On the Impact of Anti-Discrimination Legislation: Theory and Policy

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Abstract

This paper presents a partial equilibrium model of ethnic or gender pay differentials, in the presence of anti-discrimination policy. Policy consists of legislation allowing workers to take legal action against the discriminating employer. It is shown that legislation on fair recruitment has an unambiguous effect in reducing pay differentials, whereas legislation against unequal pay and unfair dismissal has an ambiguous effect and may produce the perverse consequence of widening pay differentials.

KEYWORDS: racial discrimination, sex discrimination, anti-discrimination policy, pay

JEL CLASSIFICATION: J7

1. Introduction

There is an enormous applied literature attempting to measure the impact of race and sex discrimination in the labour market (see Cain (1986) for a survey), and also well-known theoretical work on the sources of discrimination (Becker (1971), Cain (1986)). A considerable body of research has also examined the impact of anti-discrimination legislation introduced from the 1960s onwards in many countries[1].

[1] See Freeman (1973), Card and Krueger (1989) for the USA and Zabalza and Tzannatos (1985) for the UK).There has been some dispute about the size of the policy effect, since other

However, the steady reduction in pay differentials that we might expect from effective policy does not appear to have taken place. The reason for this may lie in the nature of the legislation[2].The first, and simpler, phase dealt with openly discriminatory practices that could be ended by means of a simple court or tribunal order (or by the threat of such an order). The bulk of these clear-cut examples of discrimination were almost certainly ended within a short time of the legislation being enacted, and they account for the sharp permanent reduction of pay differentials that we observe in time-series data at that time. After this first phase, most remaining discriminatory practices are indirect or disguised in some way, and come within the scope of the broader definitions of discrimination used by the later legislation (and which hinge on ill-defined concepts like comparable worth). In this phase of policy, disputes relate mostly to discriminatory treatment which may be received by individual employees, within an ostensibly non-discriminatory system of management practices adopted by their employers. Thus judgements tend to deal more with arguable individual cases than with explicit contractual terms affecting large numbers of workers, and, when successful, they are more likely to involve individual redress and compensation than the simple banning of discriminatory practices. From the employer's point of view, anti-discrimination policy has therefore become more an issue of an additional (and uncertain) potential cost, than a direct constraint on possible employment practice. Interestingly, in view of the arguments we present below, some of the clearest evidence (Leonard 1984,1989) of the effectiveness of anti-discrimination policy relates to the employment effects during the 1970s of affirmative action implemented by US executive orders, which put pressure on government contractors to meet targets for the employment of disadvantaged groups (see Leonard (1985) for an interesting analysis of the behaviour of the US government body charged with policing these orders - the Office of Federal Contract Compliance Programmes).

factors such as welfare reform, incomes policy and changes in industrial structure also occurred around the same time (Butler and Heckman (1977), Borooah and Lee (1985), Chiplin, Curran and Parsley (1980)), but the consensus view is that legislation was effective.

[2] In the USA, explicit sex discrimination in pay was made illegal by the 1963 Equal Pay Act, and more broadly defined discrimination on grounds of sex, race, colour, religion or national origin was made illegal in pay, promotion, hiring and firing by the 1964 Civil Rights Act. In Britain, the 1970 Equal Pay Act (not implemented until 1975) made formal sex discrimination in collective pay bargains illegal. This was followed by the 1975 Sex Discrimination Act and 1976 Race Relations Act, with a broad scope very similar to the American Civil Rights Act. The British Equal Opportunities Commission and Commission for Racial Equality, and the system of industrial tribunals, perform an enforcement function similar to that of the Equal Employment Opportunity Commission in the USA (See Bourn and Whitmore (1996)).

There are clearly two phases of policy here.

In general, attempts to analyse the effects of anti-discrimination policy have not been backed by any theoretical analysis of the way that different forms of anti-discrimination legislation might affect the behaviour of employers. Our aim in this paper is to give an analysis of these effects. We interpret policy in the second-phase sense described above, so that the primary consequences to the employer of successful anti-discrimination action are viewed as additional costs linked to the individual complainant, rather than direct intervention in general employment practice. These costs can be substantial. The rate of application to Industrial Tribunals (and the corresponding success rate) under the UK legislation have been rather lower than in the USA, and the potential penalties for employers were also relatively low up to 1995, when the limit on compensation amounts (previously £11,000) was removed. Even so, in a 1992 survey of cases (Department of Employment, 1994), the median total cost to an employer of a tribunal case (including time, fees and compensation) amounted to £1500 and £2300 for sex and race discrimination cases respectively, compared to only £49 as the median cost to an employee. These figures considerably understate the true costs, since they exclude the costs of preliminary internal grievance procedures, the cost of cases that do not reach tribunal, and intangible costs associated with adverse publicity and loss of reputation. Moreover, potential costs to employers are rising over time, as tribunals make increasing use of high compensation orders.

For analytical purposes, we need to identify three separate channels of policy. One is *equal pay policy*, which aims to penalise any arrangement involving different rates of pay for work of "comparable worth" supplied by members of different gender/racial groups. The second and third are *fair recruitment policy* and *fair dismissal policy,* which penalise any attempt to favour particular groups in hiring and firing respectively. In practice, these three strands of policy may be implemented simultaneously within a single piece of legislation, but in terms of their economic effects they are potentially quite different.

