Should Unequals Have Equal Opportunities?

David de Meza

CMPO, University of Bristol

Competitive credit, insurance and employment markets treat people unequally. Even when the differences are motivated by profit not prejudice, it may well be socially efficient that those least favoured in the market equilibrium should actually receive the best terms. When ability is not verifiable, or high ability can be hidden, equal opportunity (with mandatory protection against failure) replaces positive discrimination as the socially optimal policy. Public provision of low-powered incentive contracts issued on generous terms is also a potent instrument of efficient redistribution.

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1) Introduction

Markets don't treat everyone alike. Good risks are rewarded with lower insurance premiums and greater coverage, borrowers less likely to default obtain larger loans at better interest rates, and stock options are lavished on top managers. This paper makes the case that if market differentials are based on an unalterable, statistically accurate index of performance, social welfare is raised if use of the index is disallowed, whilst to maximize welfare market differentials should actually be reversed. So, for example, it should be illegal for blacks to receive worse terms than whites in credit markets even if there is robust evidence that (for whatever reason) blacks are more likely to default. Better still, under these circumstances blacks should receive preferential terms.

Whether it is actually legal to collect and utilise information involving personal characteristics varies. In most jurisdictions motoring and life insurance premiums can differ with gender but not race, whereas employment and credit contracts can vary with neither.[1] The distinction may be related to whether market differentials are most plausibly motivated by profit or prejudice.[2] For example, under the British Disability Discrimination Act 1995, insurers are required to justify any different treatment on the basis of actuarial data, medical research information or medical reports about an individual. Nevertheless, legislation often goes beyond requiring that differentials are evidence based. The US Equal Credit Opportunities Act is explicit; it allows the use of

"…..any empirically derived credit system which considers age if such system is demonstrably and statistically sound in accordance with regulations of the Board,

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[1] Montana is the only US state to have passed legislation to prohibit gender-based classification in all personal insurance policies (auto, health, disability, annuities and life).

[2] The distinction is related to the "taste for discrimination" model of Becker (1957) and the "statistical discrimination" approach of Arrow (1972) and Phelps (1972). In the former, if race or gender is a significant explanation of the terms of trade (after controlling for human capital and other observable economic variables) it is attributed to some parties disliking to interact with the disadvantaged group. In the latter the interpretation is that the characteristic is correlated with economic performance. For example, if in a loan market blacks are charged higher interest rates (as found by Blanchflower, Levine and Zimmerman (1998) the implication of Becker's approach is that in equilibrium blacks are less likely to default than whites whereas in Arrow and Phelps the opposite would be true. There is some evidence that blacks are more likely to default (Berkovec et al, (1998)) though under ECOA this would not be a defence. In standard models neither kind of discrimination leads to Pareto inefficiency though the taste for discrimination seems more troubling. Akerlof and Kranton (2000) provide a persuasive account of how group identity can lead to self fulfilling expectations of discrimination implying welfare losses.

except that in the operation of such system the age of an elderly applicant may not be assigned a negative factor or value."

There is a tendency that differentials, even if performance based, are disallowed if they appear to harm disadvantaged groups. This paper investigates whether such policies involve efficient redistribution. In effect it asks whether competitive market equilibrium differentials are of the right sign. It shows that for social efficiency it is often those most favoured by the market that should actually receive the worst terms. Problems of observability or verifiability may sometimes preclude such positive discrimination, in which case a form of equal opportunity policy is welfare improving. Public provision (whether of employment, insurance or credit) may be more effective still.

To appreciate some of the issues, suppose diabetic drivers are more accident prone than the general population and consider whether this should affect the terms on which they obtain motoring insurance.[3] Starting from equal treatment, consider whether the benefits of a premium cut depend on medical condition. The financial cost of lowering the premium is type independent, but because the diabetic is more likely to be involved in an accident, the gain in expected utility is greater since the extra income is more likely to accrue when its marginal utility is high. Given the deductible, the diabetic should therefore face a lower premium. Whether the deductible should be the same for the diabetic is more delicate. The benefit to the motorist of a lower deductible is proportional to the probability of an accident. The financial cost of more generous coverage also depends on the accident probability and the extent to which this is augmented by the induced fall in precautionary effort.[4] True the diabetic has a higher accident probability, but there is no presumption that the accident elasticity with respect to the deductible differs according to medical condition. If not, the utility bought per dollar of revenue foregone through a lower deductible is the same irrespective of type. The lower premium therefore implies that conditional on state, the diabetic has higher income than the non-diabetic.

