Corporate Social Responsibility and Wage Discrimination in a Union-Oligopoly Model
Nick Drydakis and Minas Vlassis

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Nick Drydakis and Minas Vlassis, Department of Economics, University of Crete, University Campus at Gallos

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Corporate Social Responsibility and Wage Discrimination in a Union-Oligopoly Model

Summary
We consider a unionized Cournot duopoly endowed with equally-skilled workers. The latter, however, can be grouped according to different reservation wages. We show that, under decentralized firm-union bargaining, unions may independently opt for discriminatory wage contracts across groups of employees. Yet, firms may at the same time strategically opt for non-discrimination in wages, and advertise it as an exertion of corporate social responsibility (csr). If, by independently doing so, they can vertically differentiate their product enough to compensate for, both, the csr-advertising costs, and the higher costs of production which non discrimination entails. If not, we subsequently propose that, to deter wage discrimination, a benevolent policy maker may find sufficient, as well as efficient, to publicly undertake csr-advertising in the event of non-discrimination.

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

JEL classification: C72, L15, L21, L22, J50, J51, J31

Address for correspondence:
Nick Drydakis
Department of Economics
University of Crete
University Campus at Gallos
Rethymno 74100
Greece
E-mail: ndrydakis@econ.soc.uoc.gr
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 thought 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 it\(^1\). At the same time, and in particular, 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, while 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, since 2000, the Antidiscrimination Employment Directive (2000/78/EC) establishing the principle of diversity and non-discrimination.\(^4\)

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\(^1\)These 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.

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

\(^3\)For 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.
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 social responsibility, regarding ethnic (or other) minorities in the labour market, and also to report it. It thus seems that -exerting and advertising-[*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 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, the case(s) of equality *vs* discrimination in the labour market, with a view to assess the factors and policies addressing either instance. In particular, and given the *EU-Antidiscrimination Employment Directive*, our focus is on aspects of pay discrimination.

To this end, the empirical evidence provides a strong indication that discriminatory treatment, as in particular regards ethnic minority groups and economic migrants in Europe, is still significant, and it might be related with other than productivity factors⁵. As a possible one we postulate that, in heavily unionized labour markets (like the European ones are), even in the absence of any “taste for discrimination”⁶, as well as in the presence of costless

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⁶ In Becker’s model (1957), the motivation for discrimination is based on a “taste for discrimination,” implying that employers may be willing to forego some profits to avoid the “psychic costs” of interracial contact.
screening\textsuperscript{7} regarding workers’ qualifications, there is still room for different pay across equally-skilled employees in the same firm. So long as, workers can be grouped according to different reservation wages, and the firm-specific unions are of the -open shop-utilitarian type. Then, under decentralized firm-union bargaining, unions may independently opt for discriminatory wage contracts across such groups of employees. Which contracts, moreover prove to be profitable for the firms.

On the other hand, nonetheless, consumers may \textit{ceteris paribus} attach higher valuation to the product of a firm which exerts \textit{csr} by not discriminating in pay across groups of employees. Of course, if they are informed about that. Though wage discrimination is feasible and profitable, firms may then independently achieve even higher profits by strategically opting for, and advertising it as an exertion of \textit{csr}, non-discrimination in wages. So long as, by doing so, they can vertically differentiate their product enough to compensate for, both, the \textit{csr}-advertising costs and the higher costs of production which non-discrimination (relative to discrimination) entails. In effect, the option of strategic \textit{csr} may prove sufficient to make a firm be reluctant to accept its union’s offer to discriminate wages.

If not, we subsequently propose that, in order to deter wage discrimination, a benevolent policy maker may find sufficient, himself instead of each firm independently, to inform consumers about which firm is (not) discriminating. Saving on the \textit{csr}-advertising costs, a welfare gain would then emerge too.

\textsuperscript{7}In Arrow’s model (1972), of “statistical discrimination” employers make a hiring test that unveils the worker’s true productivity, while the screening process used to determine a worker’s qualifications is costly. Therefore, and since prior expectation of productivity differs across groups, wage differentials may arise among workers of identical productivity.
The rest of the paper is organized as follows. In section 2 we develop a structural model envisaging a unionized industrial sector where two firms producing horizontally differentiated goods, compete a la Cournot. Nonetheless, these firms may as well differentiate their products vertically, in the event of firm-specific csr/wage non-discrimination. 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 this 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-advertising 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 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 $k_i = 1$ ; $i = 1,2$. 
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 \( h \in \mathbb{R}^+ \) 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 it. Let, hence, \( s_i \in [0,1] \) be a measure of the information received by the representative consumer about wage non-discrimination in firm \( i \). Equivalently, \( s_i \) is the probability that the representative consumer will receive information about the latter event. Then, like in Hackner (2000), Garella and Petrakis (2005), our utility specification combines (possible) vertical differentiation with standard (a la Spence, 1976; Dixit, 1979; Bowley, 1924) horizontal (brand) differentiation. In particular, the utility function of the representative consumer in sector \( X \) is given by:

\[
U(x_1, x_2, m) = (1 + hs_1)x_1 + (1 + hs_2)x_2 - (x_1^2 + x_2^2 - 2\gamma x_1 x_2)/2 + m
\]  \hspace{1cm} (1)

Where, \( x_i; i = 1,2 \), 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, sold at a price normalized to unity), and \( \gamma \in (0,1) \) 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 \( hs_i \in \mathbb{R}^+ \) ) in

