Employment inequality, employment regulation, and social welfare

Borooah, Vani

University of Ulster

2002

Vani K. Borooah[1]
University of Ulster[2]
Employment Inequality, Employment Regulation and Social Welfare
August 2001

This paper develops a model which explains the unequal employment outcomes of two groups -
defined as their, respective, likelihoods of successfully filling job vacancies - in terms of
disparities in their access to job networks. This disparity arises because a proportion of vacancies
are filled using informal methods so that, as a first step, information about vacancies only
becomes available through word-of-mouth; as a second step, appointments are based on the
recommendations of existing employees. If society is fragmented, then members of one group
will have little or no contact with members of the other group. Therefore, the power to inform
and to recommend becomes excessively concentrated in the group that dominates the workforce.
In such a situation, the role of fair-employment regulation is to ensure fair access to jobs for all.
While this generates equity gains, it could, by raising the costs of hiring and firing, also be
accompanied by efficiency losses. Whether social welfare increases or decreases as a result of
regulation depends on the relative magnitudes of these gains and losses.
JEL Classification: J71

Introduction

An important concern of public policy is to ensure that persons of different sex, ethnic
backgrounds, religion, colour etc., are treated fairly in the labour market. The existence of bodies
in the United Kingdom like the Equal Opportunities Commission, the Commission for Racial
Equality and the Fair Employment Commission (coupled with the prominence given by the
media to their findings) and the existence in the USA of the Civil Rights Act (coupled with the
prominence given by the media to judgements based on the Act), bears testimony to this. There
are two aspects to this concern. The first is whether differences in the remuneration to different
persons fully reflect disparities in their productivity or whether such differences are, wholly or in
part, the result of ``earnings discrimination''. The disparity in the USA between the earnings of
Southern Blacks and equally educated Whites prompted Title VII of the 1964 Civil Rights Act
banning discrimination in employment on grounds of race, sex and religion. The second aspect
relates to the differential chances, of persons from different groups, of finding suitable
employment. Here the concern is whether the different degrees of success that persons from
different groups have in finding jobs can be justified by inter-group differences in worker
attributes, or whether they are the result of ``employment discrimination''. The disparity in
Northern Ireland between the proportion of the Catholic and Protestant labour forces that were

---

[2]School of Public Policy, Economics and Law, University of Ulster, Newtownabbey, Northern
Ireland BT37 0QB (e-mail: VK.Borooah@ulster.ac.uk)

employed led to the 1989 Fair Employment (NI) Act. This Act put in place legislation to secure fair participation in employment for the two communities in Northern Ireland and created a Fair Employment Commission (FEC) to oversee its implementation.

This paper is concerned with the second issue. As Arrow (1998) has observed, although this is the more important of the two issues - in the sense of occurring more frequently in the ``real world'' - it is also the more neglected. The question most frequently asked in the literature on discrimination concerns the effect of segregated employment on the *wages* of the group discriminated against. However, as Higgs (1977) and Whately and Wright (1994) have argued in the context of the US labour market, black and white wages for the same job rarely differed by much. Instead, discrimination took the form of restricting the *range* of jobs to which Black persons were hired[3]. In similar fashion, Catholics in Northern Ireland were excluded from a range of industrial jobs, particular those relating to the Harland and Wolf shipyards - Northern Ireland's largest employer - in Belfast (Smith and Chambers, 1991).

The usual line of explanation, in economics, for employment discrimination follows the argument of Becker (1971): some White (or Protestant) employers, by attaching a special disutility to contact with Black (or Catholic) workers, have a ``taste for discrimination'' and this leads them to either exclude the offending persons from their workforce or to greatly restrict their numbers. In effect, the maximand of such employers contains, in addition to profits, a ``taste-related'' argument. Discriminating employers, by indulging their taste for discrimination, would earn a lower level of profits than their non-discriminating counterparts (who maximised *only* on profits) and would, therefore, eventually be driven out of business. Many economists have concluded from this analysis that market forces would lead discrimination to die a natural death and that, therefore, the helping hand of the legislative physician was not required. In addition, as Donohue (1998) points out, Becker's work strengthened the resolve of those who, philosophically, were opposed to state regulation. For example, Friedman (1962) argued that anti-discrimination legislation was conceptually no different from legislation (for example, like Hitler's Nuremberg laws) *requiring* employers to impose special disabilities on certain groups. Another explanation for discrimination (Krueger, 1963; Lewis, 1979; McAdams, 1995) is that its practice may accord with the *collective* interest of a group: the discriminating group - Whites in apartheid South Africa; Hutus in Burundi - acquires (economic, political and social) status by restricting the job opportunities of other groups and it imposes these restrictions by discriminating against them. In this ``status-production'' model, the forces generating discrimination stem not from the preferences of (some) individuals but from the collective preference of the group. Individuals within the group, who seek to break the group's injunctions against association with members of other groups, risk being penalised by their peers through *inter alia*: economic boycott; social ostracism; and violence against them and their property.

The third explanation for discrimination which is important in the economics literature is based on ``statistical discrimination'' (Phelps, 1972). Suppose that two groups, *on average*, do differ in terms of productivity - or that employers *believe* that they do - where these productivity differences are due to differences in some work-related attribute which is difficult, if not

---

[3]As Arrow (1998) points out, this form of discrimination was similar to residential segregation: Black persons were excluded from certain areas rather than being charged higher rents for living in those areas.

impossible, to observe (say, quality of education). In such situations, employers may use some observable quality (say, ethnicity) as a surrogate for these unobservable differences in attributes. Consequently, members of a particular group may be denied employment because employers feel that, on the balance of probabilities, they are likely to get better workers from other groups. This is a market-based explanation for discrimination which does not require tastes for discrimination.

The objections to Becker's (1971) model are well-known and have been set out succinctly by Arrow (1998). Briefly, they are that: (i) the introduction of additional variables into the maximand risks turning the theory into a tautology; (ii) a large fraction of the workforce is hired by large corporations and it is difficult to ascribe discriminatory tastes to impersonal entities; (iii) the theory does not explain discrimination by occupation; (iv) the theory predicts the demise of precisely the phenomenon it is meant to explain (Arrow, 1972). The McAdams (1995) model has been criticised by Epstein (1995): the relevance of discrimination based on social norms has diminished considerably in the modern world and many of the examples cited in support of the model - apartheid laws in South Africa; segregation laws in the Southern US states; the Protestant hegemony over jobs and housing in Northern Ireland - are defunct. The problem with statistical discrimination is that it can become a self-fulfilling prophecy. The rejection of applicants from a particular group by employers, who mistakenly believe that group identity and worker ability are correlated, could discourage members of the rejected group from making the human capital investments needed to be a good worker thus fulfilling employers' expectations that persons from this group do not make good workers[4] (Elmslie and Sedo, 1996).