2. A simple model

Our model is almost the simplest possible. *There is a single firm, operating as a monopsonist in the labour market, and seeking to maximise the utility derived from profits. The model deals with partial equilibrium and is based on a 'market power' approach; we are not concerned here with price taking behaviour or with* *strategic interactions between firms.*[3] All workers are assumed identical except for their race or gender characteristics and purely random productivity variations.[4] In terms of the demographic characteristics, workers fall into two groups: the "advantaged" and "disadvantaged". We are not especially concerned here with the sources of discrimination between the two groups, and a range of different models is available in the literature for rationalising discriminatory behaviour by employers (Cain, 1986). We allow for two possibilities, chosen mainly for their simplicity. Our conclusions will have force in any model where costs are a major element of employment and wage-setting decisions.

The first source of discriminatory behaviour in our model is a possible difference in labour supply elasticities between the two groups. The conventional theory of price discrimination then suggests that the group with the lower supply elasticity will tend to receive lower wage offers in the absence of fully effective anti-discrimination policy. A second source of discrimination is misperception of average levels of individual productivity in the two groups. We assume that members of each group in fact have identical levels of productivity on average, but that the management of the firm may be prejudiced, in the sense that they believe that there is a systematic productivity differential between the two groups. Wage differences stemming from such perceptions would tend to be eliminated in the long run (Arrow, 1972) unless there are either significant adjustment costs or technological difficulties in identifying the productive contribution of individuals and thus refuting mistaken perceptions. These are both plausible reasons for the persistence of this type of prejudice. *Thirdly, the firm may have a 'taste for discrimination', as in Becker's managerial utility model (Becker, 1971). This implies that employment and wages of the disadvantaged workers will enter negatively the firm's utility function (see below).*

The firm is assumed to operate under the simplest possible fixed-coefficients technology. On average, each worker produces a fixed expected output q per period and requires a fixed set of complementary inputs costing an amount c per period. The employer is prejudiced in the sense that he believes the average levels of productivity are q and q^* for members of the advantaged and disadvantaged

[3] There is no obvious reason why our conclusion should be affected by strategic interactions between firms, and indeed Pudney and Shields (1998) establish closely related results in a different context, using a model with Cournot-Nash oligopsonist firms.

[4] This is not an important restriction. If there are several classes of worker with different productivity characteristics, then each forms a separate labour maket which can be analysed in the same way.

groups respectively, where $q > q^*$. There may be between-individual wage variations reflecting variations in perceived individual productivities, but on average the wage rates offered by the firm to the advantaged and disadvantaged groups are w and w^* respectively. Supplies of labour to the firm are given by the functions $s(w)$ and $s^*(w^*)$, *with slopes* $s'(w) \geq 0$, $s^{*\prime}(w^*) \geq 0$.[5] The *coefficient of pay discrimination* (Becker, 1971) is $\lambda = \frac{w}{w^*} - 1$, and we also define a *coefficient of employment discrimination* as $\mu = \frac{l}{l^*} - \rho$, where l and l^* are the firm's levels of employment from the two groups and ρ is the size ratio of these two groups in the relevant part of the working population. *The firm's utility function* $U(\Pi, \lambda, \mu)$ *depends on profits* Π *(defined below) and on* λ, μ*; it satisfies the standard assumptions* $U_\Pi > 0$, $U_\lambda > 0$, $U_\mu > 0$, $U_{\Pi\Pi} < 0$, $U_{\lambda\lambda} < 0$, $U_{\mu\mu} < 0$, $U_{\Pi\lambda} \geq 0$, $U_{\Pi\mu} \geq 0$, $U_{\lambda\mu} \geq 0$. In the absence of anti-discrimination policy, the firm believes that its optimal policy would be the following:

$$\max_{l,l^*,w,w^*} \left\{ \begin{array}{c} U(\Pi(l, l^*, w, w^*), \lambda(w, w^*), \mu(l, l^*)) \\ = U(l\,[q - c - w] + l^*\,[q^* - c - w^*]\,, \frac{w}{w^*} - 1, \frac{l}{l^*} - \rho) \end{array} \right\} \tag{2.1}$$

subject to $l \leq s(w)$ and $l^* \leq s^*(w^*)$. Provided q and q^* are both greater than c, and the two labour supplies are strictly positive at sufficiently low values of w and w^*, the optimum will involve mixed employment, with the labour supply constraints holding as strict equalities. The optimum can then be represented as the following maximisation problem:

$$\max_{w,w^*} \left\{ \begin{array}{c} U(\Pi(w, w^*), \lambda(w, w^*), \mu(w, w^*)) \\ = U(s(w)\,[q - c - w] + s^*(w^*)\,[q^* - c - w^*]\,, \frac{w}{w^*} - 1, \frac{s(w)}{s^*(w^*)} - \rho) \end{array} \right\} \tag{2.2}$$