\^8 If \( \gamma \to 0 \) these brands are regarded as (almost) unrelated, whereas \( \gamma \to 1 \) corresponds to the case of (almost) homogeneous goods/brands.
her demand function for brand $i$. Informing consumers about csr/wage non
discrimination is, however, costly. Hence, for vertical differentiation to be
materialized, a csr-advertisement cost must be incurred 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: $C_i^A = \frac{1}{2} s_i^2 ; s_i \in [0,1].$

Then, normalizing the population of consumers to unity, the
maximization of (1) with respect to $x_1, x_2,$ and $m$, subject to the representative
consumer’s budget constraint, easily delivers the inverse demand function that
brand/firm $i$ faces, $p_j = 1 + hs_i - x_i - \gamma x_j ; j \neq i = 1,2$. Note now that $s_i$
effectively stands for the % of the total consumer population which are
informed about the exertion of csr by firm $i$, whenever the latter firm does not
discriminates wages. The following profit formula consequently arises, for
firm $i(=1,2),$ in sector $X$.

$$\Pi_i = (1 + hs_1 - x_1 - \gamma x_2)x_i - C_i(x_i) - C_i^A$$

(2)

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 $s_i \geq 0 \Rightarrow hs_i \in [0,\mathbb{R}^+]$

Turning, next, our attention to the structure and conditions of the
labour market in sector $X$, we assume that firm-union bargaining is
decentralized and a collective agreement struck in firm/union pair $i$ covers any

\(^9\) Verification of csr/ wage non-discrimination (in firm $i$) 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.
employee in firm $i$, regardless of his/her union-membership status. That is, the workers who find a job within each $i$ firm are by default organized into the firm’s labour union.\footnote{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]).} Furthermore, we assume that all workers opting for a job in sector $X$ are equally skilled. These workers can however be 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 $b$ and $(b - d)$; $b \geq 0$, $d > 0$, respectively. In the trade unions literature the reservation wage is typically treated to be a weighted average of the competitive wage and the unemployment benefit. We moreover consider that a group of workers ($N_d$) are differentiated regarding at least one of these two arguments. Prominent examples here seem to be the economic migrants as well as the elderly and long-term unemployed workers. They typically face lower opportunity costs of employment, relative to the “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 any of those groups would then be willing to accept a wage, even lower than the unemployment benefit, being equal to his/her disutility of work. Let next, for convenience, normalize $b = 0$. It can subsequently be postulated that the union’s $i$ objective function is an idiosyncratic variant of the Oswald’s (1982) total rents formula\footnote{Since the union is utilitarian (e.g. it treats all of its members equally), and $b = 0$, total union rents appear to be: $[N_0\text{- rents} = (w_{0i} - 0) N_0] + [N_d \text{- rents} = (w_{di} - (0 - d)) N_d]$.}:

$$U_i = w_{0i}N_{0i} + (w_{di} + d)N_{di} ; i = 1, 2$$

(3)

The sequence of events arising in the above context is as follows:
At stage one, given the EU-Antidiscrimination Employment Directive, a policy maker aims to combat wage discrimination in the labour market of sector X. The policy maker is benevolent. Hence, he is driven by the following lexicographic objective.

I. Activates a policy sufficient to deter wage discrimination across employees in any firm i.

II. Chooses the value of the policy instrument \((g)\) so as to maximize (minimize) the following gain(loss) function:

\[
G(g) \equiv D_g[CS] + D_g[PS] + D_g[U] - C_g(g)
\]

Where, given the no policy status quo, the operator \(D_g\) refers to the \(X\)-sector-specific derived differentials, regarding Consumer Surplus (CS), Producer Surplus (PS), and Union Rents (U), in case that a policy is undertaken, and \(C_g(g)\) stands for the policy’s costs.\(^{12}\)

At stage two decentralized bargains are conducted in each firm-union pair \(i\). We assume that each union retains the power to unilaterally set the firm-specific wage rate, whilst firm-specific employment decisions are left to each firm’s discretion.\(^{13}\) At this stage, given that the union members/prospective employees are ex ante differentiated regarding their reservation wage, our interest is, first, focused on whether unions will ex post set discriminatory firm-specific wage rates.\(^{14}\) Each \(i\) union may thus alternatively opt for,

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\(^{12}\) Note that in case that the no-policy status quo (where, effectively, \(g=0\)) entails wage non-discrimination, the policy maker’s criterion \(I\) is met. Hence, if the no-policy status quo also entails a higher (lower) welfare gain (loss), than any \(g\neq 0\), then, according to criterion \(II\), the no-policy status quo will ex-post prove to be optimal.

\(^{13}\) That is, for analytical convenience, we undertake the monopoly union variant of the right-to-manage hypothesis. This is a regular restriction in the union-oligopoly literature, and it is not expected to qualitatively affect our analysis (see Petrakis and Vlassis [2004], and the references therein).

\(^{14}\) According to a questionnaire conducted by the European Trade Union Confederation (2003), almost twenty-one (out of twenty-four) national trade unions surveyed agreed that,
• $w_{0i} \neq w_{di}$
• $w_{0i} = w_{di} = w_{ndi}$

Where, $w_{0i}$ ($w_{di}$) stands for the wage paid to the $N_{0i}$ ($N_{di}$)-employees, and $w_{ndi}$ denotes a non-discriminatory wage rate.