This reasoning suggests that diabetic motorists should pay lower insurance premiums than non-diabetics. What though of diabetics induced to become motorists because of the cross subsidy? Surely there is an efficiency cost then. Suppose that for a diabetic the break-even

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[3] There is limited evidence on whether diabetics are worse motoring risks. Following the DDA act of 1995 British insurers to stopped charging higher premiums, but this may be because it is cheaper to avoid litigation even though diabetics are higher risk drivers. The British Government does not allow type 1 diabetics to drive heavy goods vehicles.

[4] The change in probability does not matter in assessing the client's benefit because effort is chosen to maximise utility and so an envelope theorem applies.

premium is $2000 whereas for a non-diabetic it is $1000. The diabetic would pay at most $1800 for the policy. Under the equal treatment policy the pooling premium is, say, $1200. Forcing the diabetic to become a motorist and pay an insurance premium of $2000 would of course lead to a utility loss. If though the diabetic is offered a policy for a premium of $1200 and takes it, her real income is increased by $600 and that of other motorists is reduced by $800. Since in the unregulated equilibrium the diabetic motorist has higher marginal utility of income than the non-diabetic motorist, total utility may rise. Moreover, willingness to pay to become a motorist is now greater due to this income effect; perhaps it is now $2100. So a diabetic given $600 cash would choose to become a motorist even if the policy costs $1800, in which case the market expansion resulting from the cross subsidy involved in the equal treatment policy involves no inefficiency.

Notice that there is only a benefit from redistributing towards diabetics who choose to become motorists. For those who do not, there is no reason to think that their marginal utility of income is different to that of the rest of the population. Thus a transfer of income to diabetics irrespective of whether they are or will become a motorist (ability based redistribution) is not especially beneficial.

Subsidising diabetic insurance is feasible, but in other cases giving better contracts to the less able may run into trouble. It may be impossible to claim a falsely high ability, but it is easy to under achieve. Think of performance in a vision test. Or ability may be observable but not verifiable. Firms may be able to recognise the good managers and compete for them with the offer of lavish stock options, yet it is not feasible for the government to set transfers on the basis of intrinsic managerial ability. Finally, offering better terms to those who will perform worse may violate norms of fairness. Equal opportunity requirements may then be a compromise. Consider a law that mandates that offers should be made to all irrespective of disability, race or gender even though *laissez-faire* differentials are not the result of prejudice. Such equal opportunity legislation may make matters worse; principals may respond with contracts that induce costly self-selection. This can be avoided if a minimum payment in the bad state is required. The net result is efficient redistribution though the extent of transfer is not as great as in the socially optimal allocation. Designing and enforcing such requirements may be difficult, so a case for direct government provision of subsidised insurance, loans or even jobs can also be made. The terms involve relatively low-powered incentives and self-select those treated worst in the market equilibrium.

Three literatures are related to the analysis here. It has long been argued that information concerning an individual's type can make everyone worse off *ex ante* by eliminating opportunities to trade risk. This line of argument can be seen in Dreze (1960), Hirshliefer (1971) Marshall (1974), Arrow (1978) and Milgrom and Stokey (1982). So, for example, the public availability of genetic information hampers the provision of medical insurance and in the extreme, if outcomes are fully predictable, it may cause it to vanish. If people buy insurance in the absence of genetic information, revealing it makes them worse off in expected terms. This is a case where equal treatment of unequals is justified. By adding moral hazard, this paper shows that the best solution may not be equal treatment but to offer better terms to the least able. How to implement this outcome is not self-evident. Whether or not moral hazard is present, prohibiting insurers from using information that is available to clients may be counter productive since it creates adverse selection, as Doherty and Thistle (1996) and Hoy and Polborn (2000) demonstrate. The answer is to constrain allowable contracts or to have recourse to public provision.