Against this background, this paper develops a model which explains the unequal employment outcomes of two groups (Blacks and Whites) - defined as their, respective, likelihoods of successfully filling job vacancies - without resorting to the assumption that (some) employers, as individuals, have a taste for discrimination or to the assumption that prevailing social norms support discrimination and that individual employers depart from these norms at their peril. Nor does the model assume that (some) employers believe that group identity and worker quality are correlated. Instead, ``discrimination'' in the model arises, in the first instance, because information about vacancies is a private good which is available in unequal measure to Blacks - who receive less of it - and to Whites - who receive more of it.

This occurs because a proportion of jobs are filled through informal recruitment methods so that, as a first step, information about vacancies only becomes available by word-of-mouth; as a second step, appointments are based on the recommendations of existing employees. If society is fragmented then members of one group will have little or no contact with - or, if they do have contact, little or no sympathy for - members of the other group. In such a situation, the power to inform and to recommend is inordinately concentrated in the group that dominates the workforce. If this group happens to be Whites, then Blacks have a lower chance of filling vacancies because, relative to White job-seekers, they lack both information about vacancies and sponsors to support their applications. The two forces that drive the model are, therefore, *informal recruitment methods* and *social fragmentation* and these two forces acting in concert result in a *jobs-network* (Rees and Schultz, 1970; Granovetter, 1974 and 1988; White, 1995). The

---

[4]See Kirschenman and Neckerman (1991) for evidence on employer attudes in Chicago towards the worker-quality of Hispanics and Blacks.

central point of the model is to show that because Black job-seekers do not have the same degree of access to the jobs-network as do White job-seekers, their employment outcomes are worse than those for Whites.

The purpose of fair-employment regulation is to afford fairer participation in employment for members of the disadvantaged group. This involves emasculating the jobs-network by insisting that all information about vacancies be publicly available and that the ensuing recruitment process be both transparent and accountable[5]. The result of these interventions is *equity-gain*. However, these statutory requirements, taken collectively, could significantly raise hiring (and firing) costs and, compared to the pre-regulatory situation, lead to fewer vacancies being announced. This is identified in the model as the *efficiency-loss* from regulation. Whether fair-employment regulation leads to a net increase in welfare or not depends on comparing the welfare-magnitudes of the gains and losses. The model proposes a method, based on Atkinson's (1970) analysis of income inequality, for effecting such a comparison.

The Analytical Framework

There are M economically active persons in a region, of whom a proportion α (> 0.5) are White, the remainder, $1 - \alpha$, being Black. There is a single employer (call it a firm) in the region. This firm has E employees all of whom do a particular type of job and all of whom are paid the same wage, s. A proportion β $(> \alpha)$ of the employees are White, the remainder, $1 - \beta$, being Black. The profits of the firm are:

$$\pi = ry(E) - sE$$

where: $y(E)$ is the firm's production function ($y'(E) > 0$ and $y''(E) < 0$) and r is the output price · By assumption, both the product and the labour markets are competitive so that r and s are invariant with respect to, respectively, changes in output and in employment. By definition, there are $U = M - E,$ unemployed persons in the region of whom $U_W = \alpha M - \beta E$ are White and $U_B = U - U_W = (1 - \alpha)M - (1 - \beta)E$ are Black. The unemployment rate for Whites and Blacks are, respectively:

$$u_W = \frac{\alpha M - \beta E}{\alpha M} = 1 - \frac{\beta}{\alpha}(1 - u) = \frac{\alpha - \beta}{\alpha} + \frac{\beta}{\alpha}u$$

$$u_B = \frac{(1 - \alpha)M - (1 - \beta)E}{(1 - \alpha)M} = \frac{\beta - \alpha}{1 - \alpha} + \frac{1 - \beta}{1 - \alpha}u$$

where: $u = (M - E)/M$ is the overall unemployment rate. The three unemployment rates - u, u_W and u_B - are linked by the relationship:

---

[5]The FEC for Northern Ireland, for example, sees it as a measure of its success that, as the result of its enforcing the statutory obligations on the province's employers under the 1989 Fair Employment (NI) Act, most vacancies are publicly advertised and that a greater degree of formality has been introduced into recruitment and selection procedures (Fair Employment Commission for Northern Ireland, *Annual Report* 1999).

$$\alpha u_W + (1 - \alpha)u_B = u$$

A vacancy now occurs in this firm. This vacancy may be filled by *informal* or by *formal* methods. Informal methods comprise filling the vacancy on the basis of recommendations by existing employees. Formal methods, on the other hand, involve filling the vacancy by means of a process which *inter alia* involves: publicly advertising the job, scrutinising applications, taking up references, and conducting job interviews.

Informal Recruitment Methods

Each employee knows at least one person who is unemployed and who would like to fill this vacancy and he informs *one, and only one,* of these persons of the vacancy. In effect, every employee ``votes'' for a person on the unemployment list with a view to informing him of the vacancy. Consequently, $E$ votes are cast - two, or more, voters may vote for the same person - and $E^*$ $(\leq U)$ unemployed persons are informed of the vacancy (receive votes). These $E^*$ persons (the ``successful candidates'') constitute the pool of applicants for the vacancy. Since they were made aware of the vacancy through the strength of their contacts with existing employees, they may be regarded as belonging to a *job-network* where a job-network is defined as the set of unemployed persons, each of whom is the preferred choice (for filling the vacancy) of at least one employee.

The firm, which has to fill the vacancy from one of these E^* applicants, has no reason to prefer one applicant over another. However, it would like to place suitable weight on the number of votes received by each applicant and, in order to do so, it enters each applicant's name on as many *separate* slips of paper as the number of votes received by the applicant. Then, from this collection of E slips of paper, it picks one at random: the person whose name appears on the slip gets the job.

Assume that γ_B and γ_W are the, respective, probabilities that Black and White employees recommend someone of the *same* colour, $1 - \gamma_B$ and $1 - \gamma_W$ being the, respective, probabilities that they recommend someone of a *different* colour. Then, of the total number of slips of paper (E) in the hat, the expected proportions that have the names of White and of Black persons (denoted q_W and q_B, respectively) are:

$$q_W = [\beta\gamma_W + (1 - \beta)(1 - \gamma_B)]$$
$$q_B = [\beta(1 - \gamma_W) + (1 - \beta)\gamma_B]$$

where: $q_W + q_B = 1$. Since all the applicants are viewed equally favorably by the employer, q_W and q_B may be regarded as the respective likeihoods of a White and of a Black person filling the vacant position, *when the vacancy is filled using informal methods*. The values of γ_B and γ_W measure the degree to which society is ``fragmented'' along racial lines, with lower values of γ_B and γ_W reflecting smaller degrees of fragmentation or, equivalently, higher degrees of integration. Note that $\partial q_W/\partial \gamma_W > 0,$ $\partial q_B/\partial \gamma_B > 0.$ Two cases may be highlighted: *complete fragmentation* and *complete integration*.