The optimal wage levels then *satisfy* the following first-order conditions:

$$U_w = U_\Pi \Pi_w + U_\lambda \lambda_w + U_\mu \mu_w \geq 0 \tag{2.3}$$

$$U_{w^*} = U_\Pi \Pi_{w^*} + U_\lambda \lambda_{w^*} + U_\mu \mu_{w^*} \geq 0 \tag{2.4}$$

where:

$$\Pi_w = s'(w)[q - c - w] - s(w) = \tag{2.5}$$

$$= s'(w)\left[q - c - w(1 + \frac{1}{\epsilon(w)})\right], \tag{2.6}$$

$$\lambda_w = \frac{1}{w^*} > 0,\ \mu_w = \frac{s'(w)}{s(w^*)} \geq 0 \tag{2.7}$$

$$\Pi_{w^*} = s^{*\prime}(w^*)[q^* - c - w^*] - s^*(w^*) = \tag{2.8}$$

$$= s^{*\prime}(w^*)\left[q^* - c - w^*(1 + \frac{1}{\epsilon(w^*)})\right], \tag{2.9}$$

$$\lambda_{w^*} = -\frac{w}{(w^*)^2} < 0,\ \mu_{w^*} = -\frac{s(w)s^{*\prime}(w^*)}{(s^*(w^*))^2} \leq 0 \tag{2.10}$$

and:

$$\epsilon(w) = \frac{s'(w)w}{s(w)} \geq 0 \tag{2.11}$$

$$\epsilon^*(w^*) = \frac{s^{*\prime}(w^*)w^*}{s^*(w^*)} \geq 0 \tag{2.12}$$

are the supply elasticity functions. *It is important to note that* (2.3)-(2.4) *could hold as strict inequalities. If so, in the absence of anti-discrimination policy, there is a corner solution in w, w^*: the firm would like to pay the advantaged workers as much as it can, up to their net marginal productivity $q - c$.*

However, in the presence of anti-discrimination policy, if a firm does choose to practise discrimination, then there will be some probability that action is taken or threatened under the anti-discrimination law. Whether it involves external legal action or is restricted to internal grievance processes, and whether successful or not, such action *will* be costly to the firm, so the expected level of this cost *becomes* an additional element in the firms' cost function. Equal pay policy is assumed to penalise deviations of λ from 0, and fair recruitment and dismissal policies penalise deviations of μ from 0. These uncertain penalties will enter the firm's expected profit objective as additional expected costs. We are concerned here only with outcomes involving a potential case-specific cost (although the argument can be extended to cover the possibility that judgements may apply to more than one employees). We are not concerned with the small minority of cases where tribunals are able to identify and correct discrimination fully by decree. We now turn to the problem of modelling the discrimination costs introduced by legislation.

2.1. Equal pay policy

An equal-pay action against the firm proceeds in stages: first the worker must bring his or her grievance to the firm's attention; at this stage it may or may not be resolved. The next stage is a formal application to an industrial tribunal involving a mandatory conciliation phase; this involves a new set of legal costs for the firm. Finally, the case may or may not proceed to judgement; if successful, the judgement will impose further costs. We will work with a specification that does not depict this complex process in detail, but our specification is consistent with the complex sequential nature of the legal process, provided the probabilities of action and the cost consequences of those actions are dependent on the actual degree of pay discrimination, λ practised by the firm. We write the expected cost of such action as an amount $P(\lambda)$ per worker. Since every employee from the disadvantaged group has this associated cost, the addition to the firm's expected total costs produced by equal pay legislation is:

$$\text{Cost addition} = l^* \; [\theta \, P(\lambda)] \tag{2.13}$$

where $\theta \in [0, 1]$ is an artificial variable introduced to represent the severity of equal pay enforcement. The assumption here is that the impact of all stages of the grievance procedure are scaled up in proportion as enforcement severity rises from $\theta = 0$ (complete neglect, equivalent to an absence of legislation) to $\theta = 1$ (full enforcement). Note that the cost addition (2.13) is proportional to l^* and thus equal pay policy penalises the disadvantaged group in the sense that it imposes a cost $\theta \, P(\lambda)$ on the employment of an additional worker from the disadvantaged group, with no analogous cost for the advantaged group. The anti-discriminatory intention of the policy stems from the fact that $P(\lambda)$ increases with the degree of pay discrimination, *i.e.* $P'(\lambda) \geq 0$. Note that, in practice, equal pay legislation treats the advantaged and disadvantaged groups symmetrically, so that cases may also be brought by members of the advantaged group. However, such cases are relatively rare, and to simplify the analysis (at no essential cost in terms of generality), we assume that there is a zero probability of actions being initiated by members of the advantaged group.

2.2. Fair recruitment policy

Assume that the firm has a random process of labour turnover, at a uniform expected rate of τ separations per job per year. We postpone to section 3 consideration of the possibly more realistic case where discrimination has a distortionary effect on turnover rates. Every time a vacancy is filled by a member of the advantaged group, there is some probability that a protest or legal action will be lodged. We assume that the strength of such cases (and thus the costs of these actions) is related to the coefficient of employment discrimination, μ, for the firm. Thus the total additional expected costs stemming from fair recruitment policy are:

$$\begin{aligned}\text{Cost addition} &= \text{expected no.of vacancies filled} \\ &\quad \times\text{proportion filled from advantaged group} \\ &\quad \times\text{expected cost of action per vacancy} \\ &= \tau(l+l^*)\times\frac{l}{l+l^*}\times C_r(\mu)\end{aligned}$$

where $C_r(\mu)$ is the expected cost per relevant vacancy. If we define the function $R(\mu)=\tau C_r(\mu)$ and introduce a factor ϕ representing the severity of enforcement, the resulting cost addition is:

$$\text{Cost addition} = l\ [\phi\, R(\mu)] \tag{2.14}$$

where $R'(\mu)\geq 0$, *i.e. the policy increases with the degree of employment discrimination.* Fair recruitment policy differs from equal pay policy, since the additional cost element *is proportional to* l *and thus* tends to penalise employment from the advantaged rather than disadvantaged group.

