Wage discrimination as an illegal behavior

Yossi Tobol
Department of Economics, Bar−Ilan University, Israel

Abstract

Paying different wages to workers of equal productivity because of demographic groups to which they belong is illegal in the US and other Western countries. Yet, the vast economic literature on wage discrimination has entirely overlooked this fact when modeling the employer’s discriminatory behavior. Consequently, the desirability of practicing wage discrimination, whether arising from differences in labor supply elasticities or from an inherent taste for discrimination, has never been confronted with the risk of getting caught and punished due to violating the equal pay law. Incorporating this risk into Joan Robinson’s (1969) discriminatory monopsony model and Gary Becker’s (1971) taste−for−discrimination model, this paper examines the effects that illegalizing wage discrimination may have on the wage differential under discriminatory monopsonistic and competitive conditions. The analysis unveils a sharp contrast in the effect of illegalization in the alternative settings.

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1. INTRODUCTION

Paying different wages to workers of equal productivity because of demographic groups to which they belong is illegal in the US and other Western countries.[1] Yet, the vast economic literature on wage discrimination in monopsonistic and competitive markets has entirely overlooked this fact when modeling the employer's discriminatory behavior.[2] Consequently, the desirability of practicing wage discrimination, whether arising from differences in labor supply elasticities or from an inherent taste for discrimination, has never been confronted with the risk of getting caught and punished due to violating the equal pay law. This is particularly odd considering the fact that the role of deterrence in eliminating the employer's incentive for committing a closely related violation, paying workers less than the minimum wage, has gained considerable attention in the economic literature.[3]

The purpose of the present paper is to investigate the effects that illegalizing wage discrimination may have on the wage differential between two groups of equally productive workers under discriminatory monopsonistic and competitive conditions. The risk of getting caught and punished (henceforth, "enforcement") is therefore incorporated into Joan Robinson's (1934) discriminatory monopsony model and Gary Becker's (1971) taste-for-discrimination model. The analysis unveils a sharp contrast in the effect of illegalization under the alternative settings: while illegalization reduces the wage differential in the monopsonistic framework, acting to offset the incentive for discrimination arising by differences in labor supply elasticities, it counter-intuitively *deepens* the wage differential in the competitive framework. Furthermore, while a sufficiently high level of enforcement would eliminate the wage differential in the monopsonistic case, there is no level of enforcement that would do so in the competitive case. A sufficiently high level of enforcement would simply eliminate the incentive for employers to hire the discriminated-against group. Evidently, illegalization is not a proper remedy for alleviating discrimination in a competitive environment.

2. ILLEGALIZATION IN A MONOPSONISTIC MARKET

Consider a monopsonistic employer who produces a given product with two types of workers, A and B (e.g., males and females, whites and blacks), where A and B denote also the quantity employed of each type. Being a single employer in the markets for A and B, the monopsonist faces an upward-sloping supply curve for labor in each market: increasing the employment of either A or B workers would thus require the payment of a higher wage rate. Denoting the wage rates of A and B workers by w_A and w_B, respectively, it then follows that $w_k = w_k(k)$ for $k \in (A, B)$, where $w_k'(k) > 0$.

Suppose now that A and B workers have identical productive skills, hence the employer's production function is given by $f(W + B)$, where, by assumption, the marginal product of each type of workers is positive and diminishing (i.e., $f' > 0, f'' < 0$. Seeking to maximize his profit, the employer may consider the possibility of discriminating against B workers by paying them a lower wage than he pays A workers. Suppose, however, that wage discrimination is forbidden by law, being subject to the risk of getting caught and punished. Should he discriminate and get caught, the employer will be fined in proportion λ (>1) to his unpaid wages to B workers, $[w_A(A) - w_B(B)]B$.