Akerlof's (1978) study of the economics of tagging also bears on the analysis. The setting is the classic utilitarian dilemma, as formalised by Mirrlees (1971). The government cannot observe workers' ability or effort but there are no information problems within the private sector (perhaps because everyone is self employed) so no need for incentive contracts. Diminishing marginal utility of income makes it desirable to take from the rich and give to the poor, yet doing so weakens the incentive to earn. Consider the relative merits of two instruments of redistribution. A negative income tax provides a subsidy to all of those on low incomes irrespective of the group to which they belong whereas tagging selects a "needy" segment of the population to receive an extra transfer. Per dollar of tax revenue spent, tagging concentrates the benefits on the poor for whom the marginal utility of income is high. Due to the efficiency cost of raising tax revenue, the selective scheme may be preferable. Given that the aim is to redistribute income it seems odd that the magnitude of the transfer received by a poor person depends on personal characteristics that appear irrelevant for welfare. The resolution of the puzzle is that without this feature redistribution schemes involve too much of a scattergun approach to benefits. So in principle, it may be efficient for tax allowances to vary with disability, region, gender or race or to subsise inferior goods rather than institute negative income taxes.

The set up of this paper differs from the optimum tax framework in that ability is observable (though it may not be verifiable) whereas even within the private sector, effort is not. Economists' instinctive advice that disadvantaged groups be helped through income redistribution rather than by directly regulating contractual relationships may then be invalid. In fact redistribution can now be implemented without any inefficiency loss at all. In the standard optimum tax framework every dollar received by the poor lowers the income of the rich by more than a dollar. As Okun (1975) put it, redistribution can only be implemented by means of a leaky bucket. Equal opportunity policy is a water tight bucket.

Finally, a number of authors argue that in the presence of asymmetric information redistribution may enhance efficiency, perhaps by so much that a strict Pareto improvement results.[5] Though this paper relies on hidden action, it does not depend on redistribution promoting efficiency. The model has the property that the *laissez faire* equilibrium is constrained efficient.[6] Given the hidden action, the welfare of the low ability can only be raised at the expense of those of higher ability. The point is that the less able are more likely to fail and experience low income, so their expected marginal utility of a transfer is high. This is true whether or not the aggregate deadweight cost of hidden action increases or falls as a result of the transfer.

The next Section of the paper examines the case of moral hazard in conjunction with verifiable types. It identifies circumstances where a utilitarian would give the best contracts to the least able despite the utility of income function being the same for all. Section 3 considers partially hidden and unverifiable types and considers the merits of equal opportunity legislation and public provision as methods of moving towards a full optimum. Finally, conclusions are drawn.

2 Verifiable Types, Hidden Action

The model is developed to make the point as transparent as possible rather than in full generality. The setting is of insurance, which is analytically identical to other incentive contracts, such as loan contracts or performance pay.

Assumptions A1

- The economy comprises a large number, n, of risk-averse accident-prone individuals. An accident causes an individual's

[5] Papers include Loury (1981), Hoff and Lyon (1995), Piketty (1996) Aghion and Bolton (1997), Benabou (2000) and Gruner (2002)

[6] Though people would wish to contract behind the veil of ignorance, the efficiency of redistribution literature is concerned with inefficiencies arising when type is private information.

income to fall from *S* to *F* and involves a direct utility cost of L. Whether an accident occurs is verifiable.

- The accident probability is *(1-p)* and can be diminished by exerting precautionary effort with utility cost $C(p,a_i)$, where a_i is an observable and verifiable "ability" parameter and $C_p > 0, C_{pp} > 0, C_a < 0, C_{pa} < 0$. The choice of p is not verifiable.
- Clients are risk averse with utility function *U(y)-C(p)-x* where *x=L* if an accident occurs and *x=0* otherwise.
- Accidents are independently distributed so the Law of Large Numbers allows insurance to be offered on actuarially fair terms.

<u>Analysis</u>

First consider the market equilibrium with competitive insurance companies. Let a company commit to a contract that results in individual i obtaining net income W_i if there is an accident and B_i when there is no accident. So $(S-B_i)$ is the insurance premium and $-(F-W_i)$ the net of premium payout in the event of loss. The client maximises

$$E_i = pU(B_i) + (1-p)(U(W_i) - L) - C(p,a_i) \qquad (1)$$

so the choice of success probability satisfies

$$U(B_i) - U(W_i) - L = C_p(p,a_i) \qquad (2)$$

From (2)

$$\frac{dp}{dB_i} = \frac{U'(B_i)}{C_{pp}(p,a_i)} > 0, \quad \frac{dp}{dW_i} = \frac{U'(W_i)}{C_{pp}(p,a_i)} < 0, \quad \frac{dp}{da_i} = \frac{C_{pa}(p,a_i)}{C_{pp}(p,a_i)} > 0 \qquad (3)$$