Complete Fragmentation

If $\gamma_B = \gamma_W = 1,$ so that Black employees would never recommend for the vacancy a

unemployed person who was White, and vice-versa, then society is *completely* fragmented by race and $q_W = \beta$ and $q_B = (1 - \beta)$: the likelihood of a Black person filling a vacancy depends entirely on the proportionate presence of Black workers on the firm's payroll. On the other hand, if all the employees in the firm are White, then $\beta = 1$ and $q_W = \gamma_W$ and $q_B = (1 - \gamma_W)$: the likelihood of a Black person filling a vacancy depends entirely on the likelihood of White workers recommending Black persons. If society is completely fragmented *and* all employees are White, then $q_W = 1$ and $q_B = 0$: vacancies will never be filled by Black persons.

Complete Integration

The counter-point to complete fragmentation is complete integration. This occurs when recommendations are ``colour-blind'' so that the likelihood of an employee, *irrespective of his colour*, recommending a Black or a White person is given by the respective proportions of Black and White job-seekers in the total of unemployed persons. More formally, under complete integration:

$$\gamma_W = \frac{\alpha M - \beta E}{U} = \alpha \frac{M}{U} - \beta \frac{M - U}{U} = \frac{\alpha - \beta}{u} + \beta = 1 - \gamma_B$$

$$\gamma_B = 1 - \gamma_W = \frac{\beta - \alpha}{u} + (1 - \beta) = 1 - \gamma_W$$

so that, substituting the expressions for γ_W and γ_B from equations (cinw) and (cinb) into equations (qw) and (qb) yields:

$$q_W = \beta \gamma_W + (1 - \beta)(1 - \gamma_B) = \beta \gamma_W + (1 - \beta)\gamma_W = \frac{\alpha - \beta}{u} + \beta$$

$$q_B = \beta(1 - \gamma_W) + (1 - \beta)\gamma_B = \beta \gamma_B + (1 - \beta)\gamma_B = \frac{\beta - \alpha}{u} + (1 - \beta)$$

Formal versus Informal Recruitment Methods

The alternative to filling the vacancy by informal methods is to fill it using formal methods. These involve, as a first step, the public advertisement of the vacancy. Suppose that this attracts applications from *all* the $U = M - E$ unemployed persons in the region. Subsequent steps in the process of filling the vacancy using formal methods involve, as noted above: scrutinising applications; taking up references; conducting interviews etc..

The *disadvantages*, to the firm, of using formal methods are two. First, formal methods are more costly - if the costs of filling a vacancy by informal and formal methods are, respectively, c_E and c_F, then, by assumption, $c_E < c_F$. Assume without loss of generality that $c_E = 0$ so that $c_F > 0$. The second disadvantage is that formal methods require time to implement - by assumption, there is a delay of $\tau > 0$ periods between the decision to fill the vacancy and the new employee starting work and the cost of this delay is reflected in lost production of $\tau y'(E)$ and in lost profits of $\tau[ry'(E) - s]$. By contrast, under informal methods, the new worker can start as soon as the vacancy is to be filled.

The *advantage* to the firm of using formal methods is that these would lead to a larger number of applicants: under informal methods, only $E^* \le U$ persons would be considered for the vacant position but, under formal methods, there would be an *additional* $F = U - E^*$ applicants.

Consequently, the firm may end up with a ``better'' worker. Let ρ_E and ρ_F denote, respectively, the firm's expectation of the marginal product of a worker recruited through informal and through formal methods, $\rho_E \leq \rho_F$.

Then the expected *net* advantage, A, to the firm, of filling the vacancy using formal, instead of informal, methods is:

$$A = \int_{\tau}^{T}(\rho_F - \rho_E)e^{-it}dt - \int_{0}^{\tau}(\rho_E - w)e^{-it}dt - c_F$$

where T in equation (ADV) represents the number of periods the job is expected to last (the ``life'' of the job) and i is the discount rate. The first term in the above expression is the present value of the additional profit stream *expected* from employing a worker through formal methods. The second term is the present value of the forgone profits arising from the delay, arising from formal methods, in the new employee starting work: this is the *additional* profit the firm could have earned if the worker had, instead, been recruited informally. The last term is simply the fixed cost associated with filling the vacancy through formal methods. It is assumed that the firm is risk-neutral so that the different terms in equation (ADV) can be directly compared.

From equation (ADV), the firm will fill its vacancy using informal methods if $A < 0$, and fill it using formal methods if $A > 0$. For routine jobs - with a high degree of specificity in terms of performance and standards, which are easily supervised and monitored, in which the worker's flair and enterprise is not likely to be of importance, and for which the quality of training is fairly uniform - there would not be much difference between ρ_F and ρ_E. Opening up such vacancies - in general connected with unskilled, semi-skilled, skilled manual/non-manual or technical jobs - to public competition would not be likely to yield better workers and the firm would prefer to recruit using informal methods. On the other hand, where standards of job performance vary according to the quality of training received by the worker and according to his skill, initiative and enterprise, the firm might expect that the public advertisement of the vacancy would attract a better class of applicant than that supplied by the recommendations of existing employees: a significant difference between ρ_F and ρ_E would lead the firm to prefer formal methods.

Employment Chances under Formal and Informal Recruitment Methods

Under formal methods of recruitment all unemployed persons in a region learn of a vacancy and apply for it. Of these unemployed persons, a proportion p_W are White and p_B are Black, where:

$$p_W = \frac{\alpha M - \beta E}{U} = \alpha\frac{M}{U} - \beta\frac{M - U}{U} = \frac{\alpha - \beta}{u} + \beta$$

$$p_B = 1 - q_W = \frac{\beta - \alpha}{u} + (1 - \beta)$$

where: $p_W + p_B = 1$ and $\partial p_W/\partial\beta = 1 - 1/u < 0$ and $\partial p_B/\partial\beta = 1/u - 1 > 0$, if $u < 1$. If skills and abilities are equally distributed between Blacks and Whites, then p_W and p_B may be regarded as the, respective, likelihoods of a White and of a Black person being appointed

to the vacant position, *when the vacancy is filled using formal methods*.