2.3. Fair dismissal policy

Assume that workers have to be dismissed randomly (on disciplinary or redundancy grounds, say) at a uniform average rate σ, but that complaints for unfair dismissal on grounds of discrimination are only made by members of the disadvantaged group. Again, the strength of such complaints and the consequent cost is assumed to depend on the degree of apparent employment discrimination, μ, practised by the firm. Thus:

$$
\begin{aligned}
\text{Cost addition} &= \text{expected no. of dismissals} \\
&\quad \times \text{proportion of dismissals from disadvantaged group} \\
&\quad \times \text{expected cost of action per dismissal} \\
&= \sigma(l + l^*) \times \frac{l^*}{l + l^*} \times C_d(\mu)
\end{aligned}
$$

where $C_d(\mu)$ is the expected cost per relevant dismissal. Now define the function $D(\mu) = \sigma C_d(\mu)$ and introduce a factor ψ representing the severity of enforcement. The resulting cost addition is:

$$
\text{Cost addition} = l^* \; [\psi \, D(\mu)] \tag{2.15}
$$

where $D'(\mu) \geq 0$ since the policy increases with the degree of employment discrimination.. Like equal pay policy, *the cost addition is proportional to l^*; so* fair dismissal policy imposes an additional marginal cost on employment from the disadvantaged group.

2.4. Optimal wage-setting under anti-discrimination policy

Putting these additional costs into the profit function, the (misperceived) level of expected profit for the individual firm is:

$$
\Pi = s(w) \, [q - c - w - \phi \, R(\mu)] + s^*(w^*) \, [q^* - c - w^* - \theta \, P(\lambda) - \psi \, D(\mu)] \tag{2.16}
$$

As before, this new level of profit enters the utility function $U(\Pi, \lambda, \mu)$, which is maximised with respect to w and w^*, subject to the identities $\lambda = \frac{w}{w^*} - 1$ and $\mu = \frac{l}{l^*} - \rho$.

It is evident from (2.16) that the additional costs imposed by anti-discrimination legislation are complex in their effect. Equal pay and fair dismissal legislation introduce new per capita costs $\theta P + \psi D$ associated with any increase in employment from the disadvantaged group - tending to reduce demand for labour from that group and thus reduce w^* and worsen the pay differential. On the other hand, these additional costs decline as w^* and l^* are raised, thus giving an offsetting direct incentive in favour of equal pay. The position is modified by fair recruitment policy, which tends to offset further the decline in demand for "disadvantaged" labour produced by the introduction of P and D.

At an interior solution, the first-order conditions for *utility* maximisation *satisfy:*

$$U_w = U_\Pi \Pi_w + U_\lambda \lambda_w + U_\mu \mu_w = 0 \tag{2.17}$$
$$U_{w^*} = U_\Pi \Pi_{w^*} + U_\lambda \lambda_{w^*} + U_\mu \mu_{w^*} = 0 \tag{2.18}$$

where:

$$\begin{aligned}\Pi_w = s'(w)\,[q - c - w - \phi R(\mu) - (\mu+\rho)\phi R'(\mu) - \psi D'(\mu)] \\ -s(w) - \frac{s^*(w^*)}{w^*}\theta P'(\lambda)\end{aligned} \tag{2.19}$$

and:

$$\begin{aligned}\Pi_{w^*} = \; & s^{*\prime}(w^*)\left[q^* - c - w^* - \theta P(\lambda) - \psi D(\mu) + \phi R'(\mu)\,(\mu+\rho)^2 + (\mu+\rho)\psi D'(\mu)\right] \\ & -s^*(w^*) + \frac{s^*(w^*)}{w^*}\,\theta\,(1+\lambda)\,P'(\lambda)\end{aligned} \tag{2.20}$$

while $\lambda_w, \mu_w, \lambda_{w^*}, \mu_{w^*}$ *are defined in* (2.7)-(2.10). *Since* $\lambda_w > 0$, $\mu_w > 0$, $\lambda_{w^*} < 0$ *and* $\mu_{w^*} < 0$, *for* (2.17) *and* (2.18) *to hold as equalities we need* $\Pi_w \le 0$ *and* $\Pi_{w^*} \ge 0$: *looking at expressions* (2.19) *and* (2.20), *both these inequalities are possible, due to the extra terms deriving from the introduction of policy costs. So when equal pay, fair recruitment and fair dismissal policies are imposed on the firm, an interior solution in both wages can be obtained.* The solution of equations (2.17) and (2.18) defines the firm's *utility* maximising wage offers, $\widetilde{w}$ and $\widetilde{w}^*$, to the advantaged and disadvantaged groups respectively. We now consider how the optimal degree of pay and employment discrimination, $\widetilde{\lambda} = \widetilde{w}/\widetilde{w}^* - 1$ and $\widetilde{\mu} = s(\widetilde{w})/s^*(\widetilde{w}^*) - \rho$, respond to increasing degrees of severity of the three types of policy, starting from an initial position of no policy ($\theta = \phi = \psi = 0$).

