

Corporate Social Responsibility and Wage Discrimination in Unionized Oligopoly

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Abstract

The European labour markets are characterized by the existence of trade unions with extensive coverage whereas wage contracts are typically determined through decentralized firm-union bargaining. On the other hand, as it particularly refers to migrant and ethnic minority groups, equally-skilled workers often face lower reservation wages. We argue that these facts may lead unions to opt for discriminatory wage contracts across groups of employees. At the same time firms may nonetheless opt for non-discrimination in wages insofar as they would profitably “advertise” it as an exertion of *corporate social responsibility (csr)*. We show that, if the consumers’ valuation of non-discrimination is sufficiently high, the latter strategies would as well be compatible with the unions’ best interest in the equilibrium. Otherwise, we propose that to efficiently combat wage discrimination policy makers should instead of firms undertake *csr*-advertisement in the event of non-discrimination. Yet, such an antidiscrimination policy would always entail a net loss in social welfare.

Keywords: Unions, Oligopoly, Discriminatory Wage Contracts, Antidiscrimination Policy, Corporate Social Responsibility.

JEL Classification: C72, L15, L21, L22, J50, J51, J31.

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1. Introduction

The European economy has recently experienced a rapid growth of interest in the exertion and the implications of *corporate social responsibility (csr)* in the labour market. Perhaps because, according to the public stereotyping, workers are considered to be among the key stakeholders in any firm and there is evidence on the increasing importance which consumers attach to companies who demonstrate their social responsibility by practically recognizing that¹. At the same time the higher participation of ethnic minorities, the elderly, and people with disabilities in the labour market, challenge firms to adopt diversity and anti-discriminatory schemes, and an increasing number of firms are indeed doing so.² Not (necessarily) for ethical and legal reasons, but rather for the economic benefits which such policies are expected to deliver.³

Turning to the institutions, the *EU* in fact seems to be ahead of those trends by issuing the *Anti-discrimination Employment Directive (2000/78/EC)* establishing the principle of diversity and non-discrimination.⁴ While, according to the resolutions of the *World Summit on Sustainable Development (2002)*, a “partnership between firms, government, and civilians” has considered to be the key to progress on international sustainable development. Firms have therefore been assigned a two-fold role in enabling the society to reap the benefits of globalization: To exert

¹These are some of the key findings of the European Business Test Panel (EBTP, 2005) survey which examines the businesses case for diversity and their benefits across EU (25). The vast majority (83%) agreed that diversity initiating had a positive impact on their business. While a major benefit of diversity, receiving a score 38%, is its ability to enhance a firm’s reputation and image and its standing within local communities.

²Based on the EBTP (2005) survey, just under half (48%) of all businesses responding are actively engaged in promoting workplace diversity and anti-discrimination.

³For many firms legal compliance is a crucial reason for adopting anti-discriminatory policies. Yet, the driven incentive is the desired outcome (EBTP, 2005).

⁴ The purpose of Directive #78 (OJ L 303 27/11/2000), is to lay down a framework for combating discrimination, on the grounds of religion or beliefs, disability and age or sexual orientation, as regards employment and occupation. In particular, Directive #78 applies to all persons (regarding both the public and private sectors), in relation to: (a) Conditions for access to employment, to self-employment and to occupation, selection criteria and recruitment conditions, whatever is the branch of activity and the level of the professional hierarchy (including promotion). (b) Access to all types and to all levels of vocational guidance, vocational training, advanced vocational training and retraining, including practical work experience. (c) Employment and working conditions, including dismissals and pay, (d) Membership of and involvement in an organization of workers or employers, or any organization whose members carry on a particular profession, including the benefits provided for by such organizations.

(corporate) social responsibility regarding ethnic or other minorities in the labour market and also report that responsibility.

It thus seems that exerting (and informing the public about) *csr* in the labour market, as well as elsewhere, should today be amongst the firms' priorities. While, apart from setting up minimum legal standards for the minorities, the role of policy makers should in turn be to raise the public awareness on the benefits which such a firms' proactive approach can bring to the society.

The scope of this paper is to explore along the previous lines equality *versus* discrimination in the labour market, with a view to assess the factors and policies addressing either instance. In particular, given the *EU-Anti-discrimination Employment Directive*, our focus is on aspects of pay discrimination. To this end the empirical evidence provides a strong indication that differential treatment, particularly regarding ethnic minority groups and economic migrants, is (still) significant in Europe and it might be related with other than productivity factors.⁵

The theoretical foundations of labour market discrimination go back to the seminal papers of G. Becker, and K. Arrow. In summary, according to Becker's (1957) approach discrimination arises from "a taste for discrimination" against minority workers on the part of employers⁶; in Arrow's (1972) "statistical discrimination" hypothesis on the other hand discrimination results from the employers' uncertainty about the individual quality of workers which is biased against minority workers.⁷

In our approach, while we maintain employer's uncertainty (yet unbiased) about the relative individual quality of workers, we clearly abstain from any taste to discriminate on the

⁵See: Riach and Rich, (2002); Weichselbaumer, (2003); Carlsson and Rooth, (2006).

⁶ This motivation implies that employers may be willing to forego some profits to avoid the "psychic costs" of interracial contact.

⁷ Employers need a hiring test to unveil a worker's true productivity, since the screening process to determine his/her qualifications is costly. Therefore, and since prior expectation of productivity differs across groups, wage differentials may arise among workers of identical productivity.

part of anyone and against anybody. In a context of union-oligopoly decentralized bargaining we propose that wage discrimination among equally-skilled workers may endogenously emerge as long as workers can be *ex ante* grouped according to different opportunity cost(s) of employment (e.g., reservation wages). On the other hand nonetheless consumers may *ceteris paribus* attach higher valuation to the product of a firm which exerts *csr* by not discriminating in pay against anyone of its employees; of course, so long as they are informed about that. Hence, though wage discrimination seems to be the unions' optimal choice whenever consumers are ignorant and/or they do not care about non-discrimination in wages, firms may independently achieve higher profits by strategically opting for non-discrimination in wages and advertising it as an exertion of *csr*. If, by doing so, they can vertically differentiate their product enough to compensate for both the *csr*- advertisement costs and the higher unit costs of production which non-discrimination relative to discrimination entails. Such an option of strategic *csr* on the part of firms may in turn prove to be compatible with the unions' best interest, as well, if the consumers' valuation of non-discrimination is sufficiently high. If not, we subsequently propose that in order to deter wage discrimination a policy maker should instead of firms undertake *csr*-advertisement in the event of non-discrimination in wages. Yet, such an antidiscrimination policy would always entail a net loss in social welfare.

The rest of the paper is organized as follows. In section 2 we develop our structural model envisaging a unionized industrial sector where two firms producing *ex-ante* horizontally differentiated goods compete *a la* Cournot. Both firms may as well differentiate *ex-post* their products, vertically, in the event of firm-specific *csr*/ non-discrimination in wages. Under decentralized union-oligopoly bargaining, and in the presence of *ex-ante* grouping of the sector's workers according to different reservation wages, the postulated sequence of events is subsequently explained. Solving that game in section 3 we show that, and reason why, in the absence of an active anti-discrimination policy non-discrimination in pay may (or may not)

endogenously emerge. Based upon these findings, in section 4 we propose a public *csr*-advertisement policy to deter wage discrimination with an explicit view of its welfare effects. Our findings are conclusively evaluated in Section 5.

2. The Model

The product market of our reference industrial sector X consists of two unionized firms which compete *a la* Cournot in differentiated goods. We assume that each firm produces with *constant returns to scale* in only the labour input, given that the deployed capital input is always sufficient to produce the good. Specifically, the production function of each firm is $x_i = k_i N_i$; $i = 1, 2$, where x_i denotes output, N_i is the number of equally-skilled employees of firm i , and k_i is the productivity of labour in firm i . Restricting our analysis to firms with equally efficient production technologies we moreover normalize $k_i = 1$.

