



Statistical discrimination from composition effects in the market for low-skilled workers



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HIGHLIGHTS

- A simple model of statistical discrimination is provided.
- Discriminatory outcomes are driven by composition effects alone.
- Model is calibrated to the US market for high school drop-outs.
- Composition effects alone can generate observed outcomes.

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ABSTRACT

In a random search environment with two racial groups each composed of identical numbers of high and low productivity workers, firms use an imperfect screening device (interviews) to control hiring. If inconclusive interviews lead firms to hire majority workers but not minority workers, then the unemployment pool for majority workers is of higher average quality. This can justify the initial hiring choices. Color-blind hiring always eliminates racial disparities but is not necessarily beneficial; in the USA it would improve welfare with only a brief small increase in white unemployment.

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1. Introduction

The unemployment rate among white Americans without a high school diploma has historically been around half of that among similarly educated blacks. And, all of the disparity stems from differences in their matching (rather than separation) rates. This paper shows how such an outcome can arise in a search and matching environment with imperfect screening of workers by prospective employers. Essentially, when firms apply a stricter standard to minority applicants than those from the majority group, fewer low ability minority workers get hired. This makes the average quality of the minority unemployment pool worse than that of the majority. Firms will use the average quality of the pool as a prior as to their applicants' productivity. Imperfect screening means that even after the interview the prior has an effect on the firm's beliefs about the worker's productivity. This justifies the stricter

standard being applied to minority workers and leads to worse employment outcomes for that group. The model will be calibrated to data from the USA in order to assess its empirical validity and to address policy implications.

Holzer and LaLonde (2000) analyze worker flows in the low-skilled labor market in the USA using the National Longitudinal Survey of Youth, 1979 cohort (NLSY79). They find that after controlling for observable characteristics whites get jobs much faster than blacks yet their separation rates are not statistically different from each other. Meanwhile Bowlus and Seitz, (2000) structurally estimate a variant of the Burdett and Mortensen (1998) model for the USA using the Panel Study of Income Dynamics (PSID). They find that the matching rate for unemployed blacks is much slower than for unemployed whites. To explain measured differences in wages they conclude that there needs to be significant differences in skill levels.¹ The point of their findings for the current paper is that race explains matching and skills explain wages. The subsequent analysis abstracts from differences in

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¹ This paper will adopt throughout the convention that skill level is observable to the econometrician while productivity is not.

skill levels to focus on a particular mechanism by which race can affect matching rates.

The continuous time search and matching environment comprises people in two racial groups with similar (low) skills and the same ex ante mix of individual productivities. Each worker's true productivity is his private information. I make a fundamental assumption that makes the environment relevant for the low-skilled workforce: firms do not know the worker's employment history. If firms could observe how long a worker has been looking for a job it would provide a clearer view as to the probability that the worker is high productivity. Low-skilled workers, however, move frequently in and out of the workforce (see [Holzer and LaLonde, 2000](#); [Krusell et al., 2011](#)) so that even if a firm could find out how long a worker has been jobless, it would not be a strong indicator of how much time he has spent actually looking for work. The idea here is that each firm uses the composition of the whole unemployment pool of the appropriate racial group for its prior as to an applicant's likelihood of being high productivity.

Controlled by a free-entry condition, firms in the model create as many individual vacancies as they like. Unemployed workers encounter the vacancies according to a constant returns to scale matching function. To keep the environment simple, I assume a two point productivity distribution which represents the extreme values of the range of worker productivities who will be in the market. Employed high productivity workers produce more than their non-market output while employed low productivity workers' output is equal to that of their non-market activity. The firm incurs a cost for any worker hired that reflects specific training, administrative and equipment expenditures. Because of this, ex ante gains from trade with low productivity workers are negative. The way to view this is that markets are segmented by skill levels and the model considers the market for one particular skill level. The heterogeneity in productivity here comes from the residual variance in worker output after controlling for skills.

When they meet, the firm interviews the worker. If the worker is revealed to be of high productivity or if the interview is inconclusive but the unemployment pool is of high enough quality, the worker is hired. In the latter case there remains some asymmetry of information. Wage formation is, assumed to be by take-it-or-leave-it offer from the firm.² All workers then get a wage equal to the value of their non-market activities.³ Once hired, the firm has no incentive to get rid of the worker.

