers are essentially selling "flight insurance". If they agree to write a bond for a defendant, they promise to pay the state the bail amount in the event the defendant fails to appear in court. Bond dealers do not post any money in advance to the court. But the court specifies a forfeiture rate which is the fraction of bond that the bond dealer has to forfeit to the court if the defendant fails to appear. The bond dealer charges the defendant a bond rate which is the fraction of non-refundable fees over the bond amount. There is a report by Hartford Courant that bail amounts for black defendants were, on average, more than 70 percent higher than for white defendants. Are the judges racially biased against black defendants?

Different from the mortgage market, the bail bond context has a nondichotomous, non-censoring decision variable and under the null hypothesis the court's goal is to equalize the probability of flight across all defendants. The judge's ability to individually vary the bail among in a sense makes every defendants marginal and thus avoids the inframarginal problem that has plagued the application of outcome tests to the mortgage context. One may directly apply Becker's idea to compare the probability of flee for black defendants and white defendants in detecting if there is racial discrimination. But the defendant flight information is hard to get.

The novelty of Ayres and Waldfoegel paper is to look at the bond rates charged by bond dealers to defendants as a measure of the flight risk perceived by the competitive market. They provide some evidence that the New Haven bail bond market they study is competitive. The model is simple. Let R be the total non-refundable fees charged by the bond dealer, p be the flight probability, f be the forfeiture rate, B be the bail amount set by the state and C be the collateral requirement set by the bond dealer. Assuming $C = \alpha B$, i.e. a collateral proportional to the bond amount is required. Then competitive bail bond market requires zero profit, i.e.

$$\begin{aligned} R - p(fB - \alpha B) &= R - pB(f - \alpha) \\ \iff r \equiv \frac{R}{B} &= p(f - \alpha) \end{aligned}$$

where r is the bond rate.

Their empirical finding is that bail setting produces lower probabilities of flight among minorities, which is inconsistent with the statutory mandate that bail be set to limit flight probability to a constant maximum level for all bailees.

Knowles, Persico and Todd (2001) Knowles, Persico and Todd (2001) applied the idea of outcome test to investigate if there is taste based discrimination against minorities in highway police searches. The novelty of this paper is that they propose a model in which motorists react to the polices' potential racially biased search behavior and show that in equilibrium the probability that a marginal driver carries contraband are the same as that of an average driver.

THE MODEL

- $r \in \{A, W\}$: race of the motorist, observable by the police officer;

- c : all characteristics other than race that are potentially used by the officer in the decision to search cars; researcher may or may not observe c ; c is distributed in the population according to $F(c|W)$ and $F(c|A)$.
- A motorist of characteristic (c, r) chooses to whether to carry a contraband or not. The payoff is $v(c, r)$ if not searched by a police; and $-j(c, r)$ if searched;
- Police officers decide whether to search motorists to maximize the total number of convictions minus a search cost. Normalize the benefit of each arrest to one, and let the cost of searching a white driver be t_W and that of searching a black driver be t_A .
- Hence the game between a driver of characteristic (c, r) and the police is a “matching penny” game:

	carry drug	not carry drug
search	$1 - t_r, -j(c, r)$	$-t_r, 0$
not search	$0, v(c, r)$	$0, 0$

- The equilibrium is in mixed strategies: a driver of characteristics (c, r) carries drug with probability

$$P^*(G|c, r) = t_r$$

and the police searches the motorist with probability

$$\gamma^*(c, r) = \frac{v(c, r)}{v(c, r) + j(c, r)}.$$

- This gives them the following test for prejudice: for race r , conditional on being searched, the average probability of a driver being guilty is given by

$$D(r) = \int P^*(G|c, r) \frac{\gamma^*(c, r) f(c|r)}{\int \gamma^*(s, r) f(s|r) ds} dc = t_r.$$

Hence if there is no racial prejudice, i.e. if $t_A = t_W = t$, then

$$D(W) = D(A) = t.$$

Nice feature of this test is that the researcher is not required to know the other characteristics c in applying this test.

EMPIRICAL FINDINGS: They applied the above test to a data set collected by Maryland state troopers on Interstate 95. They use a Pearson's χ^2 test to see $D(W) = D(A)$ holds. They find that the hypothesis that $D(W) = D(A)$ is not rejected, indicating no taste-driven racial profiling. But when they test whether the probabilities of being guilty conditional on being searched are equal for all racial and ethnic groups, the null hypothesis is rejected, in fact they find prejudice against the Hispanics: the Hispanics have lower guilty rates than Blacks and Whites.

COMMENTS: This is a nice attempt to have a model in which the marginal driver is the same as an average driver. The role played by the police is really deterrence: they search blacks more simply because blacks have a higher propensity to carry drugs if they are not searched more.