Turning to the firms’ choices, at this stage, if the firm-specific wage contract is non-discriminatory (e.g., if $w_{0i} = w_{di} = w_{ndi}$), then firm $i$ may optimally choose $s_i \in [0,1]$, so as to advertise wage non-discrimination (in firm $i$) as an exertion of CSR (by firm $i$), in the continuation of the game. Otherwise (e.g., if $w_{0i} \neq w_{di}$), firm $i$ by default sets $s_i = 0$.

At stage three all firms, simultaneously and independently, adjust their employment/output levels.

3. Corporate Social Responsibility and Wage Discrimination

Assume, for the moment, that the no-policy status quo prevails at stage one. Then, solving the game by backwards induction, at stage three each $i$ firm adjusts its output ($x_i$) so that to maximize its own profits (2).

Since $x_i = N_{0i} (\equiv x_{0i}) + N_{di} (\equiv x_{di})$ ; $i = 1,2$, the sub-game equilibrium is defined by the vectors: $(x_{o1}, x_{d1}),(x_{o2}, x_{d2})$, which independently maximize: (4.1) and (4.2), respectively.

$$\Pi_i = \left[ (1 + h s_i - x_{0i} - x_{d1} - \gamma (x_{02} - x_{d2})) (x_{01} + x_{d1}) - (x_{01} | w_{01} + x_{d1} w_{d1}) \right] - \frac{1}{2} s_i^2 \quad (4.1)$$

migrants and ethnic minorities face higher levels of unemployment, lower pay and slower promotion. Hence, the unions implicitly admit that they do not include migrant/minority equal treatment in their priorities. As we subsequently explain, the unions may in fact have an opposite incentive.
\[ \Pi_2 = [(1 + h s_2 - x_{02} - x_{d2} - \gamma(x_{01} - x_{d1}))(x_{02} + x_{d2}) - [x_{02} w_{02} + x_{d2} w_{d2}]] - \frac{1}{2} s^2 \]  \hfill (4.2)  

The \textit{f.o.c.s} yield\textsuperscript{15},

\begin{align*}
1 + hs_1 - 2x_{01} - 2x_{d1} - \gamma(x_{02} + x_{d2}) - w_{01} & = 0 \\
1 + hs_1 - 2x_{01} - 2x_{d1} - \gamma(x_{02} + x_{d2}) - w_{d1} & = 0 \\
1 + hs_2 - 2x_{02} - 2x_{d2} - \gamma(x_{01} + x_{d1}) - w_{02} & = 0 \\
1 + hs_2 - 2x_{02} - 2x_{d2} - \gamma(x_{01} + x_{d1}) - w_{d2} & = 0
\end{align*}  \hfill (5.1)\textsuperscript{--}(6.2)

Subsequently (5.1)-(6.2) can be solved so as to deliver optimal group-specific employment/output rules for each firm,

\begin{align*}
x_{01} &= \{15w_{01} - 10w_{d1} - 5hs_1 - 5 - \gamma[2\gamma(w_{01} - w_{d1}) + w_{02} + w_{d2} - 2 - 2hs_2]\}/(4\gamma^2 - 25) \\
x_{d1} &= \{15w_{d1} - 10w_{01} - 5hs_1 - 5 + \gamma[2\gamma(w_{01} - w_{d1}) - w_{02} - w_{d2} + 2 + 2hs_2]\}/(4\gamma^2 - 25) \hfill (7.1)\textsuperscript{--}(7.2)
\end{align*}

\begin{align*}
x_{02} &= \{15w_{02} - 10w_{d2} - 5hs_2 - 5 - \gamma[2\gamma(w_{02} - w_{d2}) + w_{01} + w_{d1} - 2 - 2hs_1]\}/(4\gamma^2 - 25) \\
x_{d2} &= \{15w_{d2} - 10w_{02} - 5hs_2 - 5 + \gamma[2\gamma(w_{02} - w_{d2}) - w_{01} - w_{d1} + 2 + 2hs_1]\}/(4\gamma^2 - 25) \hfill (8.1)\textsuperscript{--}(8.2)
\end{align*}

Summing up by pairs (7.1)-(7.2) and (8.1)-(8.2) and rearranging, we can obtain the sub-game equilibrium reduced forms, (9.1)-(9.2), implying

\textsuperscript{15} Note that the Hessians: \( H_{ii(2)} = \begin{vmatrix} -2 & -2 \\ -2 & -2 \end{vmatrix} \) are negative semi-definite. In consequence, (4.1), (4.2), are concave in \((x_{01}, x_{d1})\), \((x_{02}, x_{d2})\), respectively. Therefore, (5.1)-(6.1) and (5.2)-(6.2), are also sufficient conditions for the (independent) maximization problems.
(regular) strategic complementarity among the bargained wages and, hence, the unit costs of production (e.g., \(\frac{w_{0i} + w_{di}}{2}\)) of firms \(i \neq j = 1, 2\).

\[
x_1 = \left[\frac{10}{(25 - 4\gamma^2)}\right][(l + hs_1) - \left(\frac{w_{01} + w_{d1}}{2}\right) - (2\gamma/5)\{(l + hs_1) - \left(\frac{w_{02} + w_{d2}}{2}\right)\}] \tag{9.1}
\]

\[
x_1 = \left[\frac{10}{(25 - 4\gamma^2)}\right][[(l + hs_2) - \left(\frac{w_{02} + w_{d2}}{2}\right) - (2\gamma/5)\{(l + hs_2) - \left(\frac{w_{01} + w_{d1}}{2}\right)\}] \tag{9.2}
\]

Let next consider stage two. Given that firm \(I(2)\) will unilaterally choose its employment level, \(N_1 = ((x_{01} + x_{d1}) = x_1)\) \((N_2 = (x_{02} + x_{d2}) = x_2)\), so that to satisfy (9.1) – (9.2), union \(I(2)\), unilaterally and independently from union 2\((I)\), determines the firm-specific wage contract so that to maximize its total rents (4.1) – (4.2). As postulated, here each union faces a binary choice, whose ingredients are summarized below.

- **Wage Discrimination**

Assume that \(s_1 = s_2 = 0\). Then, substituting \((x_{01}, x_{d1})\) and \((x_{02}, x_{d2})\), from (7.1)-(8.2) into (3), from the f.o.c. of the derived total rents formulas \textit{w.r.t} \((w_{01}, w_{d1})\) and \((w_{02}, w_{d2})\), we get the following discriminatory wage rates.

\[
w_{01} = w_{02} = \frac{(4 + d)\gamma - 10}{4\gamma - 20} \tag{10.1}
\]

\[
w_{d1} = w_{d2} = \frac{1}{4} \left(\frac{10 + d}{\gamma - 5} + 4 - d\right) \tag{10.2}
\]
As it can be checked, \( w_{01} - w_{d1} = w_{02} - w_{d2} = \frac{d}{2} \). The intuition behind this result is that, if \( w_{0i} = w_{d_i} \), the rent of an \( N_{d_i} \)-employee/union member would, from the union’s point of view, effectively considered to be higher than that of an \( N_{0_i} \)-employee/union member, by as much as \( d \). Hence, each union opts for a discriminatory wage contract, \( w_{0i} = w_{d_i} + d/2 \), to exactly compensate for that difference in group-specific rents, in the equilibrium.

- **Wage Equality**

Next, assume that firms \( i \) independently decide to exert (and advertise) \( csr \), as long as they do not discriminate wages across their employees. In such an event, the optimal \( s_i \) can be found, by substituting (7.1)-(8.2) into (4.1)-(4.2) and maximizing w.r.t. \( s_1, s_2 \):

\[
\begin{align*}
  s_1 &= \frac{30h[(w_{01} + w_{d1} - 2)(20\gamma^2 + 30h^2 - 125) + (w_{02} + w_{d2} - 2)(50\gamma - 8\gamma^3)]}{900h^4 + 300h^2(4\gamma^2 - 25) - (4\gamma^2 - 25)^3} \quad (11.1) \\
  s_2 &= \frac{30h[(w_{02} + w_{d2} - 2)(20\gamma^2 + 30h^2 - 125) + (w_{01} + w_{d1} - 2)(50\gamma - 8\gamma^3)]}{900h^4 + 300h^2(4\gamma^2 - 25) - (4\gamma^2 - 25)^3} \quad (11.2)
\end{align*}
\]

Where, it can be checked that \( 0 < s_i < 1 \); \( i = 1,2 \), for \( \{d, \gamma\} \leq \{0.1, 0.5\} \) and \( h \) being sufficiently low.

Then, given (11.1)-(11.2), by setting \( w_{0i} = w_{d_i} = w_{n_{d_i}} \) into (3) we easily get the following non-discriminatory wage rate(s).
\[ w_{nd1} = w_{nd2} = \frac{(4\gamma^2 - 25)(5d + 4\gamma - 10) + (30d - 60)h^2}{500 + 4\gamma(4\gamma^2 - 20\gamma - 25) - 30h^2} \] (12)

In consequence, the firms’ (unions’) decision to opt for the (non-) discriminatory wage contract in the sub-game equilibrium depend on the sign of the following critical differentials:

\[ \Pi_{d1}(w_{01}, w_{d1}; w_{nd2}) - \Pi_{nd12}(w_{nd1}; w_{nd2}) \equiv D_1 \Pi\{d, h, \gamma\} \] (13.1)
\[ \Pi_{d12}(w_{01}; w_{d1}, w_{02}, w_{d2}) - \Pi_{nd1}(w_{nd1}; w_{02}, w_{d2}) \equiv D_2 \Pi\{d, h, \gamma\} \] (13.2)

\[ U_{d1}(w_{01}, w_{d1}; w_{nd2}) - U_{nd12}(w_{nd1}; w_{nd2}) \equiv D_1 U\{d, h, \gamma\} \] (14.1)
\[ U_{d12}(w_{01}; w_{d1}, w_{02}, w_{d2}) - U_{nd1}(w_{nd1}; w_{02}, w_{d2}) \equiv D_2 U\{d, h, \gamma\} \] (14.2)

It can subsequently be checked that, as expected, everything depends on the \{d, h, \gamma\} parameters’ configuration (see, e.g., Appendix I).\textsuperscript{16} For instance, (13.1)-(13.2) predict that, each firm will independently opt for the non-discriminatory wage contract if \( h > 0.2 \) and \{d, \gamma\} \( \leq \{0.1, 0.5\} \). By doing so, a firm anticipates that it can vertically differentiate its product enough, to compensate for both the \textit{csr}- advertising costs and the higher costs of production which non-discrimination (relative to discrimination) entails. This is evident (see e.g., Appendix 2) since, for all \{d, h, \gamma\} relevant values, the following differentials arise:

\textsuperscript{16} Given symmetry we have to check for only a firm/union pair’s incentive to deviate from a suggested equilibrium.
\[
\sum_{i=1}^{2} x_i(w_{0i}, w_{di}; w_{ndi}) - \sum_{i=1}^{2} x_i(w_{ndi}, w_{ndi}) < 0 \quad (15.1)
\]

\[
\sum_{i=1}^{2} x_i(w_{0i}, w_{di}; w_{0j}, w_{dj}) - \sum_{i=1}^{2} x_i(w_{ndi}, w_{0j}, w_{dj}) < 0 \quad (15.2)
\]

Thus, the option of strategic CSR in the labour market can effectively make a firm be reluctant to accept its union’s offer to discriminate wages. Whilst, differentials (14.1)-(14.2), predict that, under the same scenario, unions would also gain higher rents by opting for (and “offering”) the non-discriminatory wage scheme.

Our findings regarding the firms’ (and, effectively the) unions’ engagement in CSR strategies, via anti-discriminatory wage rates, are establishing Proposition 1.

**Proposition 1**

**a. In the absence of an active antidiscrimination policy, the union of firm \( i=1, 2 \), offers to its own firm a binary -take it or leave it- wage contract scheme, with the following options.**

1. \( w_{0i} \neq w_{di} \); \( w_{0i} = w_{di} + d/2 \), provided that \( w_{0i} \) (\( w_{di} \)) applies only to the \( N_{0i} \) (\( N_{di} \)) employees.

2. \( w_{0i} = w_{di} = w_{ndi} \), applying to any employee.

**b. Depending on the \( \{d,h,\gamma\} \) configuration, the profits of each \( i \) firm may increase under a.1 (a.2), in the equilibrium. Hence, in the former case, wage discrimination endogenously emerges.**
4. Antidiscrimination Policy

Under the light of Proposition 1, let now consider the policy maker’s role, at stage one. Here, and as regards the policy maker’s -order $I$- criterion, economic intuition suggests that $csr$ wage non-discrimination must be (somehow) subsidized, whenever firms do not have sufficient incentives to opt for it (i.e., in case $a.I$). This can be done with the policy maker undertaking the $csr$-advertisement cost, whenever a firm does not discriminates wages across its employees. Such a policy may in turn prove to be sufficient to (at least) nullify the profit (and/or union rent) differentials derived from independent firm-specific wage discrimination.

To check for the above explicitly, we first repeat our backwards induction algorithm, whenever, $s_i = s_j = s; i \neq j = 1,2$, and, yet, $C_i A = 0$.

The profit schedules then become:

$$\Pi_1 = [((1 + hs - x_{d1} - \gamma (x_{d2} - x_{d2}))(x_{d1} + x_{d1})] - [(x_{d1} + x_{d1})w_{nd1s}]] \quad (16.1)$$

$$\Pi_2 = [((1 + hs - x_{d2} - \gamma (x_{d1} - x_{d1}))(x_{d2} + x_{d2})] - [(x_{d2} + x_{d2})w_{nd2s}]] \quad (16.2)$$

Therefore, at stage three, the group-specific output rules become:

$$1 - 2x_{d1} - 2x_{d2} - \gamma (x_{d2} + x_{d2}) - w_{nd1s} + hs = 0 \quad (17.1)$$

$$1 - 2x_{d1} - 2x_{d2} - \gamma (x_{d2} + x_{d2}) - w_{nd1s} + hs = 0 \quad (17.2)$$

$$1 - 2x_{d2} - 2x_{d2} - \gamma (x_{d1} + x_{d1}) - w_{nd2s} + hs = 0 \quad (18.1)$$

$$1 - 2x_{d2} - 2x_{d2} - \gamma (x_{d1} + x_{d1}) - w_{nd2s} + hs = 0 \quad (18.2)$$
Subsequently (17.1)-(18.2) can be solved so as to deliver the following optimal group-specific employment/output rules for each firm.

\[ x_{d1} = x_{d1} = [5w_{nd1r} - 5hs - 5 + 2\gamma(1 + hs - w_{nd2r})]/[25 - 4\gamma^2] \quad (19.1) \]

\[ x_{d2} = x_{d2} = [5w_{nd2r} - 5hs - 5 + 2\gamma(1 + hs - w_{nd1r})]/[25 - 4\gamma^2] \quad (19.2) \]

Thus, we get the following (tentative) anti-discriminatory wage rate(s).

\[ w_{nd1s} = w_{nd2s} = \frac{5d + (4\gamma - 10)(1 + hs)}{\gamma - 20} \quad (20) \]

The emerging equilibrium can be subsequently assured by means of the following critical profit differentials.\(^{17}\)

\[ \Pi_{d1}(w_{q1}, w_{d1}; w_{nd2r}) - \Pi_{nd12}(w_{nd1r}; w_{nd2r}) \equiv D\Pi_x\{d, h, \gamma\} \quad (21) \]

\[ = d^2(625 - 125\gamma^2 + 4\gamma^2) + 300c\nu(2\gamma^2 - 25)hs - 300(2\gamma^2 - 25)(2\nu - 25)h^2s^2 \]

Where, \(c = 2 + d, \ e = 5 - 2\gamma, \ \nu = 5 + \gamma\)

The \(s\)-roots of (21), securing interior solutions, are found to be the following.

\[ s^+ = \frac{a + \sqrt{1200d^2(2\gamma^2 - 25)(625 - 125\gamma^2 + 4\gamma^4)\nu h^2(2\gamma^2 - 25)(2\gamma - 25)}}{600h^2(2\gamma^2 - 25)(2\gamma - 25)} \quad (22.1) \]

\[ s^- = -\frac{a + \sqrt{1200d^2(2\gamma^2 - 25)(625 - 125\gamma^2 + 4\gamma^4)\nu h^2(2\gamma^2 - 25)(2\gamma - 25)}}{600h^2(2\gamma^2 - 25)(2\gamma - 25)} \quad (22.2) \]

\(^{17}\) Given symmetry we have to check only for a firm’s attitude.
Where, \( a = -1 - 300hcev(2\gamma^2 - 25) \).

It can be then readily checked that \( s^+ > 0 \) and \( s^- < 0 \) for all relevant parameter values. Moreover, whenever \( s = s^+ \) it proves that,

\[
U_{d1}(w_{01}, w_{d1}, w_{nd2s^s}) - U_{nd12}(w_{nd1s}, w_{nd2s^s}) = D_1 s U\{d, h, \gamma\}
\]

\[
= -a - 1200bd^2e(\gamma^2 - 25)^2(2\gamma^2 - 25)(\gamma^2 - 5)(2\gamma^2 + 10\gamma - 25) - \sqrt{\gamma} < 0 \tag{23}
\]

Where, \( g = 1200d^2(2\gamma^2 - 25)(625 - 125\gamma^2 + 4\gamma^2)^2(2\gamma h^2 - 25 - a^2) \)

Hence, so long as \( s = s^+ \) both firms and unions will be deterred to opt for the discriminatory wage scheme, and equality wage rates will be set in the sub-game perfect equilibrium.

As regards the policy maker’s -order II- criterion, the following -welfare comprising- differentials are subsequently seen to arise.

\[
D_x[CS] = \left\{ \sum_{t=1}^{2} x_t(w_{nd1s}, w_{nd2s})^2 - \sum_{t=1}^{2} x_t(w_{01}, w_{d1}, w_{02}, w_{d2})^2 \right\} =
100hs(c + hs) / (\gamma - 5)b^2 \tag{24}
\]

\[
D_x[PS] = \left\{ \sum_{t=1}^{2} PS_t(w_{nd1s}, w_{nd2s})^2 - \sum_{t=1}^{2} PS_t(w_{01}, w_{d1}, w_{02}, w_{d2})^2 \right\} =
300hs(d + 2 + hs) - bd^2u^2 / 4b^2u^2 \tag{25}
\]

\[
D_x[U] = \left\{ \sum_{t=1}^{2} U_t(w_{nd1s}, w_{nd2s}) - \sum_{t=1}^{2} U_t(w_{01}, w_{d1}, w_{02}, w_{d2}) \right\} =
20ehs(d + hs + 2) - bd^2(\gamma - 5)^2 \tag{26}
\]
Therefore, and recalling that, \( G(g) \equiv D_g[CS] + D_g[PS] + D_g[U] - C_g(g) \), it follows that,

\[
G(g) = [20hs(4\gamma^2 - 5\gamma - 40)(c + hs) + u^2b^2(2s^2 - d^2)]/4b^2u^2
\]

(27)

Where, \( b = 5 + 2\gamma \), \( u = \gamma - 5 \)

It then easily proves that the policy optimal \((g=) s_{\text{max}}\) is given by,

\[
s_{\text{max}} = 5hc(4\gamma^2 - 5\gamma - 40)/[b^2u^2 + 10h^2(4\gamma^2 - 5\gamma - 40)]
\]

(28)

Where, it can be checked that, \( 0 < s_{\text{max}} < 1 \), for \( \{d,\gamma\} \leq \{0.1,0.5\} \) and \( h \) being sufficiently low.

Depending on the particular \( \{d, h, \gamma\} \) parameter configuration, within the above grid, a net welfare gain (or loss) may then arise (see, e.g., Appendix 3). For instance, a net welfare gain (loss) arises, if \( h > 0.13 \) \((h < 0.13)\) and \( \{d,\gamma\} \leq \{0.1,0.5\} \). Moreover, substituting \( s_{\text{max}} \) into (20), it can be assured that \( D\Pi, > 0 \) \((D\Pi, < 0)\), if \( h > 0.13 \) \((h < 0.13)\), and \( \{d,\gamma\} \leq \{0.1,0.5\} \) (see, e.g., Appendix 4). Furthermore, it can be checked that \( s_{\text{max}} > s^+ \), entailing that \( G(g = s_{\text{max}}) > G(g = s^+) \), if \( h > 0.135 \) and \( \{d,\gamma\} \leq \{0.1,0.5\} \) (see, e.g., Appendix 5).

Summarizing, if \( h > 0.13 \) and \( \{d,\gamma\} \leq \{0.1,0.5\} \), to combat wage discrimination the policy maker may choose \( g = s_{\text{max}} \), which entails a net welfare gain. Otherwise (e.g., if \( h < 0.13 \) and \( \{d,\gamma\} \leq \{0.1,0.5\} \)) he may
choose \( g = s^+ \), sufficient to combat wage discrimination but insufficient to ensure a net welfare gain.

Our findings regarding antidiscrimination policy are now establishing Proposition 2.

**Proposition 2**

**a.** To combat wage discrimination, a benevolent policy maker may find sufficient to undertake *csr*-advertisement, i.e., to sufficiently inform consumers about which firm does not discriminate wages across its employees.

**b.** For an adequate \( \{d, h, \gamma\} \) parameter configuration, this policy will deter both firms and unions from opting the discriminatory wage scheme, in the equilibrium. Depending on the particular \( \{d, h, \gamma\} \) parameter configuration, within the adequate grid, this policy may moreover lead to a social welfare gain.

**5. Conclusions**

In this paper we have developed a union-oligopoly sectoral framework reasoning wage discrimination among equally-skilled workers that, apart from elsewhere, is often observed in the heavily unionized European labour markets. Under quite regular assumptions regarding union behavior we have shown that, although the unions may independently offer to their own firms the option to profitably discriminate wages, across employees, firms may achieve even higher profits by independently adopting, and advertising as *csr*, a non wage discrimination policy. So long as, by doing so, they anticipate that
they can vertically differentiate their product enough from competitors to overcompensate for, both, the CSR- advertisement costs, and the higher costs of production which non discrimination (relative to discrimination) entails. If not, we subsequently propose that in order to combat wage discrimination a policy maker may find sufficient to publicly undertake firm-specific CSR-advertising. A social welfare gain may then also emerge, interestingly suggesting that, considering (strategic) CSR wage non-discrimination as an intangible public good, it may lead to efficiency gains.

Our analysis, though stylized, is robust along a number of dimensions, First, our propositions would be obtained either we allow for, or ignore, technological asymmetries among firms. Second, given the –unit cost invariance- property of discriminatory wage contracts, the same 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, even if we allow for a more “egalitarian union objective function, unions may still opt for wage discrimination.

On the other hand, three key elements challenge the validity of our suggestions. We have assumed that, first, equally skilled workers are differentiated (and, thus, can be grouped) regarding (according to) their 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 (recall footnote 5), firm-specific collective agreements are taking place in many European labour markets (see, e.g., Hartog and Theeuwes [1992]).
While, given the European migrant experience over the last decades, it is rather unlikely reservation wages to be uniform, even at the firm level.

Last but not least, we have implicitly assumed that discrimination monitoring on the part of policy makers is perfect and costless. Yet, it is easy to see that our propositions can be still robust if policy makers (effectively, the society) are willing to undertake the costs needed to ensure monitoring.

Appendix 1.
Comparing the deviant profits with the profits obtained in the universal \(csr\) case we get:

\[
\Pi_{d1}(w_{d1}, w_{d1}; w_{nd2}) - \Pi_{nd12}(w_{nd1}; w_{nd2}) = D\Pi_1 \{ d, h, \gamma \} \equiv (1')
\]

\[
-75c^2(i^2 - 75h^2)(i + 6h^2)^2 / 8(125 - 20\gamma^2 - \gamma) - 30h^2)^2 (30h^2 - eb^2)^2 + \\
+36(3 + 3d + 7d^2) + 3b^2 c^2 e^2 \gamma^2 / r + 48b^2 c^2 e^4 \gamma^2 (i^2 - 150h^2)^2 - \\
-40bc^2 e^3 (1 + 2\gamma) / (i^2 - 150h^2) + 2bc^2 ev(20 + \gamma)/r / 1800
\]

Obviously, as the following table displays, the sign of equation’s (1’) depends on the \(\{d, h, \gamma\}\) parameter configuration. It can be checked, for instance, that:

\[
D\Pi_1 \{ d, h, \gamma \} < 0 \quad (D\Pi_1 \{ d, h, \gamma \} > 0) \quad \text{if} \quad h > 0.2 \quad (h < 0.2)
\]

and \(\{d, \gamma\} \leq \{0.1, 0.5\}\). Similar results hold for the \(D\Pi_2\), \(DU_1\) and \(DU_2\) differentials.

<table>
<thead>
<tr>
<th>If (d) =</th>
<th>0.01</th>
<th>0.05</th>
<th>0.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Then (h) =</td>
<td>0.020</td>
<td>0.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(D\Pi_1)</th>
<th>(\text{If } h &gt; 0.02 \text{ then } D\Pi_1 &lt; 0)</th>
<th>(\text{If } h &lt; 0.1 \text{ then } D\Pi_1 &lt; 0)</th>
<th>(\text{If } h &gt; 0.2 \text{ then } D\Pi_1 &lt; 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D\Pi_2)</td>
<td>(\text{If } h &gt; 0.02 \text{ then } D\Pi_2 &lt; 0)</td>
<td>(\text{If } h &lt; 0.1 \text{ then } D\Pi_2 &lt; 0)</td>
<td>(\text{If } h &gt; 0.2 \text{ then } D\Pi_2 &lt; 0)</td>
</tr>
<tr>
<td>(DU_1)</td>
<td>(\text{If } h &gt; 0.02 \text{ then } DU_1 &lt; 0)</td>
<td>(\text{If } h &lt; 0.1 \text{ then } DU_1 &lt; 0)</td>
<td>(\text{If } h &gt; 0.2 \text{ then } DU_1 &lt; 0)</td>
</tr>
<tr>
<td>(DU_2)</td>
<td>(\text{If } h &gt; 0.02 \text{ then } DU_2 &lt; 0)</td>
<td>(\text{If } h &lt; 0.1 \text{ then } DU_2 &lt; 0)</td>
<td>(\text{If } h &gt; 0.2 \text{ then } DU_2 &lt; 0)</td>
</tr>
</tbody>
</table>
\[\Pi_{d12}(w_{d1}, w_{d2}) - \Pi_{n1d1}(w_{nd1}, w_{nd2}) = D\Pi_{2}(d, h, \gamma) \equiv (2')\]