The population of consumers in our envisaged product market is comprised of individuals with identical tastes. All of them, perceiving *csr* exerted by any firm as an improvement in the quality of the firm's product. Let this improvement be of a measure $h \in \mathfrak{R}^+$ whenever in particular the firm does not discriminate wages across its employees. Of course such a perception for quality improvement materializes only so long as consumers are being informed about that. Let hence $s_i \in [0, 1]$ be a measure of the information received by the representative consumer about non-discrimination in wages on the part of firm i . Equivalently, s_i measures the probability with which the representative consumer will receive information about the latter event. Then, like in Hackner (2000), Garella and Petrakis (2005), our postulated preferences specification combines (possible) vertical differentiation with standard [*a la* Dixit (1979)] horizontal/brand differentiation. In particular, the utility function of the representative consumer in sector X is given by,

$$u(x_i, x_j, m) = (1 + hs_i)x_i + (1 + hs_j)x_j - (x_i^2 + x_j^2 - 2gx_ix_j)/2 + m \quad (1)$$

Where $x_i; i \neq j = 1, 2$, stands for the quantity of the good/brand i bought by the representative consumer, m is the respective quantity of a composite good (produced by the rest of the economy and sold at a price which is normalized to unity), and $g \in (0, 1)$ is a measure of substitutability among brands in sector X^8 . Note that, only if $s_i > 0$, h enters in the representative consumer's utility function additively, thus implying a vertical shift (of a measure $hs_i \in \mathfrak{R}^+$) in her demand function for brand i .

Normalizing the population of consumers to unity, the maximization of (1) *w.r.t.* $[x_1, x_2, m]$, subject to the representative consumer's budget constraint, subsequently delivers the inverse demand function for brand/firm i ,

$$p_i = 1 + hs_i - x_i - gx_j; j \neq i = 1, 2. \quad (2)$$

Note now that s_i effectively stands for the percentage of the total consumer population which are informed about the exertion of *csr* by firm i , whenever the latter firm does not discriminate wages. Informing consumers about *csr*/wage non discrimination is however costly. Hence, for vertical differentiation to be materialized, a *csr*-advertisement cost must be incurred

⁸ If $\gamma \rightarrow 0$ these brands are regarded as (almost) unrelated whereas $\gamma \rightarrow 1$ corresponds to the case of (almost) homogeneous goods/brands.

by firm i (or by someone else), whenever this firm does not discriminate wages.⁹ Assuming that the advertisement technology subjects to *decreasing returns* let this cost be,

$$C_i^A = \frac{1}{2} s_i^2 ; s_i \in [0,1] \quad . \quad (3)$$

Hence, the following profit formula arises for firm $i \neq j = 1,2$ in sector X .

$$\Pi_i = (1 + h s_i - x_i - g x_j) x_i - C_i(x_i) - C_i^A \quad (4)$$

Where $C_i(x_i) = C_i(N_i)$ stands for the production/labour costs of firm $i(=1,2)$, and $C_i^A \geq 0$ if $s_i \geq 0 (\Rightarrow h s_i \in [0, \mathfrak{R}^+])$.¹⁰

Turning our attention to the structure and conditions of the labour market in sector X , we assume that the (presumably) equally-skilled workers who find a job within each i firm are *by default* organized in to the firm's trade union. That is, under decentralized firm-union bargaining, a collective agreement struck in firm/union pair i covers any employee in firm i regardless of his/her union-membership status¹¹.

Yet, the workers opting for a job in sector X can be *ex ante* grouped according to different reservation wages. In particular, we postulate that there exist two groups of workers: N_0 and N_d , with reservation wages w_R and $d w_R$; $w_R > 0 > 0; 1 > d > 0$, respectively. Prominent examples for N_d seem to be the economic migrants as well as the aged and long-term

⁹ Verification of firm-specific *csr*/ wage non-discrimination can be assured if the particular firm (or someone else) delegates the relevant information processing to an independent agent, for instance to an advertisement company, with established credibility.

¹⁰ In case of course the firm i , and not someone else, undertakes *csr*-advertisement.

¹¹ There is evidence that such an *open shop* scheme is sustained in a number of European countries, like in Greece, France, and Spain (see e.g., Hartog and Theeuwes [1992], Vlassis [2003]).

unemployed workers. They typically face lower opportunity costs of employment, relative to “regular” (N_0) workers, and/or they may not be eligible to receive the unemployment benefit. In order to find a job, anywhere, a worker belonging to the N_d group would then be willing to accept a wage, even lower than the unemployment benefit (say w_R), equal to his/her disutility of work (dw_R). Hence, the union’s i objective function can be reasonably addressed as the following idiosyncratic variant of the Oswald’s (1982) total rents formula

$$U_i = (w_{0i} - w_R)N_{0i} + (w_{di} - dw_R)N_{di} ; i = 1,2 \quad (4)$$

On the other hand, given the above union membership configuration and assuming that employers are [unlike in Arrow (1972)] unbiased about the relative productivity of workers belonging to various groups, additional costs (i.e., beyond total labour costs: $C_i(x_i)$) are implied in (2) whenever employment is not “balanced” among groups. Following De Fontenay and Gans (2005) let specify those costs to be¹²,

$$q_i [N_{0i} - N_{di}]^2 ; i = 1,2 \quad (5)$$

Where q_i is normalized: $q_1 \equiv q \leq (>)1$; $q_2 \equiv 1$.

Given the European Council *Antidiscrimination Directives* (particularly #78), the sequence of events (see Fig.1) arising in the above context is then as follows.

¹² In the cited authors’ context this specification implies that, to the eyes of firms, distinct input suppliers (workers with different reservation wages in our context) provide imperfect substitute inputs.

At stage one a benevolent policy maker (*PM*), operating under balanced budget, handles a policy instrument (g) with the aim to combat wage discrimination in the labor market of sector X . The policy maker is driven by the following lexicographic objective.

○ *Activates the policy instrument (e.g., $g \neq 0$) so long as it is necessary and sufficient to induce non-discrimination in wages across employees, in each i firm, in the equilibrium.*

●○ *Chooses the value of the policy instrument so as to maximize (minimize) the following gain (loss) function:*

$$G(g) \equiv DSW_{g \neq 0} \equiv DCS(g) + DU(g) + DPS(g) - C(g)$$

(6)

Where, given the no-policy *status quo*, the operator D refers to the X -sector-specific derived differential in social welfare ($SW_{g \neq 0}$) in case that $g \neq 0$, relative to the case where $g = 0$. This differential, as typical, consists of similar differentials in *Consumer Surplus (CS)*, *Union Rents (U)*, and *Producer Surplus (PS)*, and $C(g)$ is a measure of the $g \neq 0$ ensuing costs.

At stage two decentralized wage bargains are conducted in each firm-union pair i , whilst firm-specific employment decisions are left to each firm's discretion. Given that the prospective employees/union members are *ex ante* differentiated regarding their reservation wages, our interest is at this stage focused on whether firm-union bargaining will *ex post* deliver discriminatory (**D**) or non-discriminatory (**ND**) firm-specific wage rates. Respectively that is, whether $w_{0i} \neq w_{di}$ or $w_{0i} = w_{di} = w_{ndi}$ in the (sub-game) equilibrium. We moreover assume that each union i , possesses all the power over the firm-specific wage bargain (*monopoly union*).

At stage three, if the firm-specific wage contract is non-discriminatory (e.g., **ND**; $w_{0i} = w_{di} = w_{ndi}$), each i firm chooses $s_i \in [0,1]$, optimally, so as in the continuation of the

game adequately advertise non-discrimination in firm-specific wages as an exertion of firm-specific *csr*; Otherwise (e.g., $\mathbf{D}; w_{0i} \neq w_{di}$), firm i by default sets $s_i = 0$.

