

COORDENAÇÃO E DISCRIMINAÇÃO EM UM MODELO INTERTEMPORAL DO MERCADO DE TRABALHO

COORDINATION AND DISCRIMINATION IN AN INTERTEMPORAL MODEL OF THE LABOR MARKET

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RESUMO

Este estudo apresenta um modelo que combina a preferência por discriminação com a coordenação gerencial em uma estrutura de otimização intertemporal. Desta forma, a perda de eficiência gerada pela presença de discriminação é compensada pelas habilidades gerenciais. Nós mostramos que uma solução possível é que os trabalhadores com produtividade diferente ganham o mesmo salário, o que indica a existência de discriminação. Além disso, somos capazes de mostrar que a condição de Solow não se sustenta. O artigo reúne três seções. A primeira compreende uma apresentação da coordenação e discriminação num modelo intertemporal do mercado de trabalho, enquanto a segunda seção inclui um estudo de um modelo básico. Por fim, as conclusões.

Palavras-chave: Discriminação, Gerência, Produtividade e Salários. JEL: J7I, D82

ABSTRACT

This paper presents a model that combines the taste discrimination with managerial coordination in an intertemporal optimizing framework. In that way, the loss of efficiency yielded by the presence of discrimination is compensated for managerial abilities. We show that a possible outcome is that workers with different productivity earn the same wages, which indicates the existence of discrimination. Furthermore, we are able to show that the Solow condition does not hold. The article contains three sections. The first one is an introduction of the coordination and discrimination in an intertemporal job market model, while the second section includes a study of the basic model. Then the conclusions.

Keywords: Discrimination, Managers, Productivity and Wages. JEL: J7I, D82

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1. COORDINATION AND DISCRIMINATION IN AN INTERTEMPORAL MODEL OF THE LABOR MARKET

There are basically two general types of frameworks of the labor market discrimination: taste discrimination and statistical discrimination models. In this paper we focus on the former. In general, these models show that there is an inverse relation between discrimination and profits. According to Becker (1971), this result arises from the fact discrimination is an argument in the utility function of the employer even when it causes a profit reduction.

The relationship between discrimination and efficiency has been one of the main focuses of the literature. According to Cain (1986, p. 693) “The (...) problem also raise the question of whether a labor market that pays unequal wages to equally productive workers is inefficient.” Akerlof (1985) shows that discrimination can persist even in competitive markets in the presence of transaction costs. The models of statistical discrimination are attributed jointed to Phelps (1972) and Arrow (1973) based on labor market analysis. These models assume that the creditor or employers don't have complete information on the individuals. These models use the characteristics of the groups that suffer discrimination, as race or its gender (as a proxy for unobservable individual characteristic), to reduce the value of the credit or of the wage.

In this paper we intend to show that discrimination is a possible outcome of a problem of intertemporal profit maximization. Following Mehta (1998), we assume that managers both monitor and coordinate their subordinates and are constrained to make tradeoffs in these activities. Besides, we assume that the manager's behavior is based on the concept of taste discrimination (BECKER, 1971).

We show that discrimination may arise as an optimal outcome of a model in which managers discriminate according to his/her tastes. Besides we show that the Solow condition does not hold in this model, which blends turnover, coordination and discrimination. The paper is structured as follows: section 2 covers the theoretical model and section 3 concludes.

2. THE BASIC MODEL

Following Ringuedé (1998), let us consider a small firm with a unique monitor, who is the firms' owner. Assume that there are two groups of workers, designated by *A* and *B* in the labour market. The terms Ω_A and Ω_B stand for the productivities of workers from groups *A* and *B* respectively. Let us assume that the group *A* has a higher average productivity than *B*, that is $\Omega_A > \Omega_B$. We denote by $\{S_A(1-M)n_A\}$ and $\{S_B(1-M)n_B\}$ the net productivity of the manager in monitoring a number n_A of workers of group *A* and a number n_B of workers of group *B*. *M* is a parameter that indexes the difficulty to manage and S_A and S_B stand for the productivity of managers coordinating respectively groups *A* and *B*.

The managers act in two ways. If he chooses to discriminate by hiring workers with lower productivity he will have to work more to compensate for the loss of productivity yielded by the practice of discrimination. The work of the discriminating manager depends on his/her effort. Thus, the firm's profit will depend on the manager's ability and

on the worker's productivity. A firm may maintain the discrimination, paying the same salary to a group of heterogeneous workers.