Whether Blacks would be more likely to get employment under formal, compared to informal, methods of filling vacancies would depend on the degree of social fragmentation (by race) as measured by the values of the parameters, γ_B and γ_W. If $\gamma_B = \gamma_W = 1$, so that society is completely fragmented then (remembering that $\alpha < \beta$), from equations (pw) and (qw),

$$p_W = \beta + \frac{\alpha - \beta}{u} < \beta = q_W \Rightarrow p_B > q_B$$

so that the likelihood of a Black person filling a job-vacancy would be higher if the firm adopted formal, instead of informal, methods of recruitment.

However, if society were completely integrated, so that the values of γ_B and γ_W were given by equations (cinw) and (cinb), respectively, then $p_W = q_W$ and $p_B = q_B$. In other words, formal recruitment methods produce the same result in terms of the chances of Blacks and Whites filling a vacancy as would informal recruitment methods *in societies that were completely integrated.*

However, complete integration is a sufficient but not a necessary condition for the likelihood of a Black or a White person filling a job-vacancy[6] to be invariant with respect to the method of recruitment adopted. Suppose that $\gamma_B = \gamma_W$. Then from equations (pw) and (qw) a necessary and sufficient condition for $p_W = q_W$ and for $p_B = q_B$ is:

$$\gamma = 1 + \frac{\alpha - \beta}{u(2\beta - 1)} < 1$$

Comparing the expression for γ from equation (comp2) with that of γ_W from equation (cinw) it is evident that[7]:

$$\gamma = 1 + \frac{\alpha - \beta}{u(2\beta - 1)} \geq \beta + \frac{\alpha - \beta}{u} = \gamma_W \Rightarrow \gamma \geq 1 - \gamma_B$$

Equation (gwb) shows that the probability of White employees recommending a White person is greater than what would be implied by complete integration: notwithstanding this, the probability of a Black or a White person filing the vacancy would not depend upon the method of recruitment. Consequently, it is possible, even under conditions of less than complete integration, for Blacks, in terms of their likelihood of filling a vacancy, to be as well off under informal, as under formal, recruitment methods. However, in practice, from equation (comp2), the ``break-even" value of γ is unlikely to be realised. For example, if one imposed the constraint the $\gamma \geq 0.5$, then from equation (comp2):

$$\gamma = 1 + \frac{\alpha - \beta}{u(2\beta - 1)} \geq 0.5 \Rightarrow u \geq \frac{2(\beta - \alpha)}{2\beta - 1}$$

---

[6]Indeed, if the value of γ was low enough, the likelihood of Blacks filling a vacancy would be higher under informal, than under formal, methods of recruitment.

[7]Since $\beta \leq 1$ and $(2\beta - 1) \leq 1$

If, for example, $\beta = 0.7$ and $\alpha = 0.6$ then, for the break-even degree of social fragmentation to be achieved, $u \geq 0.5$. Realistically, therefore, *with less than complete integration,* Blacks would be more likely to fill a vacancy if the firm adopted formal, as opposed to informal, methods of recruitment.

Fair Employment Policies

Suppose that, against the background of the basic model outlined above, the firm has V $(< U)$ vacancies and of these it decides to fill a proportion θ using formal methods and the remainder, $1 - \theta$, by informal methods. That is, in terms of equation (ADV), $A > 0$ for a fraction λ of these vacancies, $A < 0$, for the remainder. Then the likelihood of White and Black persons filling these vacancies, represented by π_W and π_B respectively are:

$$\pi_W(\theta) = \theta p_W + (1 - \theta)q_W$$

$$\pi_B(\theta) = \theta p_B + (1 - \theta)q_B$$

where: $d\pi_W/d\theta < 0$, $d\pi_B/d\theta > 0$, the values of $\pi_W(\theta)$ and $\pi_B(\theta)$ being, respectively, minimised and maximised when $\theta = 1$.

The government, observing the small number of vacancies filled by Blacks, sets up a Fair Employment Commission (FEC) to redress the racial imbalance in employment. The FEC, acting under powers assigned to it by Fair Employment legislation, imposes transparency in recruitment on the firm by requiring that *all* vacancies be filled using formal methods. It requires that the firm publicly advertise all its vacancies and it specifies detailed procedures - perhaps more rigorous than the firm acting on its own would have followed - that need to be followed before a vacancy can be filled. *As a consequence the firm is forced to eschew informal methods of recruitment so that* $\theta = 1$.

Social Welfare and Inequality
The Social Welfare Function

For a given *number* of vacancies, V, that are filled, let V_B and V_W represent, respectively, the *numbers* of vacancies filled by Blacks and by Whites and let $v = V/U$, represent the *proportion* of unemployed persons in the region who were able to find employment while $v_B = V_B/U_B$ and $v_W = V_W/U_W$ represent, respectively, the *proportion* of Black, and of White, job-seekers who obtained employment. Then v, v_B and v_W may be thought of (and are referred to in this paper as) the *likelihood of successful job-search* of, respectively: all job-seekers; Black job-seekers; White job-seekers. The relationship between the three likelihoods is given by:

$$v = \frac{V}{U} = \frac{V_B}{U} + \frac{V_W}{U} = \frac{V_B}{U_B} \frac{U_B}{U} \frac{M}{M_B} \frac{M_B}{M} + \frac{V_W}{U_W} \frac{U_W}{U} \frac{M}{M_W} \frac{M_W}{M}$$

$$= v_B(u_B/u)(1 - \alpha) + v_W(u_W/u)\alpha$$

Suppose that social welfare, J, can be written, for $k = B, W$, *in additively separable form,* as:

$$J = J(v_B, v_W) = \sum_{k=B}^{W} U_k F(v_k)$$

The function $F(.) \geq 0$ in equation (SWF), represents *society's valuation* of the gain (to it) arising from persons in group k having a likelihood, v_k, of successful job-search, with higher values of the group-specific function, $F(.)$ representing higher levels of gain. The sum of the group-specific gains is the *social welfare* associated with a given *overall* likelihood of successful job search, v.

The *change* in the value of the social welfare function (SWF) of equation (SWF), following a change in the v_k , is:

$$\Delta J = \sum_{k=B}^{W} a_k U_k \Delta v_k$$

where: $a_k = \partial F(v_k)/\partial v_k > 0$ is the *social marginal gain* attached to a change in the likelihood of successful job-search of members of group k . If it is assumed that the function $F(.)$ is *strictly concave,* then social marginal gain *decreases* for increases in v_k. Consequently, for a given overall likelihood, v, social welfare is maximised, when the likelihood of successful job-search is the *same* for persons in the different groups, that is when: $v_B = v_W$.