The main problems are:

- In practice, some of the characteristics that police officers use to decide whether to search or not is endogenous, for example, a driver is more likely to be nervous when being stopped if he/she carries contraband. [This suggests a model along the lines in the labor market discrimination literature.]
- Are the police force monolithic? The national spotlight on racial profiling is largely due to the exposure of white policemen searching black drivers. Is it possible, since the authors did not control for the race of the police, that black officers and white officers have reverse prejudice and in the aggregate they cancel out?
- What about fairness? Should the police officer also be concerned about the cost imposed on innocent drivers when they are searched?

4.3 Audit Method and Its Problems

Main reference here is Heckman and Siegelman. The major criticism against regression analysis of the differential treatments of agents controlling for observable characteristics is the omitted variable bias. Audits were suppose to present evidence that two individuals, identical as much as possible, except for race and/or gender, are disparately treated.

One of the advantage of audit method over regression analysis is that in audits, because the audit pairs are chosen by the investigators, more characteristics can be controlled for than what can be achieved in typical data sets; the second advantage of audit method is

that it allows social scientists to study behavior of employers, or landlords that are not necessarily reflected in the market outcome. For example, all regression analysis examines only the employment segregation and wage differentials, and could not explicitly consider the *hiring process*: for example, is interviewed granted? Are different questions asked during the interview? What is the rationale for not making an offer?

Audits were originally employed by legal activities, who pioneered their use in the enforcement of fair-housing laws during the late 1960s. The audit procedure can be divided into two parts:

1. First is the selection and training of auditors. Groups of two individuals, one white and one black, are selected from a group of applicants to resemble each other as closely as possible except for race. The auditors are also called testers. Testers are typically matched on such attributes as age, education, physical appearance (subjective level of attractiveness), physical strength, and level of verbal skills, as deemed relevant. The goal is to produce pairs of testers who are identical in all relevant characteristics so that any systematic difference in treatment within each pair can be attributed only to the effect of race.
2. In addition to their outward similarities, testers are given training about how they are supposed to behave during the course of the audits. Such training typically includes developing synthetic biographies (current and past employment, references, education, and so on), behavioral alignment (e.g., level of aggressiveness and overall presentation of self) and experience in role-playing, simulating the kind of transaction being audited.

Heckman and Siegelman's Critique of Audit Method:

- The implicit assumption is that audit pair analysts know which characteristics are relevant to employers, and when such characteristics are “sufficiently” close to make majority and minority audit pair members “indistinguishable”. Audit pair members must be matched on each of the relevant characteristics. This assumption may be more valid for the housing market than the labor market. But in the labor market, the current factual knowledge about which characteristics employer value and how attributes trade off in productive content is quite low and moreover, it is likely that

there is heterogeneity among employers in making these assessments. Hence it is not obvious that audit analysis would possess the relevant information required to make perfect matches. **There is a presumption of knowledge about “what is really important” that is difficult to demonstrate objectively. This inability to defend, or even fully enunciate, the criteria used to match audit pair members constitutes the Achilles heel of the audit pair methodology.**

- It is quite expensive to conduct large scale audits, moreover, the pool of potential match partners is small. This, coupled with the likely large number of relevant productivity attributes, makes the probability of successful matches rather low. For example, suppose that investigators want to conduct an audit study in Washington DC. Suppose that 10 potential white match partners for 10 potential black partners (who responded to the ad for such a study). Suppose that there are five productivity attributes that describe each worker, each independently distributed as binomial with probability one half for each value of each attribute (the case of discrete attributes is most favorable to matching), and suppose that black and white distributions are identical. Then the number of expected successful matches is less than 2.7. If the number of relevant attributes is increased to 10, the expected number of successful matches is less than 0.1.

4.3.1 Ayres and Siegelman (1995) versus Goldberg (1996)

Ayres and Siegelman (1995) conducted the first audit study of race and gender discrimination in new car dealerships in the Chicago area. Their study is influential enough that it is copied by NBC in its Dateline hidden camera audit study of disparate treatments in shopping received by similarly situated blacks and whites. In the pilot study and subsequent larger study, they employed more than more hundred independent negotiations at more than two hundred dealerships in 1990 to examine how dealerships bargain over the price of a new car. Testers of different races and genders entered new car dealerships separately and bargained to buy similar new cars, using a *uniform* negotiation strategy that were taught in the training session. The focus of the study was whether automobile retailers would react differently to this uniform strategy when potential buyers differed only by gender or race.