The rationale for this is that the manager is prepared to hire a worker of a particular type A without paying A for his/her productivity, but for the productivity of the workers of another particular type B . Workers in group A are able to accept employment despite the fact that they are discriminated against. Therefore, even if the supervisor makes a bad allocation of resources, there is a compensation for the reduction of wages, given by the average productivity of both groups. At first, it may seem that there is no discrimination on these savings, as the wages are the same for both groups A and B . However, by observing the productivity of the workers along the production line one can confirm the existence of discrimination. Becker (1971) notes that if employers' tastes are nepotistic rather than discriminatory, then the discrimination will not be eliminated by competition in the market for firm.

Here, taking as standpoint the production function developed by Metha (1998) and extended by Faria (2000), we consider that the production, denoted by y , depends both on the managers and workers productivity:

$$y = \{S_A (1 - M) + \Omega_A e(w_A)\}n_A + \{S_B (1 - M) + \Omega_B e(w_B)\}n_B \quad (1)$$

where $e(\cdot)$ captures the effort of the worker as a function of the wage, $e'(\cdot) > 0$. We assume that the firm is a perfect competitor in the goods market and that it maximizes the discounted profit over an infinite horizon. It has four control variables for maximizing profit in the infinite horizon: the number of workers of groups A and B hired, h_A and h_B respectively, and the wages of both groups, w_A and w_B . In this vein the problem of the firm may be written as:

$$\underset{h_A, h_B, w}{\text{Max}} \int_0^{\infty} [y - w_A n_A + w_B n_B - \tau(h)] e^{-rt} dt \quad (2)$$

$$\text{s.t. } \dot{n}_A = h_A - q(w_A)n_A \quad (3)$$

$$\dot{n}_B = h_B - q(w_B)n_B \quad (4)$$

where the price of product is normalized to 1, $\tau(h)$ captures the training costs, r is the intertemporal interest rate. These costs are assumed to be a function of the number of new workers and convex, that is $\tau'(h) > 0$.

Expressions (3) and (4) describe the rate of change of the workers of groups A and B employed that depend on the difference between the number of workers hired, h_A and h_B respectively, and the number of workers of each group who decide to leave the firm $q(w_A)n_A$ and $q(w_B)n_B$ respectively, where $q(\cdot)$ is the quit rates which are assumed to be a decreasing function of the relative wage, $q'(\cdot) < 0$, for both groups of workers. The current value of the Hamiltonian function is given by:

$$H = y - w_A n_A - w_B n_B - \tau(h) + \lambda [h_A - q(w_A) n_A] + \mu [h_B - q(w_B) n_B] \quad (5)$$

Inserting equation (1) in the Hamiltonian, the first order conditions are:

$$H_{h_A} = 0 \Rightarrow \lambda = \tau'(h) \quad (6)$$

$$H_{h_B} = 0 \Rightarrow \mu = \tau'(h) \quad (7)$$

$$H_{w_A} = 0 \Rightarrow n_A = \lambda q'(w_A) n_A \quad (8)$$

$$H_{w_B} = 0 \Rightarrow n_B = \mu q'(w_B) n_B \quad (9)$$

The Euler equations associated to the co-state variables n_A and n_B are:

$$\dot{\lambda} = -[S_A(1-M) + \Omega_A e(w)] + \lambda [q(w_A) + r] \quad (10)$$

$$\dot{\mu} = -[S_B(1-M) + \Omega_B e(w_B)] + \mu [q(w_B) + r] \quad (11)$$

plus the transversality conditions. From expressions (6) and (7) we conclude that $\mu = \lambda$. From expressions (8) and (9) we obtain after some algebraic manipulation that:

$$q'(w_A) = q'(w_B) \quad (12)$$

Which implies that $w_A = w_B$. Here it is possible to identify a source of discrimination since the wage paid is the same for groups with different productivity: the wages of group of workers of type A will be lower relatively to their average production than the wages of group B relatively to their average production. By equalizing expression (10) to (11) we conclude that:

$$S_A(1-M) + \Omega_A e(w_A) = S_B(1-M) + \Omega_B e(w_B) \quad (13)$$

Since we are assuming that $\Omega_A > \Omega_B$ expression (13) shows that in order to meet the optimality conditions the manager needs to compensate the smaller productivity of group B by coordinating more that group, that is, $S_B > S_A$.