The SWF has *constant elasticity* if, for $\varepsilon \geq 0$, $F(.)$ can be written as:

$$F(v_k) = \frac{v_k^{1-\varepsilon} - 1}{1 - \varepsilon}$$

since then: $a_k = \partial F(v_k)/\partial v_k = v_k^{-\varepsilon} \Rightarrow (\partial a_k/\partial v_k)/(v_k/a_k) = -\varepsilon < 0$. Consequently, the percentage change in the welfare weights, following a percentage change in the likelihood of successful job-search, is both negative and constant. The greater the value of ε, the greater the proportional decrease in the welfare weights in response to a proportional increase in the likelihood. The parameter ε represent, as shown below, society's aversion to inter-group inequality in the likelihood of successful job-search.

Inequality Aversion

From equation (vu), the change in the overall likelihood of successful job-search, Δv is related to the changes in the group likelihoods since:

$$\Delta v = \Delta v_B (u_B/u)(1 - \alpha) + \Delta v_W (u_W/u)\alpha$$

and if, in the above equation, $\Delta v = 0$, then:

$$-\Delta v_W = \Delta v_B \frac{u_B}{u_W} \frac{1 - \alpha}{\alpha} = \Delta v_B \delta \mu$$

where: $\delta = u_B/u_W$ and $\mu = (1 - \alpha)/\alpha$ are, respectively, the ratios of unemployment *rates,* and of labour force *shares*, of Blacks and Whites.

From equation (delta), and its accompanying properties, the change in the value of J , following changes in the Black and White likelihoods of successful job-search is:

$$\Delta J = a_B U_B \Delta v_B + a_W U_W \Delta v_W = \lambda^{-\varepsilon} v_W^{-\varepsilon} U_B \Delta v_B + v_W^{-\varepsilon} U_W \Delta v_W$$

where: $v_B/v_W = \lambda$ and since, by assumption, the likelihood of successful job-search for Blacks is not greater than that for Whites, $\lambda \leq 1$.   Setting $\Delta J = 0$ in equation (BWDJ) implies:

$$- \Delta v_W = \Delta v_B \lambda^{-\varepsilon} (U_B/U_W) = \Delta v_B \frac{u_B}{u_W} \frac{1-\alpha}{\alpha} \lambda^{-\varepsilon} = \Delta v_B \delta \mu \lambda^{-\varepsilon}$$

Suppose $\Delta v_B = 1$,   so that the likelihood of successful job-search by Blacks is increased by 1 percentage point (pp). If the *reduction* in the likelihood of successful job-search by Whites, $\Delta v_W > \delta \mu \lambda^{-\varepsilon}$,   then social gain would decrease since $\Delta J < 0$ and if $\Delta v_W < \delta \mu \lambda^{-\varepsilon}$,   then social gain would increase since $\Delta J > 0$.

From equation (DJ), if $\varepsilon = 0, \Delta v_W = \delta \mu$.   This implies that society, *in response to the fact that the likelihood of successful job-search is disproportionately high for White job-seekers,* would be prepared to increase the likelihood of successful job-search by Blacks by 1pp, and to reduce that of Whites by an appropriate amount $(\delta \mu)$, provided that in this redistribution the overall likelihood, v,   did not change.

If $\varepsilon > 0$,   then, in order to increase the Black likelihood by 1 pp, society would be prepared to lower the White likelihood by $\Delta v_W = \delta \mu \lambda^{-\varepsilon}$.   Since $\lambda < 1$, $\lambda^{-\delta} > 1$ (so that $\delta \mu \lambda^{-\varepsilon} > \delta \mu$) and the overall likelihood of successful job-search *falls*. Since $\partial \Delta v_W/\partial \varepsilon > 0$, associated with higher values of ε is society's willingness to accept a smaller number of vacancies (or, equivalently, a smaller overall likelihood of successful job-search)[8] than that which currently exists, *provided this smaller number of vacancies was filled more equitably, than hitherto, by Blacks and Whites*. In this sense, the value of ε represents the degree to which society is averse to inequality, between Blacks and Whites, in the likelihood of successful job-search, with higher values of ε representing greater degrees of aversion.

A Welfare-Based Measure of Inter-Group Inequality in the Likelihood of Successful Job-Search

Let $v^* \leq v$ represent the overall likelihood of successful job-search which, *if also the likelihood for Blacks and Whites,* would yield the *same* level of social welfare as the *existing* distribution of likelihoods. Then v^* may be termed the *equally distributed equivalent* likelihood of successful job-search. Following from this, Atkinson's (1970) inequality index applied to the distribution of likelihoods between Blacks and Whites yields[9]:

---

[8] $\partial \log \Delta v_W/\partial \varepsilon = -\log \lambda > 0$ since $\lambda < 1$

[9]By definition of J, $F(.)$ and $v^* : UF(v^*) = \sum U_k F(v_k) \Rightarrow (v^*/v)^{1-\varepsilon}$
$= \sum (U_k/U)(v_k/v)^{1-\varepsilon}$

$$I = 1 - (v^*/v) = 1 - \left[\sum_{k=B}^{W} \frac{U_k}{U} \left(\frac{v_k}{v} \right)^{1-\varepsilon} \right]^{1/(1-\varepsilon)}$$

When $\varepsilon = 0$, society is indifferent as to how a given overall likelihood is distributed: $v^* = v$ and $I = 0$. For $\varepsilon > 0$, $v^* < v$ and $I > 0$. The higher the value of the inequality aversion parameter, ε, the smaller will be the value of v^* and, therefore, higher will be the value of the inequality index, J.

Fair Employment Regulation and Welfare Improvement

From equation (ATK), the ``equally distributed equivalent'' likelihood of successful job-search, v^* remains unchanged for equi-proportionate changes in the Black and White likelihoods. This, however, does *not* imply that social welfare remains unchanged. Indeed, an equi-proportionate increase (decrease) in the likelihoods, by raising (lowering) the overall likelihood by the same proportion, would lead to an equi-proportionate increase (decrease) in social welfare[10]. To see this more clearly observe that in order to make comparisons of loss (or gain) across different overall likelihoods of successful job-search, a specific transformation, linking the inequality measure, I to different overall likelihoods, v, is needed. One obvious transformation is the reverse of the Atkinson transformation which yields the social welfare function:

$$J = v(1 - I)$$

which is homogenous of degree one in the stop rates. The social welfare function in equation (logn) has a natural interpretation: the welfare from an overall likelihood of successful job search (v) is reduced by the extent of inequality in the distribution of this likelihood between Blacks and Whites.

Given an overall likelihood of successful job-search, v, equation (logn) says that the value of the Atkinson index (I) is a measure of the social welfare (J) associated with this overall likelihood. This welfare depends upon the distribution of this overall likelihood between Blacks and Whites (that is, in terms of their respective likelihoods of successful job-search, v_B and v_W) *and* upon the degree to which society is averse to inequality in the distribution of this likelihood (that is, the value of the inequality aversion parameter, ε) .

