E C O N O M I C S  B U L L E T I N

# An alternative to statistical discrimination theory

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## *Abstract*

This paper offers a new representation of discrimination on the job market based on the most recent findings in the socio-psychological academic literature about human behaviour. Put it simply, it is assumed that the agents prefer working with people like themselves. This "affinity" principle is modelled through a distance between an individual (the candidate for a job) and the staff of the firm. Contrary to the classical view according to which discrimination results from asymmetric information, this new model provides a rationale for the presence of discriminative attitudes on the job market even when full information is available on the skill levels of all candidates for a working position.

I thank Pierre-Guillaume Méon and Kim Oosterlinck for helpful comments.
**Citation:** Szafarz, Ariane, (2008) "An alternative to statistical discrimination theory." *Economics Bulletin*, Vol. 10, No. 5 pp. 1-6
**Submitted:** February 21, 2008. **Accepted:** April 20, 2008.
**URL:** http://economicsbulletin.vanderbilt.edu/2008/volume10/EB-08J70001A.pdf

## 1. Introduction

Discriminations on the job market arise when hiring preferences depend on characteristics unrelated to professional skills (gender, colour, ethnicity, names[1], etc.). As the possibility that economic agents make irrational choices based on racism, sexism, or any *a priori* belief, does not fit well into the classical *homo economicus* paradigm; economists have devoted much attention finding explanations for the observable persistence of discrimination.

In opposition to the theory of Becker (1957) based on "pure" racism (disliking some specific categories of the population), the rationale initiated by Arrow (1973) and Phelps (1972) and further adopted by a large body of economists stems from the fact that firms have only imperfect information on productivity (Coate and Loury, 1993; Altonji and Blank, 1999; Fang, 2001). Therefore, employers base their choices on *a priori* beliefs drawn from their own statistical experience. This statistical discrimination story embodies an optimistic perspective: observing actual productivity could lead to giving up erroneous beliefs through a Bayesian learning process.

This paper offers a different model of human behaviour in line with recent findings in the socio-psychological academic literature. Namely, we assume that the "unfairness" component in hiring decisions is the outcome of a stable utility function translating the fact that people prefer working with people like themselves. The "affinity" attitude does not necessarily relate to racism, sexism, etc., but can obviously be linked to it. It refers to concepts like social categorizations (Wenzel, 2001; Garcia *et al.*, 2005) and "people accounting" defined by Garcia and Ybarra (2007).

According to Kang and Banaji (2006), people's judgement exhibits a permanent bias toward members of other groups which can influence all decisions to be made by human entities including firms. A formal quantification of this bias requests a measure of dissimilarity between human beings. For this purpose, we suggest using the mathematical notion of distance. A group of individuals is associated to its representative agent and the firm's hiring policy is influenced by the distance between its representative employee and the applicants for new jobs in addition to professional skill.

Thus, the choice of a candidate is based on two criteria: the adequacy to the job description and the affinity with the firm's representative agent. The first criterion is economically consistent, while the second might reveal costly to the firm's shareholders. Discrimination in this sense appears as an agency problem, leading to hiring potentially suboptimal employees having affinities with the firm's personnel.

Section 2 explains how discriminatory decisions may be described through a mathematical distance. Section 3 defines the firm hiring mechanism. Section 4 concludes by providing suggestions for further research.

## 2. Affinity as a distance

Firms may be seen as a collection of individuals endowed with characteristics among which some are linked to work abilities, and the others are independent from it. In a world without

[1] See, for instance, Bertrand and Mullainathan (2004).

discrimination, only the characteristics in the first group should influence the hiring process as well as the salaries of the new entrants.

Consider a firm whose staff *S* is made of *r* employees: $S = \{p_1, \ldots, p_r\}$. This firm is offering a job. Let $P = \{p_{r+1}, \ldots, p_{r+n}\}$ be the set of the *n* candidates to this job. Each agent, $p_i$, whether in *S* or in *P*, is characterized by a level of professional skill $s^i \in IR, i = 1, \ldots, r+n,$ supposed one-dimensional for sake of simplicity (for instance, the degree level) and a vector of *m* job-unrelated characteristics[2] $\left(x_1^i, \ldots, x_m^i\right) \in IR^m, i = 1, \ldots, r+n$. All individual characteristics and skills are assumed observable. Thus, there is no asymmetry of information.

The model assumes that any human being – in particular the ones belonging to the firm's staff – prefer being in contact with people sharing as many characteristics as possible with him/her. Dissimilarities are modelled thanks to the Euclidian distance, the most common distance[3] used in the characteristics space $IR^m$. In this framework, the distance $d_{ij}$ between the skill-unrelated characteristics of individuals $p_i$ and $p_j$ is:

$$d_{ij} = d\left(p_i, p_j\right) = \sqrt{\sum_{k=1}^{m}\left(x_k^i - x_k^j\right)^2} \ . \qquad (1)$$

The smallest the distance, the most affinity there exist between the two individuals. Any characteristic can enter into this distance provided that it is not linked to productivity. As this distance is the seed for discrimination on the job market, it should not incorporate any feature linked to job abilities.

We define a discriminative hiring process as a process where the distance between the firm's employees and candidate does matter. Now, in order to model this concept adequately, some kind of aggregation is required for the firm's staff. For this purpose let's introduce the firm "representative agent" in the hiring process.

Different views on the hiring process lead to different definitions of this representative agent. First, one can consider that the decision is taken by the board, which is quite unrealistic, except in very special cases. Second, one can take the HR director as the unique decision-maker. Third, one can aggregate the characteristics of the whole staff. Aggregation can be performed along various schemes regarding weighting coefficients.