This result is according to Becker (1971), who reported that individuals who have a taste for discrimination behave as if they were “willing to pay something”, either directly or in the form of a reduced income, to indulge those tastes. By evaluating expressions (3) and (4) in steady state we obtain:

$$q(w) n_A = h_A \quad (14)$$

$$q(w) n_B = h_B \quad (15)$$

Hence we conclude that in steady state: $h_A/n_A = h_B/n_B$. Besides it is possible to verify the validity of the Solow condition. By substituting (6) into (8) we obtain:

$$e'(w) = \frac{[\tau'(h) + \sigma x](n_A + n_B)}{p(\Omega_A n_A + \Omega_B n_B)} \quad (16)$$

From (10) and (11) in steady state we obtain:

$$p\Omega_A = \frac{\lambda(q+r) - pS_A(1-M)}{e(w)} \quad (17)$$

$$p\Omega_B = \frac{\lambda(q+r) - pS_B(1-M)}{e(w)} \quad (18)$$

By substituting (17) and (18) into (13) and after some algebraic manipulation we obtain

$$\frac{e'(w)}{e(w)} = \frac{q'(w)[\tau'(h) + \sigma x](n_A + n_B)}{\{[\tau'(h) + \sigma x](q+r) - p(1-M)\}(s_A n_A + s_B n_B)} \quad (19)$$

By multiplying both sides of (19) by w we obtain the Solow condition.

$$\frac{e'(w)w}{e(w)} = \frac{q'(w)[\tau'(h) + \sigma x](n_A + n_B)w}{\{[\tau'(h) + \sigma x](q+r) - p(1-M)\}(s_A n_A + s_B n_B)} \quad (20)$$

Expression (20) allows us to conclude that in general the Solow condition does not hold in this model with discrimination, coordination and turnover since the right hand side of (20) does not equal to 1. The fact that the Solow condition is not observed is a result induced by the discrimination hypothesis: the Solow condition is a profit maximizing condition. Since the manager chooses to discriminate — he is not minimizing the effective labor cost — he is not paying efficiency wages and pays his taste by a lower profit.

This result is similar to that one found by Faria (2000, p. 97) who reported that: “(...) the Solow condition is invalid when shirking and turnover costs are taken into account”. Lin and Lai (1994, p. 503) also concluded that: “The Solow condition thus is no longer valid.”

Hence we have verified that discrimination is a possible outcome is a set up that takes into account the possibility that the managers transfers part of his/her productivity to the group with smaller productivity. In that way, the loss of efficiency yielded by the presence of discrimination may be compensated for manager’s ability to coordinate. If he chooses to discriminate by paying the same salaries to workers with different productivities he will have to compensate for the loss of productivity yielded by the practice of discrimination by coordinating the less productive group.

3. CONCLUDING REMARKS

We have found the possibility of an optimal outcome in a model where managers discriminate according to his/her tastes and try to compensate the inefficiency brought by discrimination by coordinating more the group with lower productivity. That is, the presence of discrimination is a possible outcome when the managerial coordination increases the productivity of the group with lower productivity. Thus, the firm’s profit will

depend on the manager's ability and on the worker's productivity. A firm may maintain the discrimination, paying the same wage to a group of heterogeneous workers. Moreover, similar to Faria (2000), the Solow condition does not hold in this model.

D. REFERENCES

- AKERLOF, Gary. Discriminatory, status-based wages among tradition-oriented, stochastically trading coconut producers. *Journal of Political Economy* 93, 265 — 276, 1985.
- ARROW, Kenneth. "The theory of discrimination" In: Orley Ashenfleter and Albert Rees (Eds) *Discrimination in Labor Markets*. Princeton: Princeton University Press, 1973.
- BECKER, Gary. *The economics of discrimination*. Second Edition. University of Chicago Press, 1971.
- CAIN, G. The economic analysis of labor market discrimination: A survey. In: ASHENFELTER, O.; LAYARD, R. (Editors). *Handbook of Labor Economics*. Amsterdam: North Holland, 1986.
- FARIA, João Ricardo. Supervision and effort in an intertemporal efficiency wage model: the role of the Solow condition. *Economics Letters*. n. 67, 93 — 98, 2000.
- LIN, Chung-cheng; LAI, Ching-chong. The turnover costs and the solow condition in an efficiency wage model with intertemporal optimization. *Economics Letters*. n. 45, 501 — 505, 1994.
- METHA, Shailendra. The law of one price and theory of the firm: a ricardian perspective on inter-industry wages. *Rand Journal of Economics*. n. 29, 137 — 156, 1998.
- PHELPS, Edmund. The statistical theory of racism and sexism. *American Economic Review*. n. 659 — 661, 1972.
- RINGUEDÉ, Sébastien. An efficiency wage model for small firms: firm size and wages. *Economics Letters*. n. 59, 263 — 268, 1998.