Under fair employment regulation, *for a given overall likelihood of successful job-search,* $v = V/U$, the likelihoods of successful job-search by Blacks and Whites are, respectively, $v_B^p = V_B/U_B = p_B V/U_B$ and $v_W^p = V_W/U_W = p_W V/U_W$ while, in the absence of regulation, they were, respectively, $v_B^\pi = V_B/U_B = \pi_B V/U_B$ and $v_W^\pi = V_W/U_W = \pi_W V/U_W$, where: $v_W^p \leq v_W^\pi$ and $v_B^p \geq v_B^\pi$ with $v_W^p < v_W^\pi$ and $v_B^p > v_B^\pi$ if $\theta < 1$ (equations (thw) and

---

[10]That is, the social welfare function is homogenous of degree one in the likelihoods.

(thb)). Consequently, J^p and J^π denote, respectively, the social welfare associated with fair-employment regulation, and with the absence of fair-employment regulation, then, from equation (logn):

$$J^p - J^\pi = v(1 - I^p) - v(1 - I^\pi) = v(I^\pi - I^p)$$

where I^p and I^π are the values of the inequality index in equation (ATK) when, respectively, $v_k = v_k^p$ and $v_k = v_k^\pi$, $k = B, W$. Since, $v_B^p = v_B^p = v$, $I^p = 0$. However, since $I^\pi \geq 0$, $J^p - J^\pi \geq 0$, with $J^p - J^\pi > 0$, $\theta < 1$. *As long as some vacancies, in the absence of fair-employment regulation were filled using informal methods of recruitment, fair-employment regulation will increase social welfare.* The amount by which regulation will increase social welfare will depend upon four factors:

- the proportion of vacancies, θ, that were, in the pre-regulation state, filled using formal methods: the lower the value of θ, the greater will be the impact of regulation on welfare, the maximum impact occurring when $\theta = 0$ and the minimum (zero) impact occurring when $\theta = 1$.
- the proportion of employees, β, that are White: *ceteris paribus*, the higher the value of β the greater will be the rise in welfare following regulation, the rise being greatest when $\beta = 1$.
- the degree to which society is fragmented: the higher the degree of fragmentation (that is, the larger the value of γ), the more will social welfare rise after regulation: the increase will be greatest when $\gamma = 1$ and will be zero when γ is defined by equation (comp2).
- the degree to which society is inequality-averse: the smaller the value of the inequality-aversion parameter ε, the smaller will be the impact of regulation on welfare, with $\varepsilon = 0$ resulting in no increase in welfare.

Fair-Employment Regulation and Efficiency Loss

As a consequence of the regulatory activities of the FEC, the firm, for two reasons, incurs additional costs. First, costs go up because vacancies which earlier would have been filled through informal methods (the cost of which is zero) must now be filled using formal methods. Second, the cost of FEC-determined formal procedures may be higher than the cost of such procedures as determined by the firm. For example, the FEC may attach financial penalties to faulty compliance and, in order to avoid these penalties, the firm may have to make additional investments in acquiring appropriate expertise for its human resources department. The desire on the part of the firm to avoid error may also combine with the (possibly) more elaborate recruitment procedures laid down by the FEC so as to stretch out the recruitment process. Consequently, it is conceivable that the fixed cost of recruiting to a vacancy, and the lag between the decision to fill the vacancy and the new employee starting work, rise from c_F and τ, respectively, under the formal procedures devised by the firm, to c_F^* and τ^*, respectively, under FEC-determined procedures.

As a result of FEC regulations the costs to a firm, *per vacancy*, arising from its need to comply with FEC regulations in filling its vacancies, rise by:

$$\theta\left[(c_F^* - c_F) + \int_\tau^{\tau^*}(\rho_E - s)e^{-rt}dt\right] + (1-\theta)\left[c_F^* + \int_0^{\tau^*}(\rho_E - s)e^{-rt}dt\right]$$

The first and second terms in the first set of square brackets in equation (delc) are, respectively, the additional cost from filling a vacancy using formal procedures, and the increased opportunity cost arising from the longer delay in filling a vacancy, under FEC regulations. The third and fourth terms in the second set of squared brackets in equation (delc) are, respectively, the fixed cost that has now to be paid on vacancies that, in the absence of the FEC, would have been filled informally, and the forgone profits from the delay, resulting from the use of formal methods of recruitment, in appointing a worker.

Because the FEC, for the two reasons discussed above, raises the cost of filling vacancies, fewer vacancies will be filled under it's regulatory regime. Some vacancies which were worth filling in the pre-regulation period (particularly those that, in the absence of regulation, would have been filled through informal methods) may no longer be worth filling under FEC-approved recruitment procedures. This, more often than not, will be the invidious result of the higher costs of filling vacancies and the longer delays in filling them, combining with the fact that some vacancies have a very short life-span.

Suppose that, as a consequence of the higher recruitment costs imposed by FEC regulations, the number of vacancies that are filled falls from V^π to V^p with a concomitant decline in the likelihood of successful job-search from $v^\pi = V^\pi/U$ to $v^p = V^p/U$. Then, the *net* change in social welfare, as a consequence of fair-employment regulation, is from equation (logn):

$$\Delta J = v^p(1 - I^p) - v^\pi(1 - I^\pi) = (I^\pi - I^p)v^\pi + (v^p - v^\pi)(1 - I^p)$$

From equation (net), fair-employment regulation will, *in the net*, increase or decrease social welfare ($\Delta J > 0$ or $\Delta J < 0$) if the positive effects on welfare of greater equality between Blacks and Whites in their likelihoods of successful job-search outweigh or are outweighed by the negative effects on welfare of a lowering in the *overall* likelihood of successful job-search. The term $(v^p - v^\pi)(1 - I^p)$ in equation (net) represents the *efficiency-loss* from fair-employment regulation while, as noted earlier, the term $(I^\pi - I^p)v^\pi$ represents the *equity-gain*.

Under regulation, the overall likelihood is equally distributed so that $v^p = v_B^p = v_W^p$ and $I^p = 0$. So, by the argument of the previous section, $\Delta J > 0$ if $v^p > v^*$ and $\Delta J < 0$ if $v^p < v^*$, where v^* is the ``equally distributed equivalent likelihood'' that is, the overall likelihood of successful job-search which, if equally distributed between Blacks and Whites would yield the same amount of social welfare as the distribution of likelihoods in the pre-regulatory state. In turn, the value of v^*, depends on how averse society is to inequality with higher degrees of aversion leading to lower values of v^*. If the inequality aversion parameter, $\varepsilon = 0$, then $v^* = v^\pi$ and society would not be prepared to tolerate any efficiency-loss in exchange for equity-gains. On the other hand, for high degrees of inequality aversion, society would be prepared to accept relatively high efficiency losses in exchange for the equity-gains that fair-employment regulation confers.