Assuming a unit product price, the employer will choose the employment levels of A and B workers so as to maximize his *expected* profit

$$Ep \;=\; f(A+B) \;-\; w_A(A)A \;-\; w_B(B)B \;-\; p\lambda\,[w_A(A) \;-\; w_B(B)]B\,, \qquad (1)$$

where p denotes the probability of getting caught and punished, assumed to be independent of the wage differential or the employment levels. The first-order conditions for a maximum are

$$\frac{\partial(Ep)}{\partial A} \;=\; f'(A+B) \;-\; w_A(A) \;-\; w_A'(A)A \;-\; ew_A'(A)B \;=\; 0 \qquad (2)$$

$$\frac{\partial(Ep)}{\partial B} \;=\; f'(A+B) \;-\; w_B(B) \;-\; (1-e)w_B'(B)B \;-\; e[w_A(A) \;-\; w_B(B)] \;=\; 0\,, \quad (3)$$

where $e = p\lambda$ represents the level of law enforcement.

Equations (2) and (3) have a simple interpretation: shifting the expressions with the minus sign to the right-hand side, maximization of the expected profit requires that the marginal revenue from employment equate the expected marginal cost. While the marginal revenue from each type of workers is identical, $f'(A + B)$, the expected marginal cost differs. Employing an additional worker of type A involves the payment of the wage rate to that worker, $w_A(A)$, an additional payment to all other workers following the rise in wage along the upward-sloping supply curve, $w_A'(A)A$, as well as an increment to the expected penalty due to the widening of the wage differential between A and B, paid to all B workers, $ew_A'(A)B$. On the other hand, employing an additional worker of type B involves, in addition to the wage rate, $w_B(B)$, and the additional payments to other workers, $w_B'(B)B$, an increment to the expected penalty due to underpaying that worker, $e[w_A(A) - w_B(B)]$, as well as a *reduction* in the expected penalty due to the narrowing of the wage differential, $ew_B'(B)B$.

Rearranging, conditions (2) and (3) may be written as

$$f'(A+B) \;=\; w_A(A)\left[1 \;+\; \frac{1}{h_A}\left(1 \;+\; \frac{B}{A}e\right)\right] \qquad (2')$$

$$f'(A+B) \;=\; (1-e)w_B(B)\left(1 \;+\frac{1}{h_B}\right) \;+\; ew_A(A)\,, \qquad (3')$$

where $h_k = 1/[w_k'(k)k/w_k(k)]$ denotes the labor supply elasticity for workers of type $k \in (A, B)$. Dividing one equation by the other and rearranging, the employer's optimum must satisfy

$$\frac{w_A(A)}{w_B(B)} = \frac{1 + \frac{1}{h_B} - e\left(1 + \frac{1}{h_B}\right)}{1 + \frac{1}{h_A} - e\left(1 - \frac{1}{h_A}\frac{B}{A}\right)}. \tag{4}$$

The neoclassical theory of the discriminatory monopsonist [e.g., Robinson (1934), Madden (1973)] implicitly assumes that wage discrimination is not illegal. Consequently, there is no enforcement. Substituting $e = 0$ in equation (4) yields the well-known result of this theory: the employer would pay A workers a higher wage than he pays B workers (i.e., $w_A > w_B$) if, and only if, the labor supply elasticity of the former is greater than that of the latter (i.e., $h_A > h_B$). Given, however, that wage discrimination is illegal and accompanied by some enforcement, an elasticity differential is no longer a sufficient condition for discrimination. Because the e-term subtracted from the numerator in (4) is greater than that subtracted from the denominator, a sufficiently high level of enforcement may offset the incentive for discrimination generated by an elasticity differential,

Suppose henceforth that the labor supply curves of A and B workers have constant elasticity and that $h_A > h_B$.[4] In the absence of an equal pay legislation, the profit-maximizing monopsonist will therefore discriminate against B workers. Condition (4) may now be used to prove three propositions regarding the effects of illegalizing discrimination on the wage differential between A and B workers, $w_A(A) - w_B(B)$.

Proposition 1: Illegalization of wage discrimination, accompanied by some enforcement, will increase the wage rate of B workers and reduce the wage rate of A workers, therefore reducing the wage differential in a monopsonistic market.

***Proof*:** Totally differentiating equations (2') and (3') with respect to A, B, and e yields

$$\frac{dA}{de} = \frac{\frac{W_A(A)}{h_A}\frac{B}{A}\Omega_2 - \left[w_A(A) - \left(1 + \frac{1}{h_B}\right)w_B(B)\right]\Omega_3}{\Omega} \tag{5}$$

$$\frac{dB}{de} = \frac{\left[w_A(A) - \left(1 + \frac{1}{h_B}\right)w_B(B)\right]\Omega_1 - \frac{W_A(A)}{h_A}\frac{B}{A}\Omega_3}{\Omega}, \tag{6}$$

where $\Omega_1 \equiv \partial^2(Ep)/\partial A^2$, $\Omega_2 \equiv \partial^2(Ep)/\partial B^2$, $\Omega_3 \equiv \partial^2(Ep)/\partial A \partial B$, and $\Omega \equiv \Omega_1\Omega_2 - (\Omega_3)^2$. The second-order conditions for the maximization of the expected profit require that $\Omega_1 < 0$, $\Omega_2 < 0$, and $\Omega > 0$ at the optimum.[5] It can easily be verified that $\Omega_3 < 0$ as well. To prove Proposition 1, we evaluate the signs of (5) and (6) at the state of zero enforcement, prevailing before illegalization. Substituting $e = 0$ in condition (4) reveals that $w_A(A) = [(1 + 1/h_B) / (1 + 1/h_A)]w_B(B) < (1 + 1/h_B)w_B(B)$. Hence, the expression in the square brackets of (5) and (6) is negative. Consequently, $dA/de < 0$ and $dB/de > 0$ at $e = 0$. Because $w_A(A)$ and $w_B(B)$ are increasing in A and B, respectively, it follows that illegalizing discrimination would decrease $w_A(A)$ and increase $w_B(B)$, thus reducing the wage differential between A and B workers, $w_A(A) - w_B(B)$. ¦

***Proposition* 2:** Given that wage discrimination is illegal, yet a wage differential still exists, increasing the level of enforcement will further reduce the wage differential in a monopsonistic market.

***Proof*:** By Proposition 1, illegalizing discrimination will decrease $w_A(A)$ and increase $w_B(B)$. Consequently, the expression in the square brackets of (5) and (6), which has been shown to be negative for $e = 0$, will become even smaller (hence more negative) after discrimination is illegalized and some enforcement is introduced.[6] Increasing enforcement at this point must thus result in $dA/de < 0$ and $dB/de > 0$ as well, leading to a further reduction in the wage differential between A and B workers. ¦

***Proposition* 3**: A sufficiently high (though less than unity) level of enforcement will eliminate the wage differential in a monopsonistic market.

***Proof*:** Let $\tilde{e}$ denote the level of enforcement that eliminates the wage differential. Substituting $w_A(A) = w_B(B)$ in equation (4) and solving for $\tilde{e}$ yields

$$\tilde{e} = \frac{\dfrac{h_A}{h_B} - 1}{\dfrac{h_A}{h_B} + \dfrac{B(\tilde{e})}{A(\tilde{e})}} < 1. \qquad (7)$$

Hence, an elasticity differential is necessary, but no longer sufficient to ensure discrimination. A wage differential will arise only if $e < \tilde{e}$. Because A and B are functions of $\tilde{e}$, the latter cannot be solved explicitly without usage of specific labor supply and production functions. However, regardless of the exact shape of these functions, the level of enforcement that eliminates the wage differential is clearly positive, less than unity, and increasing in the elasticity differential, $h_A - h_B$. ¦

3. ILLEGALIZATION IN A COMPETITIVE MARKET

Consider alternatively a competitive labor market with a large number of identical employers, all producing the same product with the same production function $f(A + B)$. Using again w_A and w_B to denote the wage rates of A and B workers, respectively, the expected profit of the discriminatory employer will be

$$Ep = f(A+B) - w_A A - w_B B - pl(w_A - w_B)B, \tag{8}$$

where, contrary to the monopsonistic case, the wage rates w_A and w_B are independent of the employer's employment levels and perceived as exogenously given. Maximizing (8) with respect to A and B, the first-order conditions immediately imply that $(1 - e)(w_A - w_B) = 0$, where $e = p\lambda$ denotes again the level of enforcement. Hence, for any $e \neq 1$, $w_A = w_B$ at equilibrium, implying that there is no discrimination. This is not surprising: because every employer faces infinitely elastic supply curves for A and B workers, there is no elasticity differential in labor supply, hence no incentive to discriminate between the two groups of workers.

Recognizing this problem, the neoclassical theory of competitive wage discrimination, introduced by Becker (1957) and further developed by Arrow (1974a, 1974b), replaces profit maximization with *utility* maximization. Rather than stemming from differences in labor supply elasticities, a wage differential will now stem from a *taste* for discrimination against B workers, although both types of workers have identical productive skills. Specifically, the employer's utility function is assumed to be $U = U(\pi, A, B)$, where $U_\pi > 0$, $U_A > 0$ but $U_B < 0$. To simplify, however, the manipulation of expected utility when wage discrimination is illegal, suppose that the utility function is additively separable in the three arguments. Expected utility will then be stated as

$$EU = Ep + y(A) - f(B), \tag{9}$$

where $y'(A) > 0$, $f'(B) > 0$ and $y''(A) < 0$, $f''(B) > 0$. The employer will now choose the employment levels of A and B workers so as to at maximize his expected utility (9), subject to the expected profit constraint (8). Substituting (8) into (9), the first-order conditions for a maximum are

$$\frac{\partial(EU)}{\partial A} = f'(A+B) - w_A + y'(A) = 0 \tag{10}$$

$$\frac{\partial(EU)}{\partial B} = f'(A+B) - w_B - e(w_A - w_B) - f'(B) = 0, \tag{11}$$

requiring again that the marginal revenue from employment, $f'(A + B)$, equate the expected marginal cost. Notice that the marginal monetary cost of employing A workers is moderated by their marginal utility to the employer, $y'(A)$, whereas the marginal cost of employing *B* workers is augmented by their marginal disutility to the employer, $f'(B)$.

Substituting one condition in the other to eliminate $f'(A + B)$ and rearranging, the employer's optimum must satisfy (assuming $e \neq 1$)

$$w_A - w_B = \frac{y'(A) + f'(B)}{1 - e}. \tag{12}$$

The neoclassical theory of discrimination in a competitive labor market implicitly assumes that wage discrimination is not illegal. Consequently, there is no enforcement. Substituting $e = 0$ in equation (12) yields the well-known result of this theory: the employer would end up paying *A* workers a higher wage than he pays *B* workers (i.e., $w_A > w_B$) if, and only if, he has a taste for discriminating in favor of *A* workers [$y'(A) > 0$)], against *B* workers [$f'(B) > 0$], or both. An implicit assumption of the neoclassical theory underlying this result is that the demand for workers is the sole determinant of the equilibrium wage rates, or, in other words, that the market supply curves of *A* and *B* workers are perfectly inelastic [see Arrow (1972b), p.187].

Condition (12) gives rise to two propositions regarding the relationship between the wage differential and enforcement in a competitive labor market.

***Proposition* 4:** Illegalization of wage discrimination, accompanied by some enforcement, as well as further increasing the level of enforcement (below unity), will reduce the wage rate of *B* workers without affecting the wage rate of *A* workers, consequently *increasing* the wage differential in a competitive market.

***Proof*:** Because the supply curves of *A* and *B* workers are perfectly inelastic, $y'(A)$ and $f'(B)$ must remain constant in a competitive equilibrium. Condition (12) then implies that the wage differential is greater in the presence of some enforcement ($e > 0$) than in its absence. The greater the level of enforcement (below $e = 1$), the greater will be the wage differential. Furthermore, condition (10) reveals that the equilibrium level of w_A is not affected by the appearance of enforcement, hence condition (11) can only be satisfied with a lower level of w_B. The greater the level of enforcement, the lower must be the level of w_B. ¦

***Proposition* 5**: There is no (less than unity) level of enforcement that eliminates the wage differential in a competitive market. A sufficiently high (unit) level of enforcement will only eliminate *B* workers out of the market.

Proof: Suppose first that $e < 1$. Substituting $w_A = w_B$ into condition (12) yields $y'(A) + f'(B) = 0$, which contradicts the taste for discrimination assumption. Hence, there is no level of $e < 1$ that solves condition (12) for $w_A = w_B$. Suppose now that $e = 1$.

Evidently, condition (12) does not hold for this case. Furthermore, it is easily verified that the *effective* wage rate employers expect to pay B workers, $w_B + e(w_A - w_B)$, now equals the wage rate of A workers. It thus follows that for $e = 1$, market forces yield a corner solution at which only A workers are employed. Indeed, if both groups are of equal productivity and are paid the same, there is no incentive to employ B workers who bear disutility to employers. Compliance with the equal pay law can thus be reached only by escaping the employment of B workers all together.¦

4. CONCLUDING REMARKS

We have examined how illegalization of wage discrimination in monopsonistic and competitive markets will affect the wage differential between two groups of equally productive workers. While illegalization will reduce the wage differential in a monopsonistic market, and a sufficiently high level of enforcement will eliminate the wage differential altogether, it will, counter-intuitively, *increase* the wage differential in a competitive market. It is only by raising the level of enforcement sufficiently high to eliminate the incentive for employers to hire the discriminated-against group that the wage differential can be eliminated. Evidently, this disturbing consequence of effective enforcement is the exact opposite of what illegalization is meant to achieve. Nevertheless, it bears strong resemblance to the well-known consequence of effective minimum wage enforcement: while a fraction of the sub-minimum wage workers gets a higher pay, another fraction ends up unemployed. The problem, however, is that in the minimum wage case at least some of the target population remains in the market and benefits from the law, whereas in the present case nobody does, as the entire group whose wages the law seeks to protect is kicked out of the market.

Two shortcomings of the model should be noted. First, the probability of getting caught and punished for wage discrimination has been assumed constant, independent of the wage differential or the employment levels. However, the greater the wage differential or the number of discriminated-against workers, the higher the probability that a complaint will be filed with the enforcement agency and the employer be sued for violating the equal wage law. Making the probability of detection dependent on the employer's choice variables would add more realism to the model, but at the cost of complicating the exposition and probably yielding ambiguous results. Second, the model has focused on the equal pay aspect of anti-discrimination legislation, abstracting from the fact that discriminatory hiring is illegal too. In particular, while the model suggests that if the level of enforcement is sufficiently high a competitive employer will avoid hiring any discriminated-against workers, costs of hiring discrimination suits that might be brought against him are ignored. Taking account of this risk could generate an incentive to hiring members of the discriminated-against group, but would also add a second source of uncertainty to the model, which would greatly complicate the analysis.

NOTES

[1] US anti-discrimination legislation began in 1963, when Congress passed the *Equal Pay Act* (*EPA*) which prohibits unequal pay for women who perform equal (or "substantially equal") work to men under the same conditions. A year later, *Title VII of the Civil Rights Act* was passed, forbidding wage discrimination against other minorities as well on the basis of race, color, religion, or national origin.

[2] Even Gary Becker, who in 1968 published his seminal work on crime and punishment, makes no reference to the criminality of discrimination in his 1971 revision of *The Economics of Discrimination*. For a comprehensive survey of the discrimination literature, see for example, Cain (1986).

[3] See, for example, Ashenfelter and Smith (1979), Chang and Ehrlich (1985), Lot and Roberts (1995), Yaniv (1994, 2001).

[4] For an extensive discussion of the theoretical arguments and empirical evidence supporting this assumption with respect to sex discrimination see Sharir (1995). Because no empirical evidence regarding labor supply elasticities by sex facing *a firm* seem to exist, Sharir relates to studies of labor supply elasticities to the *market*, such as Cardwell and Rosenzweig (1980), who estimated elasticities of supply of annual hours to the market by sex, finding that the mean wage elasticity for white males was 0.4 as compared with 0.103 for white never-married females.

[5] While the sign of Ω_1 cannot, in general, be determined, it will be unambiguously negative if $h_A \leq 1$. The sign of Ω_2 is negative as long as $e \leq 1$, which, as shown below, must be the case if wage discrimination is practiced. $\Omega > 0$ is assumed to hold at the optimum.

[6] Alternatively, substituting (2') into (3') and rearranging yields

$$w_A(A) - \left(1 + \frac{1}{h_B}\right) w_B(B) = -\frac{w_A(A)}{(1-e)h_A}\left(1 + \frac{B}{A}e\right) < 0 .$$

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