Let $\tilde{p}$ denote the representative agent of the firm. We propose the following general definition:

The hiring process is said *discriminatory* if the choice of the new employee depends on the distances $d\left(\tilde{p}, p_i\right), i = r+1, \ldots, r+n,$ between the firm's representative agent and the candidates to the new position.

[2] We assume that characteristics are given by numbers, which may reveal unrealistic in several circumstances. Nevertheless, the model may be generalized to qualitative characteristics like gender or color, but then specific metrics are to be introduced.

[3] Other distances may be considered to introduce different weights associated to the *n* characteristics. Alternatively, different scaling factors may be introduced in the characteristics measures in order to take account for their relative impact in subjective distances between the group members.

In order to illustrate this definition, the next section will provide an example.

## 3. An example

Consider that the firm's representative agent is given by aggregating the whole staff. In other words, the representative agent $\tilde{p}$ is the mathematical centre of gravity[4], that is, the virtual agent who would be endowed with the staff's average[5] characteristics vector $\left(\tilde{x}_1,\ldots,\tilde{x}_m\right)\in IR^m$ where:

$$\tilde{x}_k=\frac{1}{r}\sum_{i=1}^{r}x_k^i,\ k=1,\ldots,m, \tag{2}$$

Then, the affinity between a job applicant, $p_i, i=r+1,\ldots,r+n$, and the firm is measured by the distance between the vectors of characteristics of this applicant and the representative agent of the firm:

$$d\left(p_i,\tilde{p}\right)=\sqrt{\sum_{k=1}^{m}\left(x_k^i-\tilde{x}_k\right)^2},\ i=r+1,\ldots,r+n \tag{3}$$

Suppose now that the available job requires a specific skill level, $s^*$.If the hiring process is not discriminatory, then the optimal candidate for the firm is the one which lies the closest to the target skill:

$$\underset{p_i,\ i=r+1,\ldots r+n}{Min}\left[s_i-s^*\right]^2$$

When discrimination enters the process, then the job attribution is performed through the minimization of an objective function with depends on the adequacy to the job (the economic objective) but also on the distance in Eq. (3) (the affinity objective). For instance, in a linear context, one gets:

$$\underset{p_i,\ i=r+1,\ldots r+n}{Min}\left(\left[s_i-s^*\right]^2+\alpha\ d\left[p_i,\tilde{p}\right]\right),\ \alpha>0\,. \tag{4}$$

The parameter $\alpha\geq 0$ gauges the importance of discrimination in the hiring process. The discrimination-free case, which is also the economic optimum for the firm, corresponds to $\alpha=0$. For any $\alpha>0$, there is a cost associated to the suboptimality of the job attribution.

Regarding economic consequences of a discriminative hiring process, two kinds of malfunctioning can be observed: either the new employee is over-qualified for his job and part of his professional skill value is useless, or he is under-qualified for his job and he job is not well accomplished. Assuming wages are at their market value, that is, discriminations are not entering the macroeconomic equilibrium prices, then it means that discriminative hiring process imply either excessive costs (wages for over-qualified employees) or productivity losses (under-qualified employees). In specifications (3) and (4), a symmetric quadratic loss function is taken, but, if needed, one can easily replace by a side-wise function.

## 4. Conclusion

In the purely deterministic setting proposed by this note, discrimination stems from affinity preferences. It could therefore be rationalized through the existence of some reward

[4] Note that the ex-ante level of diversity within the firm is not considered.

[5] Alternatively, a weighted average could be used for taking into account the relative importance of the firm's employees.

associated to hiring people with similar skill-unrelated characteristics. In this sense, this paper acknowledges an agency problem already put forward by Arrow (1998). This representation opens the way to wider application fields, stretching well beyond job market issues. Actually, discrimination modelling could enter the formalization of most economic decisions involving human contacts (business associations, consumption of services, marketing, etc.)

The proposed representation contrasts with the common economic approach because discrimination here is not driven by asymmetric information. Actually, the story here does not require asymmetric information but it is still compatible with it. For instance, learning about others' culture and habits might well help reducing some perceived distances. In this respect, the mathematical notion of distance offers a wide range of possible specifications[6], of which only a basic example has been proposed.

The economic loss resulting from an affinity-based hiring mechanism depends on several parameters which relate to the production technology, the characteristics of the candidates, the affinity attitude within the firm, etc. However, one could argue that, if the employees prefer working with people like themselves, then more diversity could have an indirect bad influence on their productivity. Notwithstanding, the literature has shown that, in many circumstances, diversity by itself is often associated to better financial performance[7]. Firm heterogeneity seems thus desirable for economic as well as for ethical reasons. Further empirical studies should check what happens when employees experience the arrival of an unwanted colleague. Does it really weaken their productivity?

The hiring process can be sequentially repeated, making the representative agent (for instance, the staff's centre of gravity) move over time. As the affinity principle tend to concentrate similar people in a given firm, the convergence toward a spontaneously less discriminatory equilibrium is very unlikely. However, incentive policies can be initiated by the firm owners or public policymakers. Therefore, our model is intended to be included in a broader specification and discussion on the cost of discrimination and its possible remedies, like affirmative action. Additional research work is requested to draw firm policy conclusions.

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[6] For example, one can think of distances overweighting some physical characteristics, but being insensitive to others.

[7] Diversity may be considered at different levels: in the Board (Erhardt *et al*., 2003), in the top management (Welbourne *et al.*, 2007) or in the management as a whole (Richard *et al.*, 2004).

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