Diagrammatic Representation

It may be useful to present an intuitive understanding of the approach towards measuring employment inequality, set out in the previous sections, in terms of a diagram. Diagram 1 portrays a world of Black (B) and White (W) who ``share'' a given overall likelihood of successful job-search, v to obtain, respectively, their likelihoods of v_B and v_W. The horizontal axis measures v_W and the vertical axis measures v_B. The sharing equation (vu) may be simplified as:

$$v = v_B \phi_B + v_W \phi_W$$

where: $\phi_W = U_W/U$ and $\phi_B = U_B/U$ are the respective proportions of White and Black persons in the total of unemployed persons. Equation (vu1) is represented by the ``likelihood-possibility'' line LL in Diagram 1. The slope of LL is ϕ_W/ϕ_B. Each point on LL represents a (v_B, v_W) combination that yields the value v. At the point X, which lies on the 45^0 line passing through the origin, $v_B = v_W$.

<center><Diagram 1></center>

Labour market outcomes may be viewed as a mapping *from* the parameters of the system, $v, u_B,$ u_W, u, α (which define LL) *to* a point on LL. Different outcomes will locate at different points on LL. Those that locate closer to the point X (for example, at B) will be more egalitarian in terms of the distribution of the likelihood of successful job-search between Blacks and Whites than those which locate further away from X (for example, at A). For a given constellation of parameter values, Whites (at L on the horizontal axis) and Blacks (at L on the vertical axis) can ``buy'' $v/[\alpha u_W/u]$ and $v/[(1-\alpha)u_B/u]$ as their, respective, likelihoods of successful job-search. The quantities $\phi_B$ and $\phi_W$ may be interpreted as the ``prices'' attached to the likelihood of successful job-search by, respectively, Blacks and Whites. The lower the proportion of White (Black) persons in the total of unemployed persons, the lower will the price of the likelihood of successful job search by Whites (Blacks).

Superimposed upon the likelihood-possibility line in the diagram are the welfare indifference curves: each curve shows the different v_B, v_W combinations that yield the same level of social welfare. From equation (SWF), the slope of any indifference curve is:

$$\frac{\partial J/\partial v_B}{\partial J/\partial v_W} = \frac{\phi_B a_B}{\phi_W a_W}$$

and social welfare is maximised when the slope of the indifference curve = slope LL that is, when:

$$\frac{\phi_B a_B}{\phi_W a_W} = \frac{\phi_B}{\phi_W} \Rightarrow a_B = a_W$$

and since the marginal utilities a_B and a_W diminish with increases in, respectively, v_B and v_W:

$$a_B = a_W \Rightarrow v_B = v_W$$

so that X is the point at which the likelihood-possibility line, LL, is tangential to an indifference curve. If the labour market outcome is at the point A, with $v_W = OF$ and $v_B = AF$ then this is equivalent, in welfare terms, to $v_W = v_B = CD$. The degree of

inequality in labour market outcomes is, from equation (ATK): $1 - (CD/XY)$.

A decrease in the number of vacancies filled, following an (fair-employment regulation induced) increase in the cost of filling vacancies, causes a parallel, inward shift in the likelihood-possibility line, LL. The extent of the shift will depend on the size of the efficiency-loss: the greater the loss, the more the likelihood-possibility line will shift inwards: at L_1L_1, fair-employment regulation yields a net welfare gain; at L_3L_3 it yields a net welfare loss; and at L_2L_2 the net gain (loss) is zero.

Differences in Black-White Worker Quality

The fact that the likelihood of successful job-search by Blacks is less than that for Whites may be due to two reasons: (i) Blacks have less access to job-networks than do Whites; (ii) Whites, *on average*, are better (or perceived by employers to be better) workers than Blacks. In the preceding analysis the second point was assumed away: the labour market outcome, in terms of the different likelihoods of successful job-search, was at A in Diagram 1 entirely because Blacks had an ``access problem''; fair-employment regulation, by removing this problem, would shift the outcome from A to X. In the process, efficiency losses would cause an inward parallel shift in the likelihood possibility line but, as long as this shift stopped short of L_2L_2, fair-employment regulation would confer a net welfare benefit. In this subsection the assumption of equal worker-quality is relaxed and it is assumed that Blacks, in terms of their likelihood of filling vacancies, suffer from the further handicap that, on average, they are not perceived (by employers) to be as good workers as Whites.

<Diagram 2>

In terms of Diagram 2, above, this quality constraint means that fair-employment regulation - by offering Blacks *fair access* to jobs - can only move the outcome from its pre-regulation point A to the post-regulation point B. The segment BX along the likelihood-possibility line, LL is inaccessible: even if information on vacancies was available to all, and even if recruitment practices were entirely fair and above-board, differences in average worker quality would mean that the likelihood of successful job search by Blacks could not be raised beyond B. The point B, by eliminating one difficulty that Blacks faced, offers a higher level of welfare than A. In welfare terms, point A is equivalent to point G. At G, the relative likelihoods of successful job-search by Blacks and Whites is the same as at B, but the fact that the *overall likelihood* is lower at G than at B means that it offers a lower level of welfare. The overall likelihood of successful job search associated with G is EF where the point E lies at the intersection of $L'L'$ and the 45^0 line, OX. This overall likelihood, EF, *if distributed between Blacks and Whites according to the ratio given by the slope of OB*, would yield the same level of welfare as obtained at point A.

Now if fair-employment regulation led to a decrease in the number of vacancies such that the likelihood-possibility line was shifted from (its original position of) LL to the *left* of $L'L'$ then such regulation would lead to a net welfare loss. Indeed, the greater the bite of the quality-constaint - so that the closer B was to A - the more likely it would be that fair-employment regulation would lead to a welfare loss. Conversely, the closer B was to X - that is, the less serious was the quality-constraint - the more likely would fair-employment regulation be to lead to welfare gain. In the final analysis, therefore, the likelihood that

fair-employment regulation would increase welfare would depend upon the ``human-capital gap'' between Black and White workers. Nor could this gap be by-passed by interpreting fair-employment as *positive discrimination* rather than simply as affirmative action. Under postive discrimination a Black worker would fill a vacancy even in the presence of a superior White applicant: consequently, a move from A to X would be feasible. However, the employment, under postive discrimination, of less efficient workers than are available would lead the likelihood-possibility line to shift *even further* inwards: efficiency loss would now stem from the high post-regulatory cost of filling vacancies *and* from the fact that, owing to regulation, jobs are taken by less efficient (Black) workers while more able (White) workers remain unemployed.