For equal pay policy, the following comparative statics derivatives are of interest:

$$\frac{d\widetilde{\lambda}}{d\theta} = \frac{1}{\widetilde{w}^*}\left[\frac{d\widetilde{w}}{d\theta} - (\widetilde{\lambda}+1)\frac{d\widetilde{w}^*}{d\theta}\right]$$

$$= \frac{1}{\widetilde{w}^*\Delta}\left[-\left(\widetilde{U}_{w^*w^*} + (\widetilde{\lambda}+1)\widetilde{U}_{w^*w}\right)\widetilde{U}_{w\theta} + \left(\widetilde{U}_{w^*w} + (\widetilde{\lambda}+1)\widetilde{U}_{ww}\right)\widetilde{U}_{w^*\theta}\right] \tag{2.21}$$

$$\frac{d\widetilde{\mu}}{d\theta} = \frac{1}{\widetilde{s}^*}\left[\widetilde{s}'\frac{d\widetilde{w}}{d\theta} - (\widetilde{\mu}+\rho)\,\widetilde{s}^{*\prime}\frac{d\widetilde{w}^*}{d\theta}\right]$$

$$= \frac{1}{\widetilde{s}^*\Delta}\left[-\left(\widetilde{s}'\widetilde{U}_{w^*w^*} + \widetilde{s}^{*\prime}(\widetilde{\mu}+\rho)\widetilde{U}_{w^*w}\right)\widetilde{U}_{w\theta} + \left(\widetilde{s}'\widetilde{U}_{w^*w} + \widetilde{s}^{*\prime}(\widetilde{\mu}+\rho)\widetilde{U}_{ww}\right)\widetilde{U}_{w^*\theta}\right] \tag{2.22}$$

where $\Delta = \widetilde{U}_{w^*w^*}\widetilde{U}_{ww} - \widetilde{U}^2_{w^*w}$ is a strictly positive determinant[6], and subscripted terms like $\widetilde{U}_{ww}$ are the cross *partial* derivatives of the *maximum utility function (see Appendix for full definitions).* The terms $\widetilde{s}$, $\widetilde{s}^*$, $\widetilde{s}'$ and $\widetilde{s}^{*\prime}$ are the values of the supply functions and their derivatives, evaluated at the optimum. Similar expressions to (2.21) and (2.22) apply to fair recruitment and dismissal policy. Note that, in general, it is possible for $\widetilde{\lambda}$ and $\widetilde{\mu}$ to vary in opposite directions, if the two groups have very different labour supply responses.

To examine the effects of introducing anti-discrimination policy, we need to evaluate $d\widetilde{\lambda}/d\theta$ and $d\widetilde{\mu}/d\theta$ at the point $\theta = \phi = \psi = 0$. *We obtain the following results (the proof is in Appendix):*

Fair recruitment policy: $d\widetilde{\lambda}/d\phi$ and $d\widetilde{\mu}/d\phi$ are negative; in other words, the degrees of both pay and employment discrimination are unambiguously reduced by the (marginal) introduction of fair recruitment policy.

Equal pay and fair dismissal policy: $d\widetilde{\lambda}/d\theta$, $d\widetilde{\mu}/d\theta$, $d\widetilde{\lambda}/d\psi$ and $d\widetilde{\mu}/d\psi$ cannot be unambiguously signed, so the introduction of equal pay and fair dismissal policies may either reduce or increase pay and employment differentials. The reason for the ambiguity of these effects is that *in* (2.21) *and* (2.22) *the expressions for* $\widetilde{\Pi}_{w^*\theta}$ *and* $\widetilde{\Pi}_{w^*\psi}$ *in:*

$$\widetilde{U}_{w^*\theta} = \widetilde{U}_{\Pi\Pi}\widetilde{\Pi}_{w^*}\widetilde{\Pi}_{\theta} + \widetilde{U}_{\Pi}\widetilde{\Pi}_{w^*\theta} \tag{2.23}$$

$$\textit{where } \widetilde{\Pi}_{\theta} = -\,\widetilde{s}^*P(\widetilde{\lambda}) < 0,\ \widetilde{\Pi}_{w^*\theta} = -\,\widetilde{s}^{*\prime}P(\widetilde{\lambda}) + \frac{\widetilde{s}^*}{\widetilde{w}^*}\,P'(\widetilde{\lambda})\,(1+\lambda) \tag{2.24}$$