\[300 + d[300d + d(700 - \gamma(50 - \gamma))]b^2u^2 - 75c^2(i^2 - 75h^2)(be^2v + 30uh^2)^2 / r(i^2 - 150h^2)^2\]

\[U_{d1}(w_{d1}, w_{d2}) - U_{n1d1}(w_{nd1}, w_{nd2}) = DU_{1}(d, h, \gamma) =\]

\[36f^2 - 3c^2e^2 - 3c^2e^2\gamma^2b^2 \times r^2 + 4bc^2e^2 / (i^2 - 150h^2) + 225be^2ez/be^2 - 30h^2) / (125 + 4\gamma u - 25\gamma - 30h^2)^2(30h^2 - b^2e) + 2bc^2 ev(10 + \gamma)/r\]

\[U_{d12}(w_{d1}, w_{d2}) - U_{n1d1}(w_{nd1}, w_{nd2}) = DU_{2}(d, h, \gamma) \equiv (4')\]

\[50f - \gamma(10c^2 + 15d^2\gamma - 2d^2\gamma^2) / bu^2 - 5ci(be^2v + 30uh^2)^2 / r^2(i^2 - 150h^2)\]

Where,
\[b = 5 + 2\gamma, \quad c = 2 + d, \quad e = 5 - 2\gamma, \quad r = 625 - 125\gamma^2 + 4\gamma^4 - 150h^2,\]
\[z = 4\gamma^2 + 6h - 25, \quad v = 5 + \gamma, \quad i = 25 - 4\gamma^2, \quad f = 1 + d + 3d^2, \quad u = \gamma - 5\]

**Appendix 2.**

Comparing the deviant outputs to the outputs obtained in the universal csr case, we get:

\[\sum_{i=1}^{2} x_i(w_{oi}, w_{oi}, w_{adj}) - \sum_{i=1}^{2} x_i(w_{ndi}, w_{adj}) \equiv \]

\[5ci(6h^2 - 4\gamma^2 - 25) / (125 + \gamma(4\gamma^2 - 30h^2 - 20\gamma - 25)(eb^2 + 30h^2)) + [5bc\{be^2v + 3h^2(4\gamma^2 + 10\gamma^2 - 75) + 2250ch^2] / [r(i^2 - 150h^2)] < 0\]

Similarly, we get:

\[\sum_{i=1}^{2} x_i(w_{oi}, w_{oi}, w_{adj}) - \sum_{i=1}^{2} x_i(w_{ndi}, w_{adj}) < 0\]

\[15ch^2[be^2u(25 + 2\gamma^2) - 150(25 - \gamma e h^2)] / (burt^2 - 150h^2) < 0\]

**Appendix 3.**

From the following table, it can be readily checked that:
\[G(g, s_{max}) > 0 (G(g, s_{max}) < 0) \text{ if } h > 0.13 (h < 0.13) \text{ and } \{d, \gamma \leq \{0.1,0.5\}.\]
If \( d = 0.01 \), \( 0.05 \), \( 0.1 \)

Then \( h = 0.07 \), \( 0.1 \), \( 0.13 \)

If \( h > 0.07 \) then \( G > 0 \)
If \( h < 0.07 \) then \( G < 0 \)

\( G(\Gamma_{\text{max}}) \)

If \( h > 0.07 \) then \( G > 0 \)
If \( h < 0.07 \) then \( G < 0 \)

Appendix 4.

It can be similarly checked that: \( D\Pi_j > 0 \) \( (D\Pi_j < 0) \) if \( h > 0.13 \) \( (h > 0.13) \)

and \( \{d,\gamma\} \subseteq \{0.1,0.5\} \).

If \( d = 0.01 \), \( 0.05 \), \( 0.1 \)

Then \( h = 0.01 \), \( 0.07 \), \( 0.13 \)

If \( h > 0.01 \) then \( D\Pi_j < 0 \)
If \( h < 0.01 \) then \( D\Pi_j > 0 \)

\( D\Pi_j \)

If \( h > 0.01 \) then \( D\Pi_j < 0 \)
If \( h < 0.01 \) then \( D\Pi_j > 0 \)

Appendix 5.

The \( D_5 = s^+ - s_{\text{max}} \) differential’s sign depends on the \{\( d, h, \gamma \}\} parameters configuration. It can be checked, for instance, that: \( D_5 < 0 \) \( (D_5 > 0) \) if \( h > 0.135 \) \( (h < 0.135) \) and \( \{d,\gamma\} \subseteq \{0.1,0.5\} \).

If \( d = 0.01 \), \( 0.05 \), \( 0.1 \)

Then \( h = 0.01 \), \( 0.07 \), \( 0.13 \)

If \( h > 0.015 \) then \( D_j < 0 \)
If \( h < 0.015 \) then \( D_j > 0 \)

\( D_j \)

If \( h > 0.015 \) then \( D_j < 0 \)
If \( h < 0.015 \) then \( D_j > 0 \)

References


Becker, G.S., (1957): The Economics of Discrimination, University of Chicago Press.