Simulations are provided to illustrate the workings of the model, to draw out further results beyond those that emerge from the algebra, and to explore policy implications. Parameters are chosen to generate outcomes for black and white over 25 year old high school dropouts in the USA. The presumption is that, due initially to historical factors, the unemployment pools across racial groups are sufficiently different that inconclusive interviews mean white workers get hired while black workers do not. In the Minority Disadvantaged equilibrium of the model, these choices are rational. The fact that some low productivity white workers have been taken out of their unemployment pool means that firms hiring applicants with inconclusive interviews can expect to recoup the hiring costs. Meanwhile, as all of the low productivity black workers remain in their unemployment pool, firms hiring black applicants with inconclusive interviews cannot expect to recoup the hiring costs.

There are three other possible types of equilibrium of the model. There are two types of nondiscriminatory equilibria. In the first, the "Lenient" equilibrium, all workers with inconclusive interviews are hired. In the second, the "Strict" equilibrium no workers with

inconclusive interviews are hired. The third alternative equilibrium is the "Majority Disadvantaged" equilibrium in which the numerically larger group (i.e. whites) are the ones for whom an inconclusive interview means they do not get hired.

At the parameter values used here, the Strict and Majority Disadvantaged equilibria do not exist. Thus the model provides an environment which can help to explain why we typically observe that the numerically smaller group is disadvantaged. When the larger group are disadvantaged, discriminatory hiring has a stronger impact on unemployment. Vacancies are contacted by applicants more frequently which tends to make the firms pickier. But, if the workers to whom they are lenient are sufficiently rare, firms are more inclined to accept workers with inconclusive interviews.

Two criteria for considering the efficacy of policy are considered: welfare and unemployment. As workers are risk neutral, welfare in the model amounts to aggregate benefits minus aggregate costs. The Lenient equilibrium has higher welfare and lower unemployment for both racial groups than the Minority Disadvantaged equilibrium. Corrective policy in this environment amounts to making sure that firms use color-blind hiring. At the preferred parameter values this sets the economy on a track to the Lenient equilibrium. A potential drawback from this policy is that on impact it reduces vacancy creation and, in the short-term, white unemployment will rise. This could generate political opposition to the measure. However, [Fig. 1](#) below shows that the predicted rise is barely perceptible and lasts for no longer than 6 weeks. Convergence to the new steady state takes about 30 months. [Coate and Loury \(1993\)](#) question the implementability of color-blind hiring. They suggest that outcome-based policies are more feasible. Further discussion of this issue is found in [Section 4.4](#).

2. Literature

As the focus of this paper on composition effects that come from hiring decisions, the appropriate modeling environment is one in which the composition of the unemployment pool is endogenous. The search and matching framework is readily adapted for this task and there exists a small literature on its use in understanding discrimination.

[Sattinger \(1998\)](#) provides a model in which different races (or genders) have different ex ante mixes of workers with high and low quit rates. A worker's quit rate is his private information. Statistical discrimination occurs because firms use race as a proxy for quit rates and allow it to influence their hiring strategies. However, different treatment by employers follows entirely from the ex ante difference between races. In the current paper racial groups are ex ante identical.

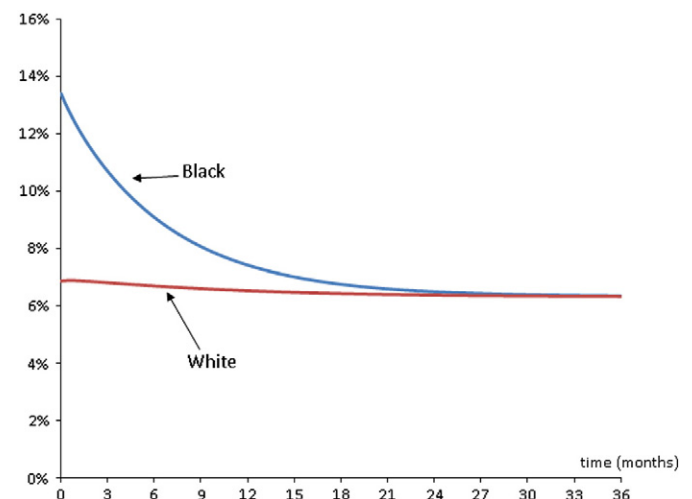


Fig. 1. Predicted transition paths of unemployment rates for black and white high school drop-outs under color-blind hiring.

² Giving workers some opportunity to make wage offers (as in [Mailath et al., 2000](#)) leads to a signaling game that has a continuum of equilibria. No standard refinement can help in this matter (see [Masters, 2009](#)).

³ Although this mechanism for wage formation is made for tractability purposes, it should be clear that, given the narrow range of productivities within the market, the range of possible wages coming from any other mechanisms will be narrow too.

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