In competitive equilibrium, B_i and W_i are chosen to maximise expected utility subject to the insurance company breaking even, which requires

$$R_i \equiv p(S-B_i) + (1-p)(F-W_i) + s_i = 0 \qquad (4)$$

where s_i is any subsidy for issuing a contract to individual i, and subject also to the incentive constraint, (2). The required conditions for an interior solution follow from the Lagrangian

$$L = E_i(B_i, W_i) + \lambda_i R_i(B_i, W_i)$$

where from (2), $p = p(B_i, W_i, a_i)$. Making use of (2) and (3)

$$\frac{dR_i}{dB_i} = -p + ((S - B_i) - (F - W_i))\frac{U'(B_i)}{C_{pp}(p,a_i)} = -p\left(1 - ((S - B_i) - (F - W_i))\frac{U'(B_i)C_p(p,a_i)}{C_{pp}(p,a_i)pC_p(p,a_i)}\right) =$$
$$-p\left(1 - ((S - B_i) - (F - W_i))\frac{U'(B_i)}{\eta(U(B_i) - U(W_i) - L)}\right)$$

where $\eta = C_{pp}(p,a_i)p / C_p(p,a_i)$ is the elasticity of marginal precautionary cost.

Since by the first-order condition $\frac{dE_i}{dp} = 0$,

$$\frac{dE_i}{dB_i} = pU'(B_i)$$

Following a similar procedure for variations in W_i, it follows from the Lagrangian that an interior solution satisfies (4) and

$$\lambda_i\left(1 - [(S - B_i) - (F - W_i)]\frac{U'(B_i)}{\eta[(U(B_i) - U(W_i) - L]}\right) - U'(B_i) = 0 \qquad (5)$$

$$\lambda_i\left(1 + [(S - B_i) - (F - W_i)]\frac{pU'(W_i)}{(1-p)\eta[(U(B_i) - U(W_i) - L]}\right) - U'(W_i) = 0 \qquad (6)$$

At an optimum, the extra utility per dollar of foregone revenue to the insurance company should be the same whether it is W_i or B_i that is increased. Of course the revenue effects of the two variations are not symmetric. A decrease in the premium holding constant net payout in the event of loss is partly offset by a decrease in the probability of loss whereas greater coverage raises the probability of loss.[7]

One property of the market solution is of relevance for subsequent analysis. If $d\lambda_i / ds_i > 0$ the incentive scheme just analysed is not optimal. Such increasing marginal utility of transfers implies that the insurance company can then increase the attractiveness of its offer by contracting with the client that two policies will be prepared, one that is optimal for $s_i = s^*$ and the other for $s_i = -s^*$. The client chooses between two unmarked envelopes each containing one of these policies. Such randomisation schemes are not observed so it will be assumed that the

[7] In an interior solution the revenue effects of reducing the premium can never be fully offset, as inspection of (5) and (6) reveal.

conditions for $d\lambda_i / ds_i > 0$ do not hold.[8] To see what is required to exclude randomisation, it is convenient to define $\theta \equiv 1-((S-B_i)-(F-W_i))\dfrac{U'(B_i)}{\eta(U(B_i)-U(W_i)-L)} > 0$ and $\phi = 1+((S-B_i)-(F-W_i))\dfrac{pU'(W_i)}{(1-p)\eta(U(B_i)-U(W_i)-L)}$. From (4), (5) and (6)

$$\frac{d\lambda_i}{ds_i} = \frac{\Delta}{H}$$

where $H > 0$ is the bordered Hessian signed from the second order conditions and $\Delta \equiv (\lambda\theta_B - U''(B))(\lambda\phi_W - U''(W)) - \lambda^2\theta_W\phi_B$.

Remark The optimal incentive scheme is non random iff $\Delta < 0$

Turn now to the social problem. A utilitarian social planner seeks to maximise

$$L_s = \sum_{i=1}^{n} E_i + \lambda \sum_{i=1}^{n} R_i$$

In contrast to the market solution, the social planner can cross subsidise within the insurance sector. The implication is that (5) and (6) must hold for λ common to all n clients. Along with the overall breakeven constraint the socially optimal solution must satisfy

$$\frac{1-[(S-B_i)-(F-W_i)]\dfrac{U'(B_i)}{\eta[(U(B_i)-U(W_i)-L]}}{U'(B_i)} = -\frac{\dfrac{dR_i}{dB_i}}{\dfrac{dE_i}{dB_i}} = \text{constant } \forall_i \qquad (7)$$

Suppose that the cost function is $C = f(a_i)(\alpha + \beta p^\gamma)$ with $f'(a) < 0$ so $\eta = \gamma - 1$ and is independent of ability. It then follows that in the social solution W_i is higher for the less able and so is B_i.