Conclusions

The central conclusion of this paper is that any employment disadvantage that members of a particular group (or groups) suffer from may not *necessarily* stem from ``discrimination'' as it is usually understood in the literature. That is to say, this disadvantage is not necessarily the outcome of employer distaste towards, or social norms that restrict contact with, persons from that group. Nor need this disadvantage be based upon any perceived inferiority in terms of worker quality. Instead, as this paper suggested, the recruitment and selection procedures for filling vacancies disadvantages persons who are not part of, or are only peripherally attached to, the jobs-network. In other words, disadvantage is the result of a lack of access to jobs. Fair-employment regulation, by insisting that information about vacancies be widely disseminated and that recruitment and selection procedures are transparent and accountable, tries to ensure that all persons have fair access to jobs. But fair access comes at a cost. Hiring and firing costs rise in the wake of regulation and, as a consequence, fewer vacancies are advertised. In assessing the effects of regulation, the equity-gains which follow from it - and which constitute its *raison-d'etre* - must be compared to the concomitant efficiency losses, where both the gains and losses are measured in terms of social welfare. This paper suggested a method for making this comparison. It argued that the likelihood of a net social gain emerging from regulation would be less the greater the quality-gap between the groups. Indeed, it may be that the redressal of this quality gap should be at least as important a component of policy as the regulation to improve minority access to jobs.

Arrow, K.J. (1972), ``Some Mathematical Models of Race in the Labor Market'', in A.H. Pascal (ed), *Racial Discrimination in Economic Life*, Lexington, MA: Lexington Books.

Arrow, K.J. (1998), ``What Has Economics to Say About Racial Discrimination?'', *Journal of Economic Perspectives*, 12, pp. 91-100.

Atkinson, A.B. (1970), ``On the Measurement of Inequality'', *Journal of Economic Theory*, vol. 2, pp. 244-63.

Becker, G.S. (1971), *The Economics of Discrimination*, Chicago: University of Chicago Press (2nd edition).

Donohue, J. (1998), ``Discrimination in Employment'', in P. Newman (ed), *The New Palgrave Dictionary of Economics and the Law*, London: Macmillan.

Elmslie, B. and Sedo, S. (1996), ``Discrimination, Social Psychology and Hysterisis in Labor Markets'', *Journal of Economic Psychology*, vol. 17, pp. 465-78.

Epstein, R. (1995), ``The Status-Production Side-Show: why the anti-discrimination laws are still a mistake'', *Harvard Law Review*, vol. 108, pp. 1085-1109.

Friedman, M. (1962), *Capitalism and Freedom*, Chicago: Chicago University Press.

Granovetter, M. (1974), *Getting a Job: A Study of Contacts and Careers*, Cambridge: Cambridge University Press.

Granovetter, M. (1988), ``Economic Action and Social Structure''*, in B.Wellman and S.D. Berkowitz (ed), *Social Structures: A Network Approach*, Cambridge: Cambridge University Press.

Higgs, R. (1977), *Competition and Coercion: Blacks in the American Economy, 1865-1914*, New York: Columbia University Press.

Kirschenman, J. and Neckerman, K (1991), ```We'd love hire them, but..': the meaning of race for employers'', in C. Jencks and P.E. Peterson (ed), *The Urban Underclass*, Washington DC: The Brookings Institution.

Krueger, A.O. (1963), ``The Economics of Discrimination'', *Journal of Political Economy*, vol. 79, pp. 481-86.

Lewis, W.A. (1979), ``The Dual Economy Revisited'', *The Manchester School*, vol. 47, pp. 211-29.

McAdams, R.H. (1995), ``Cooperation and Conflict: the Economics of Group Status Production and Race Discrimination'', *Harvard Law Review*, vol. 108, pp. 1005-84.

Phelps, E.S. (1972), ``The Statistical Theory of Racism and Sexism'', *American Economic Review*, vol. 62, pp. 659-61.

Rees, A. and Schultz, G.P. (1970), *Workers and Wages in an Urban Labor Market*, Chicago: University of Chicago Press.

Smith D. and Chambers G., (1991), *Inequality in Northern Ireland,* Oxford: Clarendon Press.

Whatley, W. and Wright, G. (1994), ``Race, Human Capital, and Labour Markets in American History'', in G. Grantham and M. MacKinnon (ed), *Labour Market Evolution*, New York: Routledge.

White, H.C. (1995), ``Social Networks Can Resolve Actor Paradoxes in Economics and Psychology'', *Journal of Institutional and Theoretical Economics*, vol. 151, pp. 58-74.
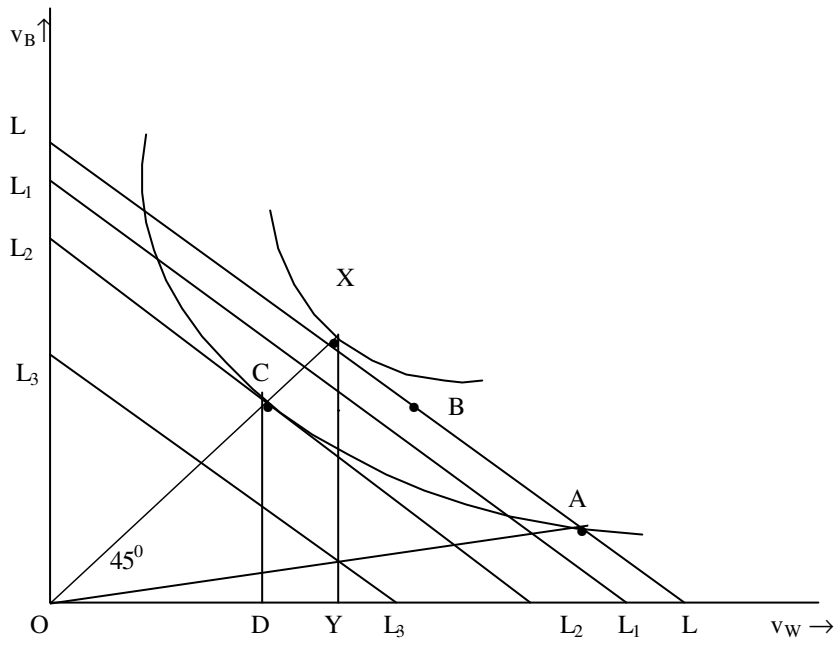
Diagram 1

v_B ↑

L
L_1
L_2

X

L_3
C

B

A

45^0

O   D   Y L_3 L_2 L_1 L v_W →

Diagram 2

v_B ↑

L

L'

X

C E

B

G

A

45^0

O   D F   Y L' L v_W →