[6] *From the second order conditions holding at the stationary point $\widetilde{w}, \widetilde{w}^*$- see Appendix.*

and:

$$\widetilde{U}_{w^*\psi} = \widetilde{U}_{\Pi\Pi}\widetilde{\Pi}_{w^*}\widetilde{\Pi}_{\psi} + \widetilde{U}_{\Pi}\widetilde{\Pi}_{w^*\psi} \tag{2.25}$$

$$where\ \widetilde{\Pi}_{\psi} = -\,\widetilde{s}^* D(\widetilde{\lambda}) < 0,\ \widetilde{\Pi}_{w^*\psi} = \widetilde{s}^{*\prime}\ [(\widetilde{\mu} + \rho)\, D'(\widetilde{\mu}) - D(\mu)] \tag{2.26}$$

cannot be signed. Consider $\widetilde{\Pi}_{w^*\psi}$. There are two counteracting terms: $\widetilde{s}^{*\prime}(\widetilde{\mu} + \rho)\, D'(\widetilde{\mu})$ is a positive differential effect stemming from the fact that the dismissal cost $D(\mu)$ increases with the degree of discrimination; the second term is $-\widetilde{s}^{*\prime} D(\mu)$ which is a negative level effect stemming from the fact that the marginal disadvantaged employee brings an extra cost of $D(\mu)$. The relative sizes of the level and gradient of $D(\mu)$ (and similarly of $P(\lambda)$ *in* $\widetilde{\Pi}_{w^*\theta}$) determines which of these counteracting terms is dominant. This is an issue involving the detailed design and implementation of legal processes and penalties.

These are also important implications for the policy mix. Equal pay and fair dismissal policies are relatively easy to implement, since they affect workers who are already employees of the firm, and therefore have good access to the kind of information required to support a complaint of discrimination. The drawback is their possible ineffectiveness or even perverse effects. In contrast, actions under fair recruitment policy are clearly anti-discriminatory, but in practice they require individuals who have *not* been hired by the firm to make a complaint. As outsiders, such individuals are generally in a much weaker position to produce evidence to support their complaints.

2.5. A numerical example

We have demonstrated that, even in this simple model, no unambiguous result on the impact of equal pay and fair dismissal policy is available. To show that this ambiguity is more than a theoretical curiosity, we illustrate the result with a simulation based on a particular specification of the *utility*, supply and cost relationships. Parameter values are intended to be plausible, but are essentially arbitrary. The results have not been found to be very sensitive to anything but the specification of $P(.)$, $R(.)$ and $D(.)$. *In fact, we are able to demonstrate that identical results to those obtained in section 2.4 hold when firms maximise just profit (the 'pure monopsony' model)*[7]*; so below we present simulations based on*

[7] *A proof is available from the authors on request.*

this computationally easier case (whose advantage is that it does not require to specify a functional form for utility).

The level of individual productivity, q, is set at 1, and the perceived productivity differential, $(q - q^*)/q$, is 10%. Non-labour unit cost is $c = 0.1$. Labour supplies are:

$$s(w) = w^{2.5} \tag{2.27}$$

$$s^*(w^*) = 0.1\, w^{*2} \tag{2.28}$$

and the population demographic ratio is $\rho = 8$ (approximately equal to the ratio s/s^* in an equilibrium where pay equality is imposed exogenously). We use two variants of the model, based on alternative forms for the functions P, R and D. Each of these is specified as a probit for the probability of anti-discrimination action, multiplied by a specified form for the expected cost to the firm per action. We make two alternative functional form assumptions, differing in terms of the responsiveness of the costs to the coefficients of discrimination λ and μ.

(i) Flat costs

$$P(\lambda) = 1.2\, \Phi(\beta_0 + \beta_1 \lambda) \tag{2.29}$$

$$R(\mu) = 1.2\, \Phi(\beta_0 + \beta_1 \mu) \tag{2.30}$$

$$D(\mu) = 0.2\, \Phi(\beta_0 + \beta_1 \mu) \tag{2.31}$$

(ii) Steep costs

$$P(\lambda) = 5\, [\lambda]\, \Phi(\beta_0 + \beta_1 \lambda) \tag{2.32}$$

$$R(\mu) = 5\, [\mu]\, \Phi(\beta_0 + \beta_1 \mu) \tag{2.33}$$

$$D(\mu) = 0.5\ [\mu]\, \Phi(\beta_0 + \beta_1 \mu) \tag{2.34}$$

where $\beta_0 = -2$ and $\beta_1 = 0.5$; $\Phi(.)$ is the standard normal distribution function and $[x]$ denotes $\max\{x, 0\}$.

The simulation involves numerical optimisations over a grid of values for θ, ϕ or ψ, to maximise the profit function. This is done separately for each in turn, with the other two enforcement parameters set to zero. The shapes of the flat and steep expected cost curves are shown in figure 1, which plots $P(\lambda)$.*(all figures are reported at the end of the paper, after the Appendix)* The λ, θ locus resulting from the simulation is plotted in figure 2, and the λ, ϕ locus in figure 3. Plots for μ rather than λ are qualitatively similar, and plots for ψ are similar to those for θ; they are not presented here. Flat and steep costs clearly give rise to qualitatively different effects of policy on actual discrimination. If the costs to the firm of dealing with discrimination complaints are steeply rising with the degree of discrimination, then equal pay and fair dismissal policy will tend to diminish the practice of discrimination. On the other hand, if costs are significant even at low levels of discrimination and relatively insensitive to the magnitude of discrimination, such policy may be largely ineffective, or even have the perverse effect of increasing pay and recruitment differentials. On the other hand fair recruitment policy is unambiguous in its tendency to reduce the optimal degree of discrimination.

Note that simulations (not reported here) in which θ, ϕ and ψ are restricted to be equal (so that all three types of policy are used together and enforced to the same degree) also display divergent effects of enforcement on pay and employment discrimination between the cases of flat and steep costs.