At stage four all firms simultaneously and independently adjust their employment/output levels.¹³

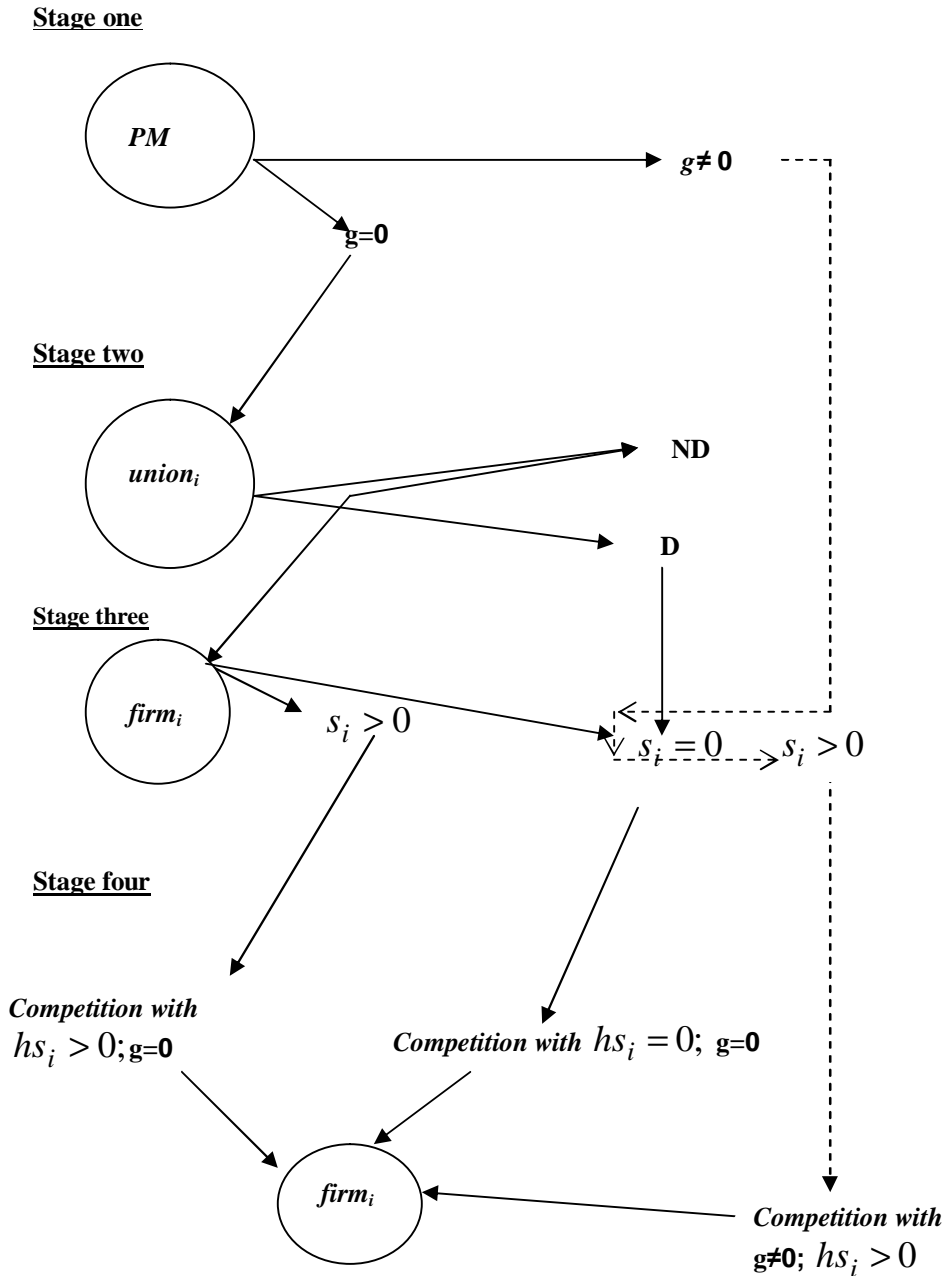


Figure 1: Sequence of Events

¹³ Note that, as it will be explicitly addressed later on, in case that under the no policy *status quo* $s_i = 0$ emerges at stage three, our postulated PM 's objective dictates that, if $g \neq 0$, then $s_i > 0$.

3. Corporate Social Responsibility versus Wage Discrimination

Assume for the moment that the no-policy *status quo* prevails at stage one. Solving the game by backwards induction, at stage four each i firm independently adjusts its employment/output so that to maximize its own profits (4).

Since $x_i = N_{0i} (\equiv x_{0i}) + N_{di} (\equiv x_{di})$; $i = 1, 2$, the sub-game equilibrium is then defined by the vectors (x_{01}, x_{d1}) , (x_{02}, x_{d2}) which respectively maximize (7.1), (7.2) below.

$$\begin{aligned} \Pi_1 = & \{ [1 + hs_1 - (x_{01} + x_{d1}) - g(x_{02} + x_{d2})] (x_{01} + x_{d1}) \\ & - (x_{01}w_{01} + x_{d1}w_{d1}) - q(x_{01} - x_{d1})^2 - s_1^2 / 2 \} \end{aligned} \quad (7.1)$$

$$\begin{aligned} \Pi_2 = & \{ [1 + hs_2 - (x_{02} + x_{d2}) - g(x_{01} + x_{d1})] (x_{02} + x_{d2}) \\ & - (x_{02}w_{02} + x_{d2}w_{d2}) - (x_{02} - x_{d2})^2 - s_2^2 / 2 \} \end{aligned} \quad (7.2)$$

The *f.o.c.s* yield the following group-specific optimal employment/output rules for firm(s) $i \neq j = 1, 2$.

$$x_{0i} = \frac{q_i [8\{(1 + hs_i) - w_{0i}\} - 2g\{2(hs_j + 1) - (w_{0j} + w_{dj})\}] - g^2(w_{0i} - w_{di})}{8q_i(4 - g^2)} \quad (8)$$

$$x_{di} = \frac{q_i [8\{(1 + hs_i) - w_{di}\} - 2g\{2(hs_j + 1) - (w_{0j} + w_{dj})\}] + g^2(w_{0i} - w_{di})}{8q_i(4 - g^2)} \quad (9)$$

Summing up by pairs (8)-(9) and rearranging, we may subsequently get a regular system of reaction functions , $x_i = RF_i(x_j)$, given the firms' $i \neq j = 1,2$ unit cost(s) of production, $(w_{0i} + w_{di})/2$, average over N_{0i}, N_{di} .

$$(x_{01} + x_{d1}) \equiv x_1 = \frac{1 + hs_1 - gx_2 - [(w_{01} + w_{d1})/2]}{2} \quad (10.1)$$

$$(x_{02} + x_{d2}) \equiv x_2 = \frac{1 + hs_2 - gx_1 - [(w_{02} + w_{d2})/2]}{2} \quad (10.2)$$

Solving (10.1)-(10.2) we in turn obtain the firm-specific total employment/output rules, (11.1), (11.2), which as expected imply strategic substitutability among the $i \neq j = 1,2$, unit costs of production Moreover, $s_{i \neq j=1,2}$ are similarly seen to be strategic substitutes from the point of view of firms $i \neq j = 1,2..$

$$(x_{01} + x_{d1}) \equiv x_1 = \frac{2hs_1 - 2[(w_{01} + w_{d1})/2 - 1] + g[(w_{02} + w_{d2})/2 - (1 + hs_2)]}{4 - g^2} \quad (11.1)$$

$$(x_{02} + x_{d2}) \equiv x_2 = \frac{2hs_2 - 2[(w_{02} + w_{d2})/2 - 1] + g[(w_{01} + w_{d1})/2 - (1 + hs_1)]}{4 - g^2} \quad (11.2)$$

Let us next consider stage three. As postulated, if the firm-specific wage contract derived from stage two is non-discriminatory (i.e., $w_{0i} = w_{di} = w_{ndi}$), each i firm optimally chooses $s_i \in [0,1]$ so as to adequately advertise it as an exertion of *csr* on the firm's part in the continuation of the game. Let, for the moment, assume that $w_{0i} = w_{di} = w_{ndi}$; $i \neq j = 1,2$, emerges at stage two in the (sub-game) equilibrium. In such an event, by substituting $(w_{0i} + w_{di})/2 = w_{ndi}$, through (11.1)-(11.2), into (7.1)-(7.2), and maximizing *w.r.t* s_1, s_2 , the optimal s_i rules are found to be,

$$s_1 = s_2 = \frac{4h(1 - w_{nd})}{(2 - g)(2 + g)^2 - 4h^2} \quad (12)$$

Let finally consider stage two. Given that firm 1[2] will unilaterally choose its output/employment level, $N_1 = ((x_{01} + x_{d1}) \equiv x_1$ [$N_2 = (x_{02} + x_{d2}) \equiv x_2$], so that to satisfy (11.1) [(11.2)], and that firms would in any case allocate output/employment, across the $-N_{0i}, N_{di}$ - groups of their employees, according to (8)-(9), union 1[2] unilaterally and independently from union 2[1] determines the firm-specific wage contract so as to maximize its total rents (4). Recall nonetheless that $w_{0i} = w_{di} = w_{ndi}$; $i \neq j = 1,2$, is previously addressed to be the candidate equilibrium. Therefore, substituting $(w_{0i} + w_{di})/2 = w_{ndi}$, through (11.1)-(11.2), into (4), given (12), from the *f.o.c.s* of the derived total rents formulae *w.r.t* w_{nd1}, w_{nd2} , we easily get the following non-discriminatory wage rate(s).

$$w_{nd1} = w_{nd2} = w_{nd} = \frac{[2 + w_R(1 + d)][2(2 - h^2) - g^2] - g(4 - g^2)}{8(2 - h^2) - g[(4 - g^2) + 4]} \quad (13)$$

By means of (12), the following optimal level(s) of *csr*-advertisement in turn arise in the (candidate) non-discriminatory equilibrium.¹⁴

$$s_1 = s_2 \equiv s_b = \frac{4h[w_R(1+d) - 2][2h^2 - 4(1-g^2)]}{[4h^2 - (2-g)(2+g)^2][g\{4 + (4-g)g\} - 8(2-h^2)]} \quad (14)$$

To check however whether (13)-(14) comprise part of a (sub-game perfect) *Nash* equilibrium, let consider a unilateral deviation (*d1*) from the candidate equilibrium on the part of union 1. That is, at stage two, and before the firm-specific wage scheme is announced, union 1 considers setting $w_{01} \neq w_{d1}$ instead of $w_{01} = w_{d1} = w_{nd1}$, given that $w_{nd2}; s_2 (\equiv s_2^{d1}); s_1 = 0$ will be consistently (e.g., given $w_{01} \neq w_{d1}$) chosen, respectively by union 2, firm 2, and firm 1, in the continuation of the game.¹⁵ The following $[w_{01}, w_{d1}, w_{nd2}, s_2]$ configuration is then seen to arise.

$$w_{01} = \frac{[4(g-2)^2(2+g)(4+g) - 64h^2] + [(2-g)(2+g)\{8 - (1-d)\} - 64h^2]w_R}{4[32(2-h^2) - g^2(20-g^2)]} \quad (15)$$

$$w_{d1} = w_{01} - \frac{(1-d)w_R}{2} \quad (16)$$

¹⁴ It can be readily checked that, if $(w_R, h, g, d) \in (0,1)$, then $0 < s_b < 1$.

¹⁵ We therefore postulate that stage two effectively consists of two sub-stages without delay.

$$w_{2nd} = \frac{\{32 - [g\{8 + g(12 - g)\} + h^2(16 - 4g)]\} + [(1 + d)(4 + g)\{4 - (g^2 + 2h^2)\}]w_R}{32(2 - h^2) - g^2(20 - g^2)} \quad (17)$$

$$s_2^{d1} = \frac{2h[4 - 2g\{1 - (w_{01} + w_{d1})/2\} - 4w_{2nd}]}{(g^2 - 4)^2 - 8h^2} \quad (18.a)$$

$$s_2^{d1} = \frac{4h[2 - w_R(1 + d)][(g - 2)^2(g + 2)(g + 4) - 4h^2(4 - g)]}{[32(2 - h^2) - g^2(20 - g^2)][(g^2 - 4)^2 - 8h^2]} \quad (18.b)$$

In consequence, for expository purpose considering $w_R = 0.1; g = q = 1$, the union's incentive to unilaterally deviate from the candidate non-discriminatory equilibrium [(13)], opting for a firm-specific discriminatory wage contract [(15) and (16)], depends on the sign of the following union rent differential (see Fig. 2a).¹⁶

$$DU = DU_1 \equiv [U_1^{d1}(w_{01}, w_{d1}; w_{nd2}) - U_{nd12}(w_{nd1}; w_{nd2})] =$$

$$\left\{ [(3 - 2h^2)(1.9 - 0.1d)^2] \left[\frac{(15 - 16h^2)}{2(9 - 8h^2)[32(2 - h^2) - 19]^2} - \frac{(9 - 12h^2)}{2(9 - 4h^2)[8(2 - h^2) - 7]^2} \right] + \frac{0.01(1 - d)^2}{64} \right\} \quad (19)$$

¹⁶ The $-[(w_R, h, g, d) \in (0, 1); q > (\leq 1)]$ -arising formulae of DU and $D\Pi$ [see (20) below] are available upon request.

On the other hand, to find out whether such a deviation is also compatible with the firm's best interest, we need further to check the sign of the following profit differential (see Fig. 2a).

$$D\Pi = D\Pi_1 \equiv [\Pi_1^{d1}(w_{01}, w_{d1}; w_{nd2}) - \Pi_{nd12}(w_{nd1}; w_{nd2})] =$$

$$\left\{ \frac{[(3 - 2h^2)(1.9 - 0.1d)^2] \left[\frac{(15 - 16h^2)}{(9 - 8h^2)[32(2 - h^2) - 19]^2} - \frac{(9 - 8h^2)}{(9 - 4h^2)[8(2 - h^2) - 7]^2} \right] + \frac{0.01(1 - d)^2}{64}} \right\} \quad (20)$$

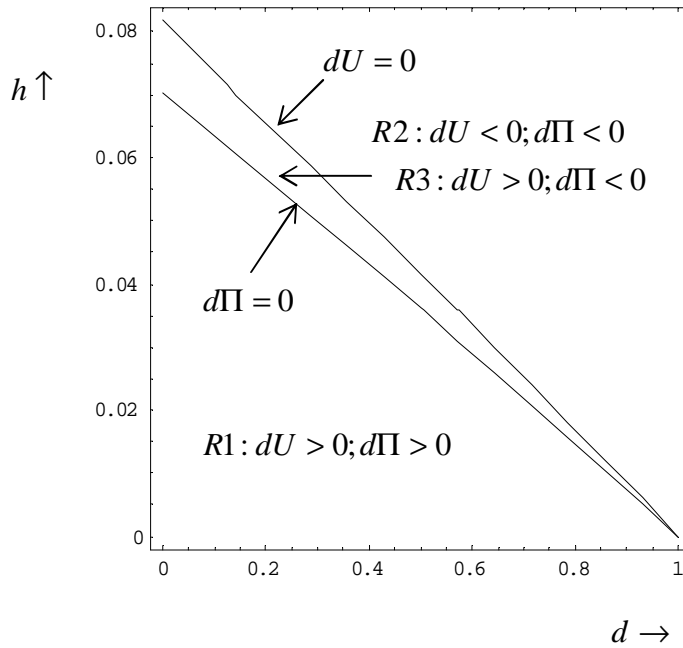


Figure2a: Incentives to discriminate;
Low $w_R = 0.1; g = q = 1$

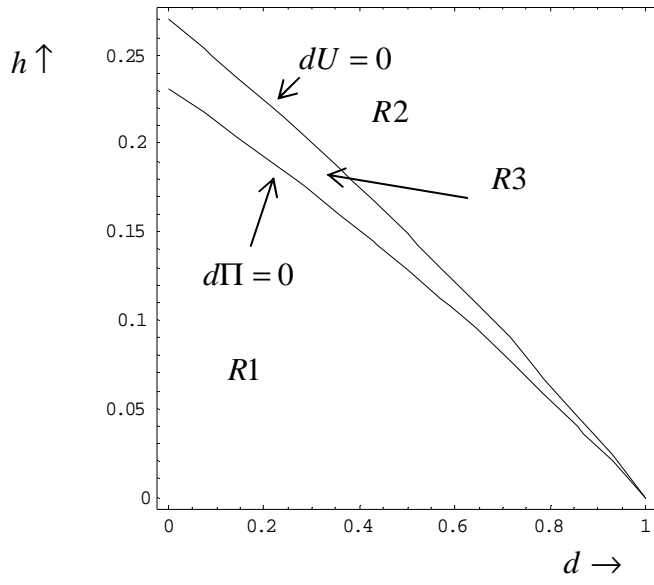


Figure 2b: Incentives to discriminate;
High $w_R = 0.3; g = q = 1$

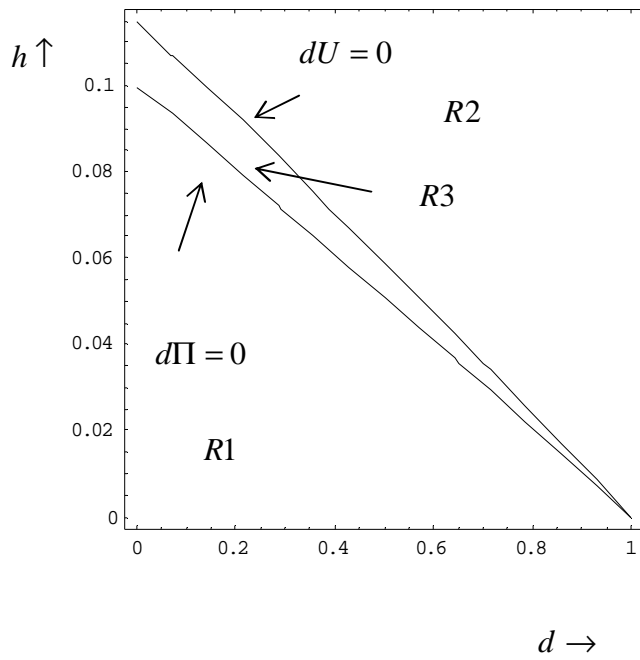


Figure 2c: Incentives to discriminate;
Low $q = 0.5; g = 1; w_R = 0.1$

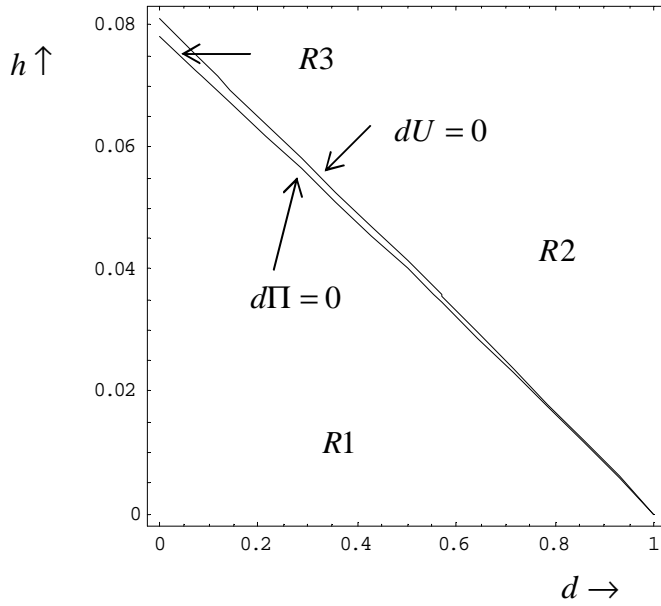


Figure 2d: Incentives to discriminate;
 Low $g = 0.5; q = 1; w_R = 0.1$

As illustrated in Fig. 2a, each of differentials (19) - (20) defines a similar -downwards sloping- locus in the $[h, d] \in [0,1]$ space. Thus, the latter space is partitioned into the following regions (R).

$$R1 : dU > 0; d\Pi > 0, R2 : dU < 0; d\Pi < 0, R3 : dU > 0; d\Pi < 0.$$

These partitions are then seen to establish the following lemma.

Lemma 1

For any given $0 < d < 1$, and $(w_R, g, q) \in (0,1]$, there exist $\underline{h}_U, \underline{h}_\Pi$; $\underline{h}_U(d)' < 0; \underline{h}_\Pi(d)' < 0$:

(i) $DU > (<)0$ if $h < (>)\underline{h}_U$.

(ii) $D\Pi > (<)0$ if $h < (>)\underline{h}_\Pi$.

(iii) $\underline{h}_U > \underline{h}_\Pi$.

For instance, if $\bar{d} \cong 0$, and $w_R = 0.1; g = q = 1$, then $DU > (<)0$ if $h < (>)\underline{h}_U \cong 0.085$; whilst, $D\Pi > (<)0$ if $h < (>)\underline{h}_\Pi \cong 0.075$.

To check the robustness of lemma 1 we have performed all possible partitions in response to changes in the $(w_R, g, q) \in (0,1)$ configuration; whilst lemma's 1's suggestions remained qualitatively invariant, quite intuitive insights have been moreover by that means arisen. As Fig. 2b shows, both $\underline{h}_U, \underline{h}_\Pi$ increase with w_R , yet it remains $\underline{h}_U > \underline{h}_\Pi$; whilst, $\underline{h}_U, \underline{h}_\Pi$ decrease with q similarly (see Fig.2c).¹⁷ On the other hand (see Fig.2d), while \underline{h}_U remains invariant, \underline{h}_Π decreases with g , hence, as g decreases \underline{h}_Π converges to \underline{h}_U (thus $R3$ shrinks).

To interpret those findings and conclude regarding the *Nash* equilibrium let us analytically examine what happens at stage four, in the event of a unilateral deviation (on the part of union 1) from non-discrimination in wages at stage two. Considering the symmetric-firms case (e.g., $q = 1$), the following differentials are for that quite illuminating.

$$D_{\text{unit cost}}_{12} \equiv \{[(w_{01} + w_{d1})/2] - w_{2nd}\} = \frac{2gh^2[w_R(1+d) - 2]}{32(2-h^2) - g^2(20-g^2)} \quad (21)$$

$$Dx_{12} \equiv [x_1^{d1} - x_{2nd}] = \frac{2h^2[16(2-h^2) - g^2(12-g^2)][w_R(1+d) - 2]}{[(4-g^2)^2 - 8h^2][32(2-h^2) - g^2(20-g^2)]} \quad (22)$$

Where, in the background of (22) the following reaction functions are operative (see Fig.3).

$$x_1^{d1} \equiv RF^{d1}(x_{2nd}) = \frac{1 - gx_{2nd} - [(w_{01} + w_{d1})/2]}{2} \quad (23)$$

¹⁷ Note that, thus addressing the case $q_1 \equiv q < 1 < q_2 \equiv 1$, and since (as it will become evident later on) discrimination incentives decrease with q , we do not need to (also) consider a similar unilateral deviation on the part of union 2 in order to check for the non-discriminatory *Nash* equilibrium when firms are asymmetric.

$$x_{2nd} \equiv RF(x_1^{d1}) = \frac{1 + hs_2 - gx_1^{d1} - (w_{2nd})}{2} \quad (24)$$

Note now that, in Fig.3, the candidate non-discriminatory equilibrium is depicted where the reaction functions [(25) below] intersect.

$$x_{ind} \equiv RF(x_{jnd}) = \frac{1 + hs_i - gx_{jnd} - (w_{ind})}{2} ; i \neq j = 1,2 \quad (25)$$

Then consider a unilateral deviation to wage discrimination on the part of union 1. In such an event, and since $w_R < 1 \Rightarrow w_R(1+d) < 2$, so long as $h > 0$ (22) takes a negative value. In Fig.3 that is depicted by $RF(x_{2nd})$ [$RF(x_{1nd})$] shifting to $RF^{d1}(x_{2nd})$ [$RF(x_1^{d1})$], implying a negative *business stealing effect (bse)* to firm's 1's production and profits arising from firm-specific wage discrimination. At the same time, however, (21) also takes a negative value, similarly implying a positive *unit cost effect (uce)* to firm's 1's production and profits. In Fig.3, the latter effect is depicted by $RF^{d1}(x_{2nd})$ shifting rightwards so as to counter (only a) part of the loss in firm's 1's employment/production and profits due to the *bse*; thus firm's profits shift to Π_1^{d1} , instead to Π_1^{d1-} where only the *bse* is considered. Apart from those effects of wage discrimination, two direct costs also contribute in (20) and are thus embedded in the emerging isoprofit locuses. The first is suggested by (5) and it is essentially a fixed cost to the firm whenever the firm's union discriminates wages; the firm would then adjust $N_{01}(=x_{01}) < N_{d1}(=x_{d1})$ according to (8)-(9), given (15)-(16). The second arises from (3) as a *csr-advertisement cost* incurred to the firm whenever its union delivers a non-discriminatory wage contract; hence, on the contrary, it would be zero under wage discrimination. What

nonetheless drives the non-discriminatory *Nash* equilibrium is that a non-profitable deviation to firm-specific discrimination in wages, like the one illustrated in Fig.3, would also be incompatible with the union's best interest if h is (as lemma 1 suggests) sufficiently high. The reasoning is as follows.

First of all note that, if $h = 0$, then firm-specific discrimination in wages ensues [as (21) and (22) suggest] no employment effect to the union's total rents. At the same time the union, driven by its utilitarian objective, would through wage discrimination internalize the effect of the exogenous factor d (which *ex ante* differentiates reservation wages) so that the remuneration of each one of its members to equally contribute to the union's total rents in the equilibrium. To grasp the latter adjustment, note that if $w_{0i} = w_{di}$ then the rent of an N_{di} -employee/union member would from the union's point of view considered to be higher than the rent of an N_{0i} -employee/union member, by as much as $(1-d)w_R$; hence, each union would opt for a discriminatory wage contract : $w_{0i} = w_{di} + \{(1-d)w_R/2\}$, in order to compensate that difference in group-specific rents in the equilibrium.

If, however, $h > 0$, then the gain in both employment and wages brought by non-discrimination [recall (22) and (21)] can be high enough so that the union would [as lemma 1 suggests] trade off wage discrimination, as above driven, with higher total rents. While, regarding the firm, the ensuing *csr-advertisement* cost and the adverse *uce* would be both compensated by a favorable *bse*. At this point recall (from Fig. 2a and Fig. 2d) that the firm's critical h (\underline{h}_Π) diverges from the union's one (\underline{h}_U) as the degree of brand differentiation decreases (e.g., as g increases). The reason is that, the higher is g , the stronger would be the adverse *bse* of firm-specific wage discrimination and, as a result, the higher would be the firm's relative to the union's incentive for non-discrimination in wages.

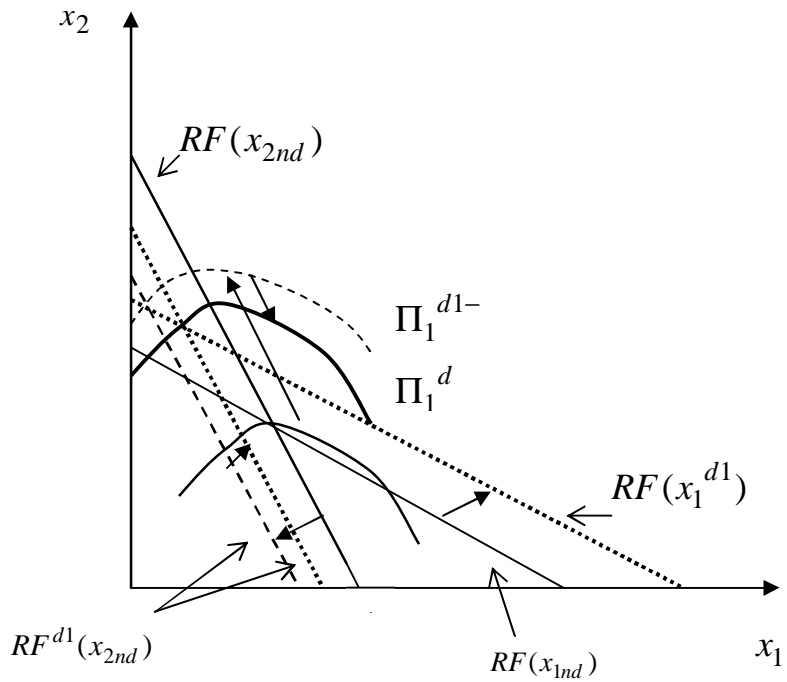


Figure 3: Non-Profitable deviation to Discrimination

In sum, the option of strategic *csr* on the firm's part via non-discrimination in wages may in equilibrium prove to be compatible with both the firm's and union's best interest for the same reason: High enough gain in firm-specific employment/production which is *ceteris paribus* driven by high enough h .

Our findings under the no-policy *status quo* ($g = 0$) are now seen to establish the following proposition.

Proposition 1

a. For any given $0 < d < 1$, and $(w_R, g, q) \in (0, 1]$, if $1 > h > \underline{h}_U \geq \underline{h}_\Pi > 0$, then in the equilibrium both unions $i \neq j = 1, 2$, independently set non-discriminatory firm-specific contracts $w_{0i} = w_{di} = w_{ndi}$; both firms $i \neq j = 1, 2$, independently adjust

$$s_i = \frac{4h(1 - w_{ndi})}{(2 - g)(2 + g)^2 - 4h^2}, \text{ so as to optimally advertise non-discrimination in firm-specific}$$

wages as an exertion of firm-specific csr.

b.¹⁸ Otherwise, i.e., if, for any given $0 < d < 1$, and $(w_R, g, q) \in (0, 1]$, $1 > \underline{h}_U > h > \underline{h}_\Pi > 0$, or $1 > \underline{h}_U \geq \underline{h}_\Pi > h > 0$, then in the equilibrium both unions $i \neq j = 1, 2$, independently set

$$\text{discriminatory firm-specific contracts : } w_{0i} = w_{di} + \frac{(1 - d)w_R}{2} ; \text{ both firms } i \neq j = 1, 2,$$

independently set $s_i = 0$.

4. Antidiscrimination Policy

Let now consider the policy maker's role at stage one. Under the light of foregoing analysis and as regards the policy maker's first order criterion (e.g., to combat wage discrimination), economic intuition suggests that non-discrimination in wages must be somehow subsidized whenever unions do not have sufficient incentives to opt for it; that is, as Proposition 1b suggests, whenever $\underline{h}_U > h > \underline{h}_\Pi$ or $\underline{h}_U \geq \underline{h}_\Pi > h$. In any of the latter instances, the reason why the union does not find a non-discriminatory wage contract to its best interest is that the ensuing gain in total rents, in terms of both higher wage(s) and employment, is not high enough to compensate the union for the distortion brought in its utilitarian objective. This is in turn due to insufficient csr-advertisement on the firm's part, the reason for the latter being that the csr-advertisement costs are unprofitably high relative to the gain expected from a higher market

¹⁸ The proof for the second part (b) of Proposition 1 is analogous to the proof of the first part (a) in the previous pages.

share. Therefore, a simple policy instrument for the policy maker to fight wage discrimination is to announce at stage one (and undertake at stage three) firm-specific *csr*-advertisement whenever, and only if, the firm-specific wage contract (at stage two) is non-discriminatory. That is, $s_i = s > 0$, with $g \neq 0$; $C_i^A = 0$. Under these premises let assume that the candidate equilibrium is non-discrimination in firm-specific wages, i.e. $w_{0i} = w_{di} \equiv w_{ndis}$; $i \neq j = 1, 2$. Repeating our backwards induction algorithm, the group-specific employment/output rules derived at stage four are,

$$x_{0is} = x_{dis} = [(2 - g)(1 + hs) - 2w_{ndis} + gw_{ndis}]/[2(4 - g^2)] \quad (26)$$

Whilst, the non-discriminatory wage contracts(s) derived at stage two are,

$$w_{ndis} = \frac{(2 - g)(1 + hs) + (1 + d)w_R}{4 - g} \quad (27)$$

Consider now a unilateral deviation (d2) to wage discrimination, on the part of union 2, at stage two.¹⁹ The following outcomes would then arise in the continuation of the game.

$$x_{01s} = x_{d1s} = [\{(2 - g) + 2hs\} - 2w_{nd1s} + g\{(w_{02s} + w_{d2s})/2\}]/[2(4 - g^2)] \quad (28.1)$$

$$x_{d2s}^{d2} = [8(1 - w_{d2s}) - 2g\{2(hs + 1) - 2w_{1nds}\} + g^2(w_{02s} - w_{d2s})]/[8(4 - g^2)] \quad (28.2a)$$

¹⁹Moreover, to avoid (also) checking for a unilateral deviation on the part of union $j \neq i$, in assuring the *Nash* equilibrium, we here address the case $q_1 \equiv q > 1 > q_2 \equiv 1$.

$$x_{02s}^{d2} = [8(1 - w_{02s}) - 2g\{2(hs + 1) - 2w_{1nds}\} - g^2(w_{02s} - w_{d2s})] / [8(4 - g^2)] \quad (28.2b)$$

$$w_{nd1s}^{d2} = \frac{\{(1 + hs)[8 + g(g + 2)]\} + \{(4 - g)(1 + d)w_R\}}{16 - g^2} \quad (29)$$

$$w_{02s} = \frac{\{4[8 - g(g + 2hs) + 2]\} + \{(4 + g)[8 - g(1 - d)]w_R\}}{4(16 - g^2)} \quad (30)$$

$$w_{d2s} = w_{02s} - \frac{(1 - d)w_R}{2} \quad (31)$$

$$Dunit\ cost_{21s}^{d2} \equiv \{[(w_{02s} + w_{d2s})/2] - w_{1nds}^{d2}\} = -\frac{(2 + g)hs}{(4 + g)} \quad (32)$$

$$Dx_{12s}^{d2} \equiv [x_{1s}^{d2} - x_{2s}^{d2}] = \frac{2hs}{(2 - g)(4 + g)} \quad (33)$$

Hence, the following critical differentials subsequently arise.

$$\begin{aligned}
& U_{d2s}(w_{02s}, w_{d2s}; w_{nd1s}) - U_{nd12s}(w_{nd1s}; w_{nd2s}) = \\
& - \frac{2hs(8-g^2)\{(2-g)(4+g)[2-(1+d)w_R] + [8-g(4+g)]hs\}}{[(16-g^2)]^2(4-g^2)} + \frac{(1-d)^2 w_R^2}{32}
\end{aligned} \tag{34}$$

$$\begin{aligned}
& \Pi_{d2s}(w_{02s}, w_{d2s}; w_{nd1s}) - \Pi_{nd12s}(w_{nd1s}; w_{nd2s}) = \\
& - \frac{4hs(8-g^2)\{(2-g)(4+g)[2-(1+d)w_R] + [8-g(4+g)]hs\}}{[64-g^2(20-g^2)]^2} + \frac{(1-d)^2 w_R^2}{64}
\end{aligned} \tag{35}$$

For $w_R = 0.1$, and $g = 1$, the $0 < s_r < 1$ roots of (34) = 0 and (35) = 0 respectively are,

$$s_{rU_2} = \frac{[(5\sqrt{7})\sqrt{405.1 - d(44.2 - 1.9d)}] - 140(1.9 - 0.1d)}{168h} \tag{36}$$

$$s_{r\Pi_2} = \frac{[(0.1)\sqrt{234.4 - d(25.3 - d)}] - (1.6 - 0.1d)}{h} \tag{37}$$

It can be then readily checked that $s_{rU_2} > s_{r\Pi_2}$ for $0 < h < 1$; $0 < d < 1$. It further proves that $s_{rU_2} > s_{r\Pi_2}$ for all $(w_R, h, g, d) \in (0,1)$.²⁰ Hence, so long as $s = s_{rU_2} \equiv s_{rU}$ is announced at stage one, union 2 would effectively be deterred to deviate to a discriminatory

²⁰ The $-(w_R, h, g, d) \in (0,1) - s_{rU_2}; s_{r\Pi_2}$ formulae are available upon request.

wage scheme at stage two; therefore the non-discriminatory wage scheme can assured to be the sub-game perfect *Nash* equilibrium.

As in turn regards the policy maker's second order criterion (e.g., $\max G(g)$) the following differentials are seen to arise under the suggested antidiscrimination policy.²¹

$$D[CS] \equiv \left\{ \left[\frac{(1+g)}{4} \left[\sum_{i=1}^2 x_i (w_{nd1s}, w_{nd2s})^2 - \sum_{i=1}^2 x_i (w_{01}, w_{d1}, w_{02}, w_{d2})^2 \right] \right\} = \frac{[2(1+hs) - (1+d)w_R]^2 - [2 - (1+d)w_R]^2}{(4-g)^2 (2+g)^2} \quad (38)$$

$$D[U] \equiv \left\{ \sum_{i=1}^2 U_i (w_{nd1s}, w_{nd2s}) - \sum_{i=1}^2 U_i (w_{01}, w_{d1}, w_{02}, w_{d2}) \right\} = \frac{4hs(2-g)[(2+hs) - (1+d)w_R]}{(4-g)^2 (2+g)} - \frac{(1-d)^2 (1+q)w_R^2}{32q} \quad (39)$$

$$D[PS] \equiv \left\{ \sum_{i=1}^2 \Pi_i (w_{nd1s}, w_{nd2s}) - \sum_{i=1}^2 \Pi_i (w_{01}, w_{d1}, w_{02}, w_{d2}) \right\} = \frac{8hs[(2+hs) - (1+d)w_R]}{(4-g)^2 (2+g)^2} - \frac{(1-d)^2 (1+q)w_R^2}{64q} \quad (40)$$

Henceforth, and considering that, under the suggested antidiscrimination policy,

$G(g) = \{D[CS] + D[PS] + D[U] - [2(\frac{1}{2}s^2) = s^2]\} \equiv G(g)_S$, it easily proves that the optimal $s(\equiv s_{\max})$ is given by (41) below.

²¹ Note that in our context of analysis (total) *Producer Surplus* (*PS*) is equal to (total) profits ($\sum_{i=1}^2 \Pi_i$).

$$s_{\max} = \frac{2h[2 - (1+d)w_R][7 + (1-g)g]}{(2+g)^2(4-g)^2 - 4[7 + (1-g)g]h^2} \quad (41)$$

It can be now readily checked that,

$$s_{\max} \Big|_{w_R = 0.1; g = 1} = \frac{14[1.9 - 0.1d]h}{81 - 28h^2} \quad (42)$$

Hence, it by simple comparison proves that $s_{\max} \Big|_{w_R = 0.1; g = 1} > s_{rU}$, for $0 < h < 1$;

$0 < d < 1$.

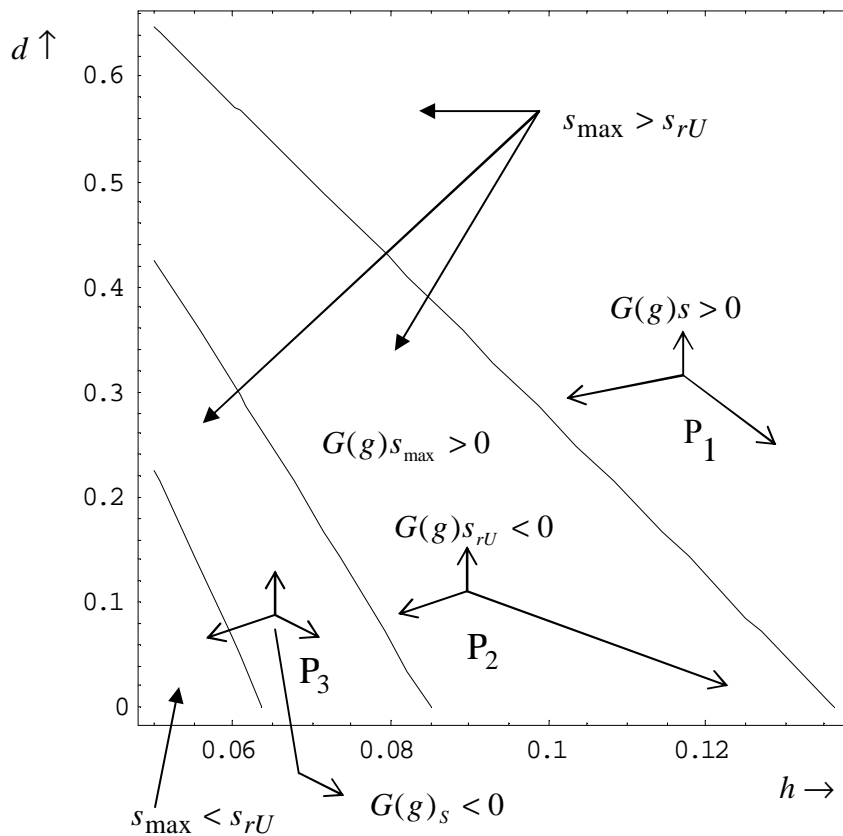


Figure 4

Yet, if $0 < g < 1$, it turns out that $s_{\max} < s_{rU}$ for sufficiently low $[h, d]$ values, suggesting that, for such parameter configurations, s_{\max} is non-binding and thus violates the *sufficiency* property of policy maker's first order criterion. For tractability, let $w_R = 0.1; g = 0.5$, and consider the symmetric firms case (e.g. $q_1 \equiv q = q_2 \equiv 1$). Then, as illustrated in Fig. 4, the $[h, d] \in [0,1]$ space is twice partitioned into the following regions (P).

$$P1: G(g)s_{\max} > 0; G(g)s_{rU} > 0; s_{\max} > s_{rU}, \quad P2: G(g)s_{\max} > 0; G(g)s_{rU} < 0; s_{\max} > s_{rU}, \quad P3: G(g)s_{\max} < 0; G(g)s_{rU} < 0; s_{\max} > (<)s_{rU}.$$

These partitions along with lemma 1 subsequently establish lemma 2.

Lemma 2

For any given $0 < d < 1$, and $(w_R, g, q) \in (0,1]$,

a. There exist $\bar{h}_U > \underline{h}_U (\geq \underline{h}_\Pi)$; $\bar{h}_U(d)' < 0; \underline{h}_U(d)' < 0; \underline{h}_\Pi(d)' < 0$:

(i) $G(g)s_{\max} > 0; G(g)s_{rU} > 0; s_{\max} > s_{rU}$, if $h > \bar{h}_U$.

(ii) $G(g)s_{\max} > 0; G(g)s_{rU} < 0; s_{\max} > s_{rU}$, if $\bar{h}_U > h > \underline{h}_U$.

(iii) $G(g)s_{\max} < 0; G(g)s_{rU} < 0; s_{\max} > s_{rU}$, if $\underline{h}_U > h$.

For instance, if $\bar{d} \cong 0$, and $w_R = 0.1; g = 0.5; q = 1$, then $\bar{h}_U \cong 0.14; \underline{h}_U = 0.085$.

b. There exist $0 < \underline{\underline{h}} < \underline{h}_\Pi \leq \underline{h}_U$; $\underline{\underline{h}}(d)' < 0; \underline{h}_U(d)' < 0; \underline{h}_\Pi(d)' < 0$:

$G(g)s_{\max} < 0; G(g)s_{rU} < 0; s_{\max} < s_{rU}$, if $h < \underline{\underline{h}}$.

For instance, if $\bar{d} \cong 0$, and $w_R = 0.1; g = 0.5; q = 1$, then $\underline{\underline{h}} = 0.065$.

Our findings regarding antidiscrimination policy can be now summarized in the following proposition.

Proposition 2

For any given $0 < d < 1$, and $(w_R, g, q) \in (0, 1]$,

a. If $h > \bar{h}_U$, or if $\bar{h}_U > h > \underline{h}_U$, then the policy maker, driven by the necessity property of the first order criterion of its lexicographic objective, does not activate any policy instrument (e.g., $g = 0$). Yet, under the no-policy status quo, non-discriminatory wage contracts emerge in the equilibrium.

b. If $\underline{h}_U > h > \underline{\underline{h}}$, or if $h < \underline{\underline{h}}$, then, to combat the emerging wage discrimination, the policy maker announces at stage one (and undertakes at stage three) firm-specific *csr*-advertisement, in the event of firm-specific non-discrimination in wages (at stage two). For that, the chosen level of firm-specific *csr*-advertisement is $s_{\max} (> s_{rU})$ in the first instance, while it is $s_{rU} (> s_{\max})$ in the second instance. In both instances, however, a net loss in social welfare arises in the policy driven- non-discriminatory equilibrium. Respectively, $G(g)s_{\max} < 0$, $G(g)s_{rU} < 0$. Yet, the net social welfare loss is lower (higher) if $\underline{h}_U > h > \underline{\underline{h}}$ ($h < \underline{\underline{h}}$).

5. Conclusions

Under quite regular assumptions regarding union preferences, and in accordance with the stylized facts across Europe, we propose that powerful (monopoly) unions may opt for discriminatory wage contracts across groups of employees. At the same time we nonetheless argue that firms may strategically opt for non-discrimination in firm-specific wages insofar as they would profitably advertise it as an exertion of corporate social responsibility (*csr*).

Our findings suggest that, if the consumers' valuation of non-discrimination is sufficiently high, then the firms' *csr*/non-discrimination strategies would as well be compatible with the unions' best interest in the equilibrium. If not, we propose that in order to combat wage discrimination a benevolent policy maker may find sufficient to announce and, instead of firms undertake, *csr*-advertisement in the event of non discrimination. It proves however that such a

policy always entails a net loss in social welfare, interestingly, yet intuitively, suggesting that, so long as the consumer-driven social valuation of non-discrimination is low enough, equality in pay across equally productive individuals is an inefficient arrangement.

Our analysis, though stylized, remains robust along a number of dimensions. First, our propositions would be qualitatively sustained either we allow, or ignore, for technological asymmetries across firms. Second, similar results would emerge whether firms adjust their quantities or their prices in the product market. Third, depending on the relative weights assigned to the partial welfare of each group of workers, unions may still opt for wage discrimination even if we allow for a more “egalitarian” union objective function. On this issue nonetheless it seems more promising to consider firm-union bargaining about wages and/or employment, with the union’s bargaining power in any instance being less than one.

On the other hand, three factual elements challenge the validity of our present suggestions. We have assumed that, first, equally skilled workers can be grouped according to different reservation wages. Second, unions effectively embody all kinds (groups) of equally skilled workers. Third, firm-union bargaining is decentralized at the firm level. Nonetheless, there is adequate evidence that those elements are often met in the European labour markets: Apart from the *open shop* scheme, firm-specific collective agreements are taking place in many European labour markets. While, given the European migrant experience over the last decades, it is rather unlikely reservation wages to be uniform, even across equally-skilled workers.

Moreover, we have implicitly assumed that monitoring discrimination (versus *csr*) is perfect and costless. Yet, it is easy to grasp that our proposed antidiscrimination policy is still valid if policy makers (effectively the society) are (also) willing to undertake the costs needed to ensure such monitoring.

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