The characteristics that Ayres and Siegelman controlled for to achieve their “uniform bargaining” include the following:

- Age: all testers were twenty-four to twenty-eight years old;
- Education: All testers had three or four years of college education;
- Dress: All testers were dressed similarly during the negotiations. Testers wore casual sportswear.
- Transportation: All testers drove to the dealerships in similar used rental cars of the same model and year. Using similar modes of transportation prevented the dealers from making inferences based on the kind of car the tester drove or the way the tester reached the dealership;
- Economic class: Testers volunteered that they could finance the car themselves;
- Occupation: If asked by a salesperson, each tester said that he or she was a young urban professional (for example, a systems analyst for First Chicago Bank);
- Address: If asked by the salesperson, each tester gave a fake name and an address in an upper-class, Chicago neighborhood;
- Attractiveness: Applicants were subjectively ranked for average attractiveness.

In the training session, each tester was given a script of how to negotiate, and then mock negotiation sessions were conducted to make sure of the testers' spoken as well as non-verbal behavior uniformity.

Ayres and Siegelman study revealed systematic disparate treatment. Dealerships offered white males significantly lower prices than blacks and women. The average prices offered white women were more than \$200 higher than the offers to white men, the offers to black women were more than \$400 higher than those to white men, and the offers to black men were more than \$900 higher. And these differences are statistically significant. Their audits uncovered very little evidence of outright refusals to bargain and no evidence that dealerships were less likely to bargain with non-white male testers. [**Note, however, Ayres and Siegelman do not establish that the disparate treatment is due to animus (or taste).**]

How should we understand Ayres and Siegelman findings? Does the disparate treatment found in the audit study of dealership offers provide much evidence of the *economic injury*

born by blacks who in equilibrium might in a variety of ways mitigate its impact? Heckman claims that:

“[Audit evidence of disparate racial treatment] is entirely consistent with little or no market discrimination at the margin. Purposive sorting within markets eliminates the worse form of discrimination. There may be evil lurking in the hearts of firms that is never manifest in consummated market transactions.”

Heckman’s claim relies on the existence of dealerships with varying degrees of racial treatment differences. But in Ayres and Siegelman’s audit, testers in the controlled experiment visit various dealerships in the Chicago area, some of which are located in poorer areas or in black neighborhoods, yet there is no evidence of any difference in the treatment minorities receive in such locations.

But in actual bargaining, blacks and whites may use a different bargaining strategy that differs from the strategy that was imposed to the testers. It is then important to know whether blacks pay more in actual consummated transactions. Goldberg (1996) conducted such an analysis using Consumer Expenditure Survey (CES) of approximately 1300 new car purchases drawn randomly from the nation. [The CES data set is created by the Bureau of Labor Statistics to compute the Consumer Price Index.] For years 1983-1987, Goldberg created a data set of approximately 1300 reliable new car purchases. She constructed a measure of the discount from the dealer’s sticker price (from Automobile News Market Data Book) and regressed this variable on a host of consumer characteristics including race and gender. She found that variables referring to race and sex have no explanatory power: the hypothesis that whites and blacks, or men and women, receive the same discounts cannot be rejected at any reasonable significance level.

Reconciling The Differences Between AS and Goldberg: Leave it to you.

5 Discussions

Is the market discrimination in the labor market still the main obstacle for black’s improvement in their economic status? This is the question that we have to ask more than 20 years after the enactment affirmative actions policies. Answers to this question may lead to better policies to help the minorities.

Neal and Johnson (JPE 1996) use NLSY data to run the following simple regression: log wage regressed on a score from a test administered as teenagers (18 or younger) prepared to leave high school and embark on work careers or postsecondary education, and race, gender. What they found is that this one test score explains all of the black-white wage gap for young women and much of the gap for young men. From this, they conclude that for today's young adults, the black-white wage gap primarily reflects a skill gap, which in turn they trace, at least in part, to observable differences in the family backgrounds and school environments of black and white children.

Neal and Johnson's approach differs significantly from earlier attempts to measure the labor market discrimination, which run wage regression controlling for education, experience etc. Neal and Johnson's criticism of the earlier approach is that education, experience, career choices etc. in these earlier regressions are endogenous and themselves could be affected by market discrimination.

Keane and Wolpin (Careers Choices of Young Men 1996) also found in a structural model that most of the variation in the wages can only be explained by unobserved heterogeneities at age 14.

Neither of the studies in any way imply that genetic differences are the reason for racial wage inequality. Instead, they seem to point out that the obstacles blacks face have changed from market discrimination to the obstacles in productivity skill acquisition for the children. Government policies to help the blacks can be more effective if they are directed to improving blacks' primary, and secondary education, improving the social norms in black neighborhoods, etc..

What is your view on this issue?