3. Externality and turnover effects

It is quite reasonable to expect discrimination to have some impact on quit rates. A worker who perceives himself or herself to be unfairly treated may quit rather than stay on and fight a discrimination case - in other words use the "exit" rather than "voice" route (Freeman, 1980). We have taken account of this to some degree already, since the labour supply function $s^*(w^*)$ reflects the effect of the lower wage offered to members of the disadvantaged group. However, there may be two further effects. One is an externality in labour supply, with the supply of labour to the firm from the disadvantaged group being reduced as a direct consequence of discrimination: thus $l^* = s^*(w^*, \mu, \lambda)$, where s^* is increasing in w^* but decreasing in μ and λ. A second possible effect is on turnover rates. An employer may be able to sustain a steady-state average number of employees at $l^* = s^*(w^*, \mu, \lambda)$ by offering a wage w^* to members of the disadvantaged group, but this might also be associated with a higher rate of turnover than for workers from the advantaged group. The assumption here is that if workers perceive themselves to be discriminated against, they may consequently have a weaker attachment to the firm and thus have a lower expected job tenure. This in turn raises the average level of hiring and training costs for members of the disadvantaged group.

Assume as before that there is a uniform turnover rate τ (equal to the reciprocal of expected job tenure) for workers from the advantaged group. Workers from the disadvantaged group have a turnover rate of $\tau + \delta(\mu, \lambda)$, where δ is some increasing function of the two indices of discrimination, satisfying the condition $\delta(0, 0) = 0$. Let the hiring/training costs per head be h and redefine the cost c to include baseline turnover cost $h\tau$. Then expected profit is:

$$\begin{aligned}\Pi = s(w)\,[q - c - w - \phi\, R(\mu)] \\ + s^*(w^*, \mu, \lambda)\,[q^* - c - w^* - \theta\, P(\lambda) - \psi\, D(\mu) - h\delta(\mu, \lambda)]\end{aligned} \tag{3.1}$$

There are three new effects here: (i) labour supply from the disadvantaged group is decreased, tending to push up the wage and reduce the degree of discrimination; (ii) there is an additional turnover cost element associated with the employment of a member of the disadvanatged group, thus tending to reduce labour demand and increase the degree of discrimination; (iii) this additional turnover cost declines as the degree of discrimination is reduced, thus giving an additional incentive to reduce the degree of discrimination. There are again offsetting factors to be considered, and the effect of differential turnover may be either to reduce or increase the optimal degree of discrimination, depending on the steepness of the labour supply and differential turnover functions $s^*(\,.\,, \mu, \lambda)$ and $\delta(\mu, \lambda)$.

The extension of the comparative statics analysis of section 2.4 to this case is straightforward but very tedious. Rather than repeat the analysis here, we instead illustrate the robustness of our earlier conclusions by extending the numerical example to include externality and turnover effects. The model used here is identical to (2.27)-(2.34)except for the labour supply and turnover cost functions which now become:

$$s^*(w^*, \mu, \lambda) = 0.1 \left(1 - \frac{\mu + \lambda}{2}\right) w^{*2} \tag{3.2}$$

$$h\delta(\mu, \lambda) = 0.01\,(\mu + \lambda) \tag{3.3}$$

In terms of equal pay policy, even though the externalities in supply and differential turnover costs have the effect of reducing the simulated degree of discrimination (from 20.5% to 10.2% in the absence of enforcement), there remains a sharp qualitative difference between the "flat" and "steep" cost specifications, in terms of the implied relationship between the optimal degree of pay discrimination and the severity of policy enforcement. It remains at least theoretically possible for equal pay and fair dismissal policy to have perverse effects.

4. Conclusion and implications for policy design

Our main conclusion is that the impact of equal pay and fair dismissal policy on the optimum degree of discrimination for an employer depends critically on the way the legal system works. If the costs to the firm of dealing with discrimination complaints rise steeply with the degree of discrimination, then equal pay and fair dismissal policy will tend to reduce the extent of discrimination. On the other hand, if costs are significant even at low levels of discrimination and relatively insensitive to the magnitude of discrimination, such policy may be largely ineffective, or even have the perverse effect of increasing pay and recruitment differentials. This "flat cost" case is a real possibility. In Britain over the period 1976-95, only 7.5% of discrimination cases brought before industrial tribunals resulted in a judgement in favour of the complainant and, even allowing for out-of-court settlements and errors in tribunal decisions, this suggests that even non-discriminatory employers run some risk of costly anti-discrimination action being taken against them. The theoretical possibility of non-effectiveness of equal pay and fair dismissal policy is also consistent with the findings of much of the empirical literature, at least for the second phase of policy following the initial legislative impact. In terms of policy design, there is strong support in our results for the use of a generally cheap and permissive legal system which nevertheless has the power to award high levels of compensation in cases of extreme discrimination. Thus, in the UK, the removal of the £11,000 compensation limit which was imposed on industrial tribunals prior to 1995 seems a sensible reform, provide tribunals resort to high compensatory awards only in the most serious cases.

