ADVERSE SELECTION, ASYMMETRIC INFORMATION AND DISCRIMINATION IN THE LABOR MARKET

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The main objective of this study is the application of an adverse selection model to verify the existence of discrimination in a competitive labor market caused by asymmetric information. The most important result obtained is when a group of workers with different productivities earn the same wage characterizing discrimination.

1 INTRODUCTION

To explain the existence of discrimination, Becker (1957) focuses on the idea of preference for discrimination in three segments of the economy: employers, employees and consumers. The motivation for this type of discrimination is personal. The whole focus of the employer's discrimination behavior is inversely related to the firm's profit function, where discrimination is an argument in the utility function of the employer, even when this may cause a profit reduction. According to Becker (1957), discrimination motivated by preference does not persist in a competitive labor market.

On the other hand, statistic discrimination models with imperfect information, such as in Phelps (1972) model, verifies that the existence of discrimination takes place between two groups of workers (black and white), who have the same expected productivity, yet earn different wages. According to Aigner and Cain (1977), racial or gender discrimination is a consequence of group discrimination: discrimination among individuals in a group is inevitable. On the other hand, Spence (1973) assumes that employers know that the distribution of probability of the employee's productivity vary inside a specific group. As true productivity for each employee is not observed and identifying it becomes rather costly–economically it is not possible for the employer to determine perfectly the true quality of a candidate–therefore, the employer may use a signal to identify him or her. So, this identification is imperfectly observed and a signal is considered for the true productivity.

Farmer and Terrel (1996) demonstrate through Bayesian analysis that discrimination comes from the employer's beliefs in the employees responses, with the employers updating their beliefs each period, taking for granted the production, as they believe in distributing levels of abilities by group of employees.

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When a firm does not know all the information about their employees then this is known to be adverse selection, that is, at the moment the firm signs a contract with an employee, his or her main abilities are still not known at this time, which leads the employer to choose inappropriately, whilst information is available only for employees who are being hired. Workers know more about themselves than their employers. Therefore, the market contains asymmetric information.

In the labor market, when a firm decides to hire, workers with more productivity tend to loose private information–referring to their characteristics–in contrast to workers with less productivity, i.e., workers with less productivity earn relatively better contracts than workers with more productivity, by taking advantage on asymmetric information. They may presume that the quality of their workers is low, by lowering wages, increasing the proportion of low quality workers in the labor market. Alternatively, they cannot infer this information on any other worker, until the contract is signed. The firm will make a distinction of abilities between the less capable and more capable worker, to avoid the best workers leave their jobs.

Asymmetric information is presented in the adverse selection model, where a competitive firm is unable to make a distinction among workers with different characteristics, treating them as if they were only one group, i.e., as if they had only one distribution of probability function of their productivity. The same wage is offered for the whole group.

This research, uses an adverse selection model to detect the existence of wage discrimination resulting from asymmetric information (non-observed productivities) in the labor market. The employer may discriminate statistically knowing that the worker's distribution of probability function of their productivity differs. As firms avoid risks they infer wages to groups, which may result in discrimination. The main outcome of this paper is that a group of worker's with different productivity receives the same wage (the inverse result of a classic definition for discrimination), characterizing this as group discrimination.

This paper is structured as follows. After this introduction, section 2 covers a simple model of adverse selection to analyze the existence of discrimination and section 3 presents the conclusions.

2 THE MODEL

Consider a labor market where there are workers with different productivities and a number of identical firms–which can hire workers producing the same product using technology with constant returns to scale–and where the only input is their work and the product has a normalized price equal to 1.

The market supply is defined as the wage function *w*. The worker earns wages from a equal reserve $\big(\phi(\varphi)\big)$, which represents its use. The worker's opportunity cost in accepting a job is defined by:

$$\phi(\varphi) \leq w \tag{1}$$

meaning that the worker of type φ, has a reservation wage $\phi(\varphi)$ indicating that the group of workers which accepts to work is given by:

$$\Phi(w) = \big[\varphi : \phi(\varphi) \leq w\big] \tag{2}$$

where $\varphi \varepsilon \big[\underline{\varphi}, \overline{\varphi}\big] \subset R$ and $0 < \underline{\varphi} < \overline{\varphi} < \infty$.

The productivity of each worker is:

$$\mu = \int_{\varphi \varepsilon \phi} \varphi f(\varphi) d\varphi \tag{3}$$

where $\varphi \varepsilon \phi(w)$.

The demand for work is defined by the wage function $D(w)$. The firm believes that a worker's average productivity to accept a job is μ, therefore:

$$D(w) = \begin{cases} (i) & 0, \, if \, \mu < w \\ (ii) & [0, \infty], \, if \, \mu = w \\ (iii) & \infty, \, if \, \mu > w \end{cases} \tag{4}$$

If the workers fit in condition (i), the firm's demand for work will be zero; on the other hand, condition (ii) of the firm to pay a wage ω is the same average productivity of those who accept to work and the firm's demand for work will vary as $0 < \underline{\varphi} < \overline{\varphi} < \infty$ for the first period; condition (iii) tells us that the firm's demand for work will be infinite, if a worker accepts to earn a wage lower than his average productivity.

The market supply $\Phi(w)$ together with the demand for work $D(w)$ can be leveled in equilibrium with a positive job level if and only if:

$$w^* = E \, [\varphi / \varphi \, \varepsilon \, \Phi^*] \tag{5}$$

where:

$$\Phi^* = \left[\varphi : \phi(\varphi) \leq w^* \right] \tag{6}$$

Definition: in a competitive labor market model, where there are levels of productivity not observed by the workers, the competitive balance is represented by a wage w^* and a group Φ^* of workers who will accept to work (according to MAS-COLELL; WHINSTON; GREEN, 1995, p. 439).

Let's say, for example, that half of the workers of group type φ that accept jobs earn wage w equal to the average productivity of group μ. The average productivity of the worker who accepts a job is:

$$M^* = \underline{E} \left[\varphi : \varphi \, \varepsilon \, \Phi^* \right] \tag{7}$$

where Φ^* is a group of types which accept jobs in equilibrium.

Assuming that the expected profit of the firms would be given by:

$$E \left\lfloor (\varphi - w) \middle| \varphi \, \varepsilon \, \psi(w) \right\rfloor \tag{8}$$

meanwhile the workers want to maximize their wages according with the expression:

$$E \left\lfloor (\varphi - w) \middle| \varphi \, \varepsilon \, \phi(w) \right\rfloor = E \left\lfloor \varphi \middle| \varphi \, \varepsilon \, \Phi(w) \right\rfloor - w \tag{9}$$

$$
\begin{aligned}
E \left[(\varphi - w) \middle| \varphi \, \varepsilon \, \Phi(w) \right] &= \frac{1}{P(\varphi \varepsilon \Phi(w))} \int_{\varphi \varepsilon \Phi(w)} (\varphi - w) f(\varphi) d\varphi - w = \\
&= \frac{1}{P(\varphi \varepsilon \Phi(w))} \int_{\varphi \varepsilon \Phi(w)} (\varphi) f(\varphi) d\varphi - \\
&\quad - \frac{1}{P(\varphi \varepsilon \Phi(w))} \int_{\varphi \varepsilon \Phi(w)} f(\varphi) d\varphi = \\
&= \mu - w \frac{1}{P(\varphi \varepsilon \Phi(w))} \int_{\varphi \varepsilon \Phi(w)} f(\varphi) d\varphi
\end{aligned}
$$

which gives us:

$$\mu - w = 0 \tag{10}$$

Equation (10) informs us that the firm pays a wage w equal to the average productivity of those who accept to work.

Proposition 1: asymmetric information generates wage discrimination. Although the workers expect to earn wages according to their expected marginal productivity, the labor market is discriminatory in a sense that the groups of workers with different productivities earn the same wage.

When there is asymmetric information, the existence of a heterogeneous group of workers is considered. As it is not possible to know how to distinguish their varied characteristics, a group universe of n workers is considered, by assigning to the group one only distribution of productivity probability, such as in figure 1.

FIGURE 1

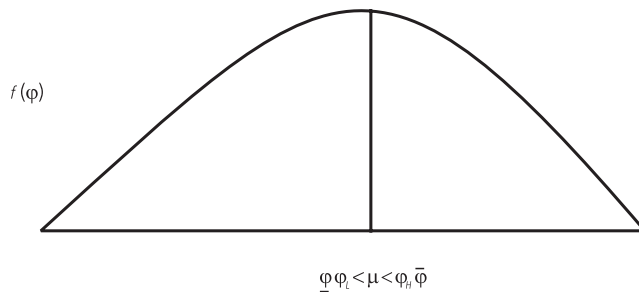$\underline{\varphi} \, \varphi_L < \mu < \varphi_h \, \bar{\varphi}$

Figure 1 of the distribution of probability function of the productivity of the workers who accept work tells us that the firm is paying a wage equal to the average productivity of the workers who accept to work: that is the work with highest productivity $\varphi_H > \mu$ earn wages lower than their effective productivity, while the workers with productivity lower than average $\varphi_L < \mu$ earn wages higher than their real productivity. In other words, workers with higher productivity are being discriminated (punished) by earning lower wages than their productive performance. It is as if the firm wants to punish whoever is more efficient. The worker's average productivity of type φ_H that accepts a job increases the average

productivity of all of the workers. Which means that without these workers, the firm would have its average productivity lowered.

The presence of private information makes the group with different productivity earn the same wage w, which characterizes wage discrimination. This happens when there is asymmetric information in the labor market.

This is an important finding, because with this new interpretation of discriminatory behavior we obtain at least two advantages: *i*) in competitive equilibrium theoretical models, discrimination implies in a cost to the firm. However, with this new interpretation the cost of discrimination is transferred to the higher productivity workers. That is, contrary to Becker (1957), the discrimination cost is paid by workers ourselves, and not by firms; and *ii*) in empirical models, the discrimination is verified whenever workers with similar characteristics earn different wages. However, with this new discrimination interpretation we can understand that workers with similar characteristics can earn different wages, not by discrimination behavior (in the sense proposed by BECKER, 1957), but just because the heterogeneity of the market implies this result. Moreover, we can apply a new test to verify discrimination: if groups with different variances earn the same wages this can be interpreted as discrimination. The advantage of this procedure is its easy implementation.

3 CONCLUSION

This article uses a simple model of adverse selection to analyze the existence of wage discrimination. The evidence presented suggests that asymmetric information is a strong determinant of discrimination, which the main outcome being that workers with different productivities earn the same wage.

Now, we have an alternative definition to discrimination: groups of workers with different productivity that earn the same wage characterize discrimination behavior. This interpretation gives us at least two advantages: *i*) in contrast to Becker (1957), the cost of discrimination in competitive markets is paid by workers and not by firms; and *ii*) a simple variance test can indicate the presence of discrimination.

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