<u>Proposition 1</u> If random incentives are not optimal and $C = f(a_i)(\alpha + \beta p^\gamma)$, then it is socially optimal that both B_i and W_i are decreasing in ability.

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[8] The same result can be achieved if the client takes a fair gamble prior to buying insurance. This makes it seem that the client is a risk lover but this is not really so. There is diminishing marginal utility of consumption but not necessarily of income. The reason for the latter is that when income is high their may be more self insurance so avoiding the deadweight cost of moral hazard. The celebrated Friedman and Savage (1948) reconciliation of simultaneous purchase of insurance and lottery tickets is a different story; here the potential implication is sequential purchase.

Proof
To find how incentives should vary with ability the procedure is to perform comparative statics on (5) and (6) for a given *i* holding λ fixed. This is eased by the fact that with η constant the FOC w.r.t. to B_i is independent of *a*.

$$\frac{dB_i}{da_i} = -\frac{\lambda^2\theta_W\phi_a}{\Delta} < 0, \quad \frac{dW_i}{da_i} = \frac{(\lambda\theta_B - U''(B))\lambda\phi_a}{\Delta} < 0.$$

The signings follow since it is readily checked that $\theta_B > 0, \phi_W < 0, \theta_a = 0, \phi_a > 0$ (the latter two terms are signed as η is independent of a but from (2), $p(B_i, W_i, a)$ rises in a whilst $\Delta > 0$ follows from the non-randomness of incentives.

To illustrate Proposition 1, suppose $C = p^3/3a$ so $\eta = 2$, $S = 10, F = 0$ and the utility function is CARA with risk aversion parameter $r = 0.5$. Calculation reveals that λ is decreasing in the relevant range. Allowing for endogenous p, the market equilibrium for $a = 1$ is plotted in Figure 1 with the indifference curve and breakeven revenue constraint having the expected shapes.

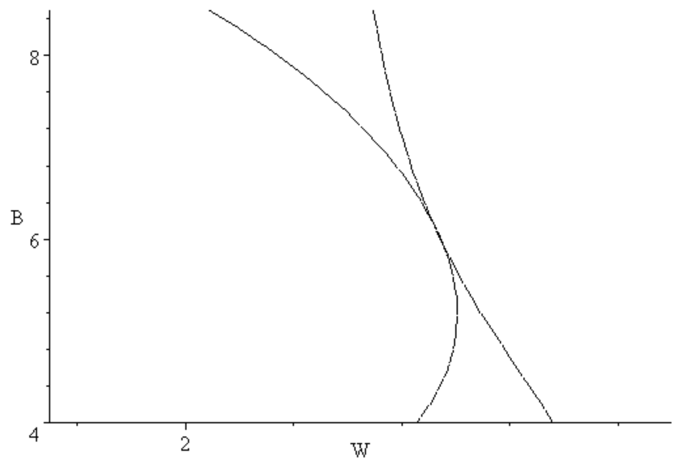

Figure 1

The optimal payments for $a = 1$ and for the higher ability level $a = 1.2$ are shown below.

	$a = 1$	$a = 1.2$
Competitive W	2.9	3.2
Optimal W	3.5	2.7
Competitive B	6.1	6.5
Optimal B	6.5	6.1

In this case the socially-optimal solution raises the return of the lower-ability individual so much that, despite their lower success probability, they are better off than the more able.

Of course Proposition 1 reports sufficient but not necessary conditions for the more able to receive strictly worse terms. Making the necessary and sufficient terms easily interpretable has proved elusive. One further result is that if $C = C(p - a_i)$ then $p/(1-p)\eta$ is certainly increasing in ability and applying the same methodology as above, it is socially optimal that B falls with ability.

A possible objection to Proposition 1 is the assumption that the whole population is engages in some activity, say driving, giving rise to the same income contingencies. A relevant alternative for the less able is not to drive at all. Then the social planner must decide how many drivers there should be. To model this, becoming a motorist is represented as a discrete choice creating utility M but at some monetary cost and exposing the motorist to income loss (and possibly utility loss) should an accident occur.

Assumption A2
Rejecting the activity which gives rise to income risk yields utility $w = U(\overline{Y}) - M$.

There is now the issue of how many policies to sell. In particular, should more policies should be issued than under *laissez faire.* Suppose that n policies are sold, with the rest of the population, $N - n$, choosing the safe activity and enjoying utility w. Given that w is independent of type, it is of course best that it is the most able types that engage in the risky activity. The planning problem is now to select B_i, W_i and n to

$$\max \sum_{i=1}^{n} (E_i + M) + (N - n)U(w) \quad s.t. \sum_{i=1}^{n} R_i = 0 \; and \; U(B_i) - U(W_i) = C'(p)$$ [9]

First, n should certainly not be smaller than under competition. Everyone choosing the risky activity (rather than taking the w option) in a free market does so on terms that enable the insurance company to breakeven. So there can be no social loss in the social planner insuring them on breakeven terms rather than excluding them. Yet it has been

[9] This formulation supposes that cross subsidies are between those engaging in the risky activity. Allowing transfers between activities yields similar results and if, as is possible, the marginal utility of income is the same in the two activities there will be no transfers between them.

demonstrated that with the same set of clients as under competition, it is best to offer terms that differ from the competitive equilibrium. Consider the most able individual rejecting the risky option in the competitive equilibrium. Were this individual offered insurance on terms making motoring at least as attractive as the w option but as close to breakeven as possible, the expected financial loss to the company would be negligible. Offered instead the distinctly more attractive contract that is one of the set that maximises aggregate welfare, the previously marginal buyer will certainly accept it and by definition, overall benefits are greater. With such contracts it must therefore be strictly advantageous for social welfare for this client to participate and the same must apply to potential clients of slightly lower ability. Consider though whether it would be worth selling to every applicant who applies on the terms that are socially optimal were they to accept. Then the marginal buyer obtains zero expected surplus, but being the highest risk of all and given overall breakeven, this client must involve an expected financial loss.[10] Hence, surplus would be greater were this individual not offered insurance.

Proposition 2 To maximise welfare under A1 and A2, more policies should be sold than under *laissez faire*. Policies should though be rationed in that there is a cut off ability level below which policies are not available even though these clients are willing to accept finitely worse contracts than offered to those only infinitesimally more able.

A natural extension is to suppose that M varies across individuals and is private information. A general treatment is messy, but for illustrative purposes suppose that M is either zero or high. The individuals with $M = 0$ never become motorists and Propositions 1 and 2 apply to those with the positive M. The economic point of these remarks is to further illustrate the difference between ability based redistribution and regulation of contracts. The strategy developed here involves redistribution to low ability motorists. Subsidising low ability non-motorists at the expense of the high ability lowers aggregate utility. So even if ability is observable, ability taxation by itself is not optimal.

3 Unverifiable Types, Hidden Action

Although ability has been assumed to be observable by the competitive firms it may not be verifiable, in which case it is not a feasible tax base. This is especially true if, as seems likely, it is easy to feign incompetence.

[10] There may be no marginal buyer for the whole population may wish to purchase when offered the socially optimal terms given that they are buyers. A version of the argument above implies that it may be better if not everyone buys. An extra high risk buyer does impose externalities on existing clients.

Consider vision. If, as in the competitive equilibrium, those able to score above a threshold qualify for better insurance terms this is implementable, but a scheme rewarding those doing badly in the test is useless.

In addition to taking this hidden-types constraint into account, the issue of implementation in a competitive insurance market is addressed. Competition is specified in standard game theoretic fashion; two or more firms make simultaneous offers of contracts then clients choose the one they prefer.

The analysis requires identification of how the slope of indifference curves and the slope of the revenue function vary with ability. Round an indifference curve

$$\frac{dB_i}{dW_i} = -\frac{1-p}{p}$$

Given the incentive contract, p increases in ability and so therefore does the slope of the indifference curve. Turn now to the slope of the iso-revenue curve

$$\frac{dB_i}{dW_i} = -\left(\frac{1-p}{p}\right)\left(\frac{1-((S-B_i)-(F-W_i))\dfrac{U'(B_i)}{\eta(U(B_i)-U(W_i)-L)}}{1+[(S-B_i)-(F-W_i)]\dfrac{pU'(W_i)}{\eta(1-p)[(U(B_i)-U(W_i)-L]}}\right)$$

Under the assumptions of Proposition 1, this slope increases in ability by less than does the indifference curve. In Figure 2 the convex functions are indifference curves, the concave are iso-revenue curves (not necessarily breakeven level) and the bold functions for higher ability types. The slope properties noted above imply that for a high ability type, the locus of tangencies between iso revenue curves and indifference curves (not shown to avoid clutter) lies strictly above that for those of low abilty. From here, for simplicity, only two ability levels are considered.

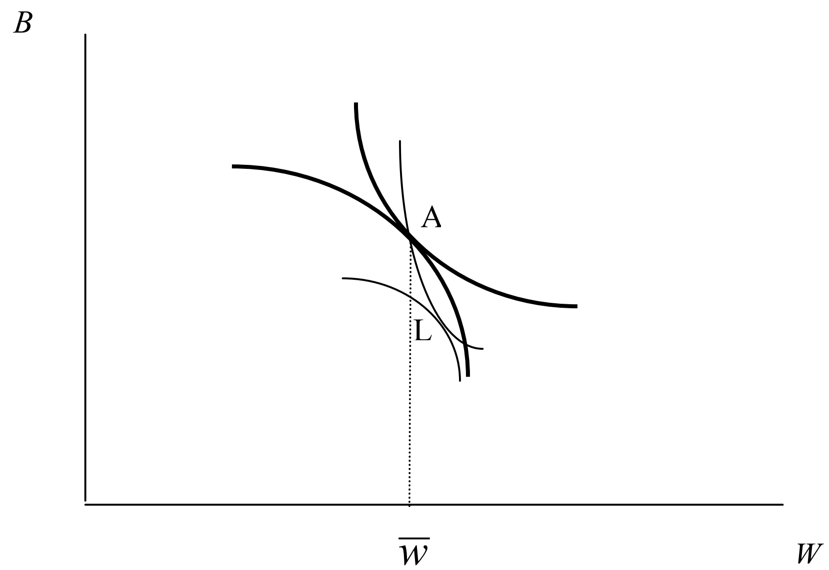

Figure 2

So far it has been assumed that type is observable, but whether or not this is the case, if firms are not allowed to contract on their information, this is equivalent to hidden types. With sufficient risk aversion a separating equilibrium emerges. Firms offer a menu of contracts that results inducing the high-ability types take on just enough risk to dissuade those of low-ability following suit. The lowest ability types are no better off than in the absence of equal opportunity legislation and the rest are worse off. [11] Think of a requirement that annuities must be available on terms independently of gender. As women live longer on average, pooling terms would be unattractive to men. Women will buy annuities and men purchase shorter duration financial instruments. This is no gain.

There is though a simple remedy; legislate a minimum payment in the fail state. This involves a maximum deductible in the insurance case, protecting some of a bankrupt debtors assets in the credit context or setting a minimum basic wage in the case of an employment contract.[12]

[11] This is shown explicitly in Doherty and Thistle (1996) and Hoy and Polborn (2000).
[12] It seems appropriate to compare this policy with the rather different conclusions of de Meza and Webb (1987). There the economy comprises a collection of risk-neutral agents differing in ability

Proposition 3 Whether or not type is hidden, under the other assumptions of Proposition 1 aggregate welfare is increased from the market level by a statutory minimum W and a requirement that all contracts must be available irrespective of ability.

Proof. Consider the configuration in the diagram where the minimum low-state payment is $\overline{w}$. High-ability types select contract A which is on a revenue function that delivering positive expected income whilst the low-ability opt for contract L on a loss-making offer curve. These two contracts are breakeven overall. The allocation is Pareto efficient (as a result of the tangency properties). By Proposition 1, to maximise social welfare the low-ability type should have higher state-contingent payments than the more able. As the configuration in the diagram involves a subsidy to the less able, but stops short of the optimal redistribution it must represent a welfare improvement relative to the market outcome.

If the allocation is an equilibrium for the market game there must be no profitable deviation. A company would wish to find an offer that only appeals to the high-ability types, but all such deals lie to the left of $\overline{w}$ so are inadmissible. Contracts to the right of $\overline{w}$ either separate by attracting the low-ability to a contract involving even greater losses, or attract both types to a contract involving greater losses. ‖

Regulation of contractual form may not be easy to enforce. Profit maximisers may find ways round the regulations. This is particularly true of employment contracts where many aspects are covered, some implicitly. An alternative is to put a lump-sum tax on the private sector and use the proceeds to fund public provision. The public firm offers contract L and the private sector A. The highest ability types still find it best to patronise the private sector, but due to the tax face worse terms than under *laissez faire.* The government contract attracts the less able, is lower powered than the private sector offer, and returns a financial loss.

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though effort is not a choice variable. Under hidden types there is a pooling equilibrium in which the implication is that the information-impacted sector expands relative to the full-information level. As there is universal risk neutrality, a utilitarian would not care about distribution. Consequently if types were initially observable imposing equal opportunity legislation would certainly lower welfare. As Proposition 3 is for Assumptions A1 there is no alternative activity, the possibility of misallocation is closed off. Now the asymmetric-information solution (augmented by a prohibition on contractual form) is fully efficient and better on distributional grounds than the full-information solution. With an alternative safe activity introduced (Assumption A2), extending equal opportunity policy to all ability levels could lead even a utilitarian to prefer the laissez-faire solution. Along the lines of Proposition 2, there will though be an ability level such that if equal opportunity policy only applies to those above this threshold the solution improves on laissez faire. Moreover, this threshold involves more agents in the risky sector than in the free-market solution.

This solution is workable even if, as typically true in labour markets, ability is observable but not verifiable.

Proposition 4 Government provision should be designed to attract the less able, offering lower-powered incentives but on terms that the private sector could never match.

Conclusion

This paper has shown that the market distribution of incentives is not generally welfare maximising. Competition rewards the more able with superior contracts, but social efficiency often requires the opposite. Granted that moral hazard leads to agents being incompletely insured, were everyone to have the same incentive contract the expected marginal utility of increasing income in all states is greater for the less able since they are more likely to have the low income associated with the fail state. This is the underlying reason the less able should have better contracts so much so as sometimes to have greater expected utility. Such positive discrimination is not feasible if it is possible to hide high ability, or if ability is observable but not verifiable. When better deals cannot directly be given to the less able any offered contract should be available irrespective of ability with regulation ensuring a minimum of protection in unfavourable states. So prohibiting "discrimination" on grounds of gender, race or disability may be efficient even if competitive market differentials are prejudice free. One implication is a case against allowing banks to adopt credit scoring techniques.

Preventing firms from offering terms that subvert the regulations will be difficult though. Then the analysis provides the basis of a case for state provision of insurance, loans and employment on terms that appeal to those the market treats worse. One feature of optimal public provision is that it should involve weaker performance incentives than offered by profit maximising firms.

An analytically trivial but practically important extension in the labour market case is if disability entails a direct cost on the employer, say in modifying machinery. Write this cost $z(a_i), z'(a_i) < 0$ (effects are identical if the state contingent gross payoffs are reduced by disability to $S - z(a_i), F - z(a_i)$). It is immediate that (5) and (6) still apply and so therefore does Proposition 1. Lower state-contingent productivity or the cost of catering to a disability does not upset the conclusion that the disabled should receive unambiguously superior contracts. Moreover, let the safe alternative to employment be unemployment. Proposition 2 then applies. The ability threshold below which agents are unemployed should be lower than the free market level even with a positive z . Prohibiting employers from making offers on terms that depend on the level of disability and setting a minimum ability threshold above which offers must be made is welfare enhancing.

The most compelling objection to policies that require employers to be blind to "ability" is that competence is often the result of prior investment rather than innate talent. If ability is endogenous there will be moral hazard effects if those not investing can still secure attractive terms, say in government employment. There are two responses to this. First, the moral hazard is inescapable but redistributing through constraining the form of incentive contracts is superior to the use of income taxes. Income taxes distort *ex post* incentives whereas equal opportunity policy preserve them. Second, it may sometimes be possible to draw a distinction between productivity effects that an individual can control and those that they cannot. Only the former involve moral hazard, so discrimination involving the latter can often be outlawed with no efficiency cost. Indeed, the analysis here suggests that positive discrimination may well be justified. For example, if race is correlated with barriers to human capital acquisition then positive discrimination on this characteristic is potentially beneficial. It is commonly held to be unjust to penalise people for what they cannot help. Such a view will frequently coincide with efficiency considerations.

Of course public policy in these areas is ultimately fuelled by factors beyond those dreamt of in utilitarian philosophy, most notably by conceptions of procedural justice. Even so, it is worth knowing that there is no real conflict with distributional efficiency.

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