Our second finding is the unambiguous nature of the effect of fair recruitment policy. Public support and assistance for complainants on grounds of unfair recruitment is unambiguously anti-discriminatory, although difficult to make effective. It is tempting to go further than this, and claim support from our results for affirmative action based on employment quotas. By pushing the employer towards the target employment ratio, such policy would clearly decrease pay differentials in our model - a result that is consistent with empirical evidence on the employment effects of US affirmative action (Leonard 1984, 1989). However, the problems of implementation are serious. Crude affirmative action cannot easily handle differences in qualifications and abilities. Affirmative action in the form of employment quotas would only coincide with the idea of fair recruitment policy that is used here if the quotas correspond to the relevant population ratio ρ. However, this ratio should be defined as the ratio of the numbers of potential workers in the two populations *having the same set of productivity characteristics.* In practice, affirmative action may fall far short of this ideal.

Our final conclusion relates to the conduct of empirical work. We have demonstrated that anti-discrimination legislation is not a single homogeneous policy. There are three separate strands of policy relating to hiring, firing and pay, and these may have quite different effects. Convincing empirical work therefore needs to identify policy impacts in corresponding detail. It is difficult to see how this can be done without going beyond the usual wage and employment data, and looking at statistical evidence on individual firms' experience of internal and external grievance processes related to complaints of discrimination.

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5. *Appendix*

In order to sign expressions (2.21) and (2.22) of the text, that is:

$$\frac{d\widetilde{\lambda}}{d\theta} = \frac{1}{\widetilde{w}^*}\left[\frac{d\widetilde{w}}{d\theta} - (\widetilde{\lambda}+1)\frac{d\widetilde{w}^*}{d\theta}\right]$$

$$= \frac{-\left(\widetilde{U}_{w^*w^*} + (\widetilde{\lambda}+1)\widetilde{U}_{w^*w}\right)\widetilde{U}_{w\theta} + \left(\widetilde{U}_{w^*w} + (\widetilde{\lambda}+1)\widetilde{U}_{ww}\right)\widetilde{U}_{w^*\theta}}{\widetilde{w}^*\left(\widetilde{U}_{ww}\widetilde{U}_{w^*w^*} - (\widetilde{U}_{ww^*})^2\right)} \tag{5.1}$$

and:

$$\frac{d\widetilde{\mu}}{d\theta} = \frac{1}{\widetilde{s}^*}\left[\widetilde{s}'\frac{d\widetilde{w}}{d\theta} - (\widetilde{\mu}+\rho)\,\widetilde{s}^{*\prime}\frac{d\widetilde{w}^*}{d\theta}\right] =$$

$$\frac{-\left(\widetilde{s}'\widetilde{U}_{w^*w^*} + \widetilde{s}^{*\prime}(\widetilde{\mu}+\rho)\widetilde{U}_{w^*w}\right)\widetilde{U}_{w\theta} + \left(\widetilde{s}'\widetilde{U}_{w^*w} + \widetilde{s}^{*\prime}(\widetilde{\mu}+\rho)\widetilde{U}_{ww}\right)\widetilde{U}_{w^*\theta}}{\widetilde{s}^*\left(\widetilde{U}_{ww}\widetilde{U}_{w^*w^*} - (\widetilde{U}_{ww^*})^2\right)} \tag{5.2}$$

we proceed in two steps: first, we obtain $\frac{d\widetilde{w}}{d\theta}$ and $\frac{d\widetilde{w}^*}{d\theta}$ by comparative static analysis, in order to prove the (RHS of) the above equalities. Second, we need to sign $\widetilde{U}_{ww}, \widetilde{U}_{w^*w^*}, \widetilde{U}_{ww^*}, \widetilde{U}_{w\theta}$ and $\widetilde{U}_{w^*\theta}$, in order to sign $\frac{d\widetilde{\lambda}}{d\theta}$ and $\frac{d\widetilde{\mu}}{d\theta}$ at the point $\theta = \phi = \psi = 0$.

Differentiating the first order conditions (2.17) and (2.18) - which hold as identities at the optimum - with respect to θ gives:

$$\frac{d\widetilde{U}_w}{d\theta} = 0 = \widetilde{\Pi}_w\frac{d\widetilde{U}_\Pi}{d\theta} + \widetilde{\lambda}_w\frac{d\widetilde{U}_\lambda}{d\theta} + \widetilde{\mu}_w\frac{d\widetilde{U}_\mu}{d\theta} + \widetilde{U}_\Pi\frac{d\widetilde{\Pi}_w}{d\theta} + \widetilde{U}_\lambda\frac{d\widetilde{\lambda}_w}{d\theta} + \widetilde{U}_\mu\frac{d\widetilde{\mu}_w}{d\theta} \tag{5.3}$$

$$\frac{d\widetilde{U}_{w^*}}{d\theta} = 0 = \widetilde{\Pi}_{w^*}\frac{d\widetilde{U}_\Pi}{d\theta} + \widetilde{\lambda}_{w^*}\frac{d\widetilde{U}_\lambda}{d\theta} + \widetilde{\mu}_{w^*}\frac{d\widetilde{U}_\mu}{d\theta} + \widetilde{U}_\Pi\frac{d\widetilde{\Pi}_{w^*}}{d\theta} + \widetilde{U}_\lambda\frac{d\widetilde{\lambda}_{w^*}}{d\theta} + \widetilde{U}_\mu\frac{d\widetilde{\mu}_{w^*}}{d\theta} \tag{5.4}